OFFICIAL CONFERENCE PROCEEDINGS

The 12th European Conference on Education (ECE2024)

The 2024 IAFOR Summer Conference Series in London

July 11 - July 15, 2024 | London, United Kingdom, and Online

Organised by The International Academic Forum (IAFOR), held in partnership with Birkbeck, University of London, the IAFOR Research Centre at the Osaka School of International Public Policy (OSIPP) at Osaka University, and in affiliation with University College London (UCL).

ISSN: 2188-1162

"To Open Minds, To Educate Intelligence, To Inform Decisions"

The International Academic Forum provides new perspectives to the thought-leaders and decision-makers of today and tomorrow by offering constructive environments for dialogue and interchange at the intersections of nation, culture, and discipline. Headquartered in Nagoya, Japan, and registered as a Non-Profit Organization (一般社団法人) , IAFOR is an independent think tank committed to the deeper understanding of contemporary geo-political transformation, particularly in the Asia Pacific Region.

INTERNATIONAL

INTERCULTURAL

INTERDISCIPLINARY

iafor

International Academic Board

Dr Joseph Haldane, IAFOR and Osaka University, Japan, & University College London, United Kingdom
Professor Jun Arima, President, IAFOR & University of Tokyo, Japan
Professor Anne Boddington, Executive Vice-President and Provost, IAFOR & Middlesex University, United Kingdom
Professor Barbara Lockee, Virginia Tech, United States
Professor Donald E. Hall, Binghamton University, United States
Dr James W. McNally, University of Michigan, United States & NACDA Program on Aging
Professor Grant Black, Chuo University, Japan
Professor Dexter Da Silva, Keisen University, Japan
Professor Baden Offord, Centre for Human Rights Education, Curtin University, Australia & Cultural Studies Association of Australasia
Professor Frank S. Ravitch, Michigan State University College of Law, United States
Professor William Baber, Kyoto University, Japan

ECE & ECAH & ECLL 2024 Conference Programme Committee

Professor Anne Boddington, Executive Vice-President and Provost, IAFOR & Middlesex University, United Kingdom
Dr Evangelia Chrysikou, Bartlett School of Sustainable Construction, University College London, United Kingdom
Dr Mehmet Demir, University of Birmingham, United Kingdom
Professor Jean-Marc Dewaele, Birkbeck, University of London, United Kingdom
Dr Joseph Haldane, IAFOR and Osaka University, Japan, & University College London, United Kingdom (Conference Co-chair)
Professor Donald E. Hall, Binghamton University, United States
Dr Jacqueline Lottin, Higher Colleges of Technology, United Arab Emirates
Dr David Mallows, University College London Institute of Education, United Kingdom
Professor Andrea Révész, University College London Institute of Education, United Kingdom
Dr Ian Scott, University College London, United Kingdom
Dr Marcelo Staricoff, University of Sussex, United Kingdom

EGen 2024 Conference Programme Committee

Jane Biddulph, University College London, United Kingdom
Dimitrios Buhalis, Bournemouth University Business School, United Kingdom
Dorina Cadar, Brighton & Sussex Medical School, United Kingdom
Stefano Capolongo, Polytechnic University of Milan, Italy
Carina Dantes, SHINE 2Europe, Portugal
Eddy Davelaar, Birkbeck, University of London, United Kingdom
Isaiah Durosaiye, School of Architecture, University of Sheffield, United Kingdom
Joseph Falzon, Centre for Research & Innovation, Malta
Ava Fatah, Bartlett School of Architecture, University College London, United Kingdom
Dr Joseph Haldane, IAFOR and Osaka University, Japan, & University College London, United Kingdom (Conference Co-chair)
Paul Higgs, Faculty of Brain Sciences, University College London, United Kingdom
Fernando Loizides, School of Computer Science & Informatics, Cardiff University, United Kingdom
Elena Petelos, Faculty of Medicine, University of Crete, Greece & Faculty of Health, Medicine & Life Sciences, Maastricht University, Netherlands
Eleftheria Savvopoulou, SynThesis Architects, Greece
Anastasios Tellios, School of Architecture, Aristotle University of Thessaloniki, Greece
Greg Williams, University of Manchester, United Kingdom

The European Conference on Education 2024

Official Conference Proceedings

ISSN: 2188-1162

© The International Academic Forum 2024
The International Academic Forum (IAFOR)
Sakae 1-16-26-201
Naka Ward, Nagoya, Aichi
Japan 460-0008
www.iafor.org

Table of Contents

Body Image Perception: Predictor of Risky Sexual Behaviour Among Female University Undergraduates in Southwestern Nigeria
Precious Akintoye
Sehinde Oluwatosin pp. 1 - 9

Microteaching and Microlearning Strategy to Improve the Quality of Education Through E-learning Platforms
Hira Kulsum Natamkar pp. 11 - 19

Gender Disparities of Teaching Reading in DepEd Northern Mindanao, Philippines
Felix B. Gaviola, Jr.
Loreta L. Fajardo
Lindy Lou Gaviola pp. 21 - 36

A Mixed Method Study of Middle School Students' Perception of the Impact of Socio-Economic Status on Academic Intrinsic Motivation
Pallavi Aggarwal
Taylor Mae-L. Lawson Smith pp. 37 - 56

The Study of the Influence of Comparative Literary and Cultural Studies on English Language Acquisition
Gwanza Basilashvili pp. 57 - 74

Learning Environment on the Move: First Design Concepts to Embrace Embodied Learning in Secondary Education
Lindsay Everaert
Wim Tops
Anouk Agten
Ruth Stevens pp. 75 - 90

Transformation of the English Courses in the Turkish Educational System From the Ottoman Empire to the Republic of Turkey
Sinem Maden pp. 91 - 103

Empowering Young Minds: A Comprehensive AI Education Framework for 4-5-Year-Olds
Konstantina Tastsi
Panagiotis Karamalis pp. 105 - 117

Impact of Music Education on the Developmental Skills of Students With Autism Spectrum Disorder
Tania Eljaam pp. 119 - 135

Using Artificial Intelligence to Teach and Learn the Formal Languages and Automata Course at the University of Nariño
Jesus Insuasti
Felipe Roa
Carlos Mario Zapata-Jaramillo pp. 137 - 150

The Use of Interactive Videos in Undergraduate Courses: Lecturers' Acceptance Level
Chin Sook Fui
Tina Lim Swee Kim pp. 151 - 164

Representing Curriculum Design Practices in ESSENTIA CURRICULUM: A Case Study at the University of Nariño, Colombia
Jesus Insuasti
Carlos Mario Zapata-Jaramillo pp. 165 - 180

Transformative Pathways: Rethinking Gender-Inclusive Educational Structures for Innovation and Adaptability in Contemporary Learning Environments
Adelfa C. Silor
Faith Stephanny C. Silor
Miguelito B. Emfimo pp. 181 - 188

The Role of the School Manager in the Implementation of Active Methodologies in a Vocational Education Institution
Fabia Maria Silva Lins dos Santos
Marcos Canto Machado pp. 189 - 202

A Systematic Review of Teachers' Beliefs and Practices of Overt Translanguaging in English-Medium-Instruction Classrooms
You Wu
Juliana Othman pp. 203 - 216

Applications of Human-Centered Artificial Intelligence and Open Educational Resources to Improve E-learning: Case Study of "Online Journalism" Lesson
Ali Asghar Kia
Kaveh Bazargan pp. 217 - 226

Teachers' Characteristics, School Factors As Correlates of Students Achievement in Basic Science in Secondary School in Oyo State
Ezekiel Olusegun Babatunde pp. 227 - 237

Unlocking Ice Hockey Prowess: Pose-Centric Analysis With MMaction2, Yolov10, and BoT-Sort for Sports Education
Boyang Zhang pp. 239 - 246

The Strategic Curriculum Redesign of Ingeniería En Ciencia De Materiales (ICMA) at Universidad De Guadalajara
Mariela Bravo-Sanchez
Erick Omar Cisneros-Lopez
Lorenzo Gildo-Ortiz
Oscar Blanco-Alonso
Sabrina Lizbeth Vega-Maldonado
Marco Antonio Perez-Cisneros pp. 247 - 254

Identifying How Widening Access Students Build Their Sense of Belonging
John Deane
Besty Jose
Stephanie Ng
Mark Gallagher-Read pp. 255 - 264

Empowering Success: Strategies for Widening Participation Students Facing Personal Commitment Challenges
Mark Gallagher-Read
Besty Jose
Stephanie Ng
John Deane pp. 265 - 274

Digital Diagnostics and Individualized Support for Reading at the Primary Level With Formative Assessment
Judith Hanke pp. 275 - 288

A Mirror Image of Social Justice: A Case Study of Two Midwestern (USA) Somali Teachers Share Their Perceptions in DEI
Hsuehi Lo pp. 289 - 298

Bridging the Reading Gap: Investigating Pedagogical Approaches in Language Classrooms
Liao Feng Jiao
Kuldeep Kaur pp. 299 - 311

Impact of Topic and Video-Based Learning in Programming on Students' Performance: A Pilot Study in Undergraduate Engineering Education
Burak Bilgi
Özlem Albayrak
Mert Çopur pp. 313 - 324

A Conceptualized Framework of University Students' Perceptions of ChatGPT as a Tool for Learning and Research
Sibusisiwe Dube
Belinda Ndlovu
Sinokubekezela Princess Dube pp. 325 - 339

To Investigate Students' Learning Experience by Re-designing a University Science Laboratory Subject Using Alternative Assessment and Digital Technology
Kim Hung Lam
Dawn Lo
Chun Sang Chan pp. 341 - 350

Breaking Boundaries: Exploring Engineering Faculty Perceptions of Transdisciplinary STEM Education
Hebah Alamr pp. 351 - 358

Teaching in the Era of AI: Teachers' Perspectives of Utilizing ChatGPT in Education
Nato Pachuashvili pp. 359 - 371

Attitudinal Predispositions of First Year Preservice Teachers to Technology Integration in Pedagogy
Thuthukile Jita
Alice Dhliwayo pp. 373 - 385

Challenges Regarding the Accessibility of Library Services in Heritage Conservation Using the Matrix of Users' Consumption Behaviors
Ioana Cornelia Cristina Crihană pp. 387 - 395

Autonomy-Guided Professional Development in Higher Education
Nilüfer Ülker
Pınar Kır
Esra Meşe pp. 397 - 406

Visual Memory Deficits in Children With ADHD
Chalmpe Maria
Agapitou Paraskevi
Bonoti Fotini
Vlachos Filippos pp. 407 - 415

A Comparative Study on the Implementation of Merdeka Belajar (Freedom of Learning) Curriculum at Secondary Level: Flexibilities, Complexities, and Implications
Renda Lestari
Mutia Rahmadani pp. 417 - 426

Analysis of Factors Influencing Dropout Among Adult Learners in Korea: A Study Utilizing the Nontraditional Undergraduate Student Attrition Model
Inseo Lee pp. 427 - 438

Enhancing Traditional Textbooks Using the Task-Based Approach: The Case of Teaching Turkish to Greek L1 in Cyprus
Katerina Antoniou Karantoki pp. 439 - 455

A Review of Shortcomings That Impact Primary and Secondary Education in South Africa
Mogoshadi Lynah Msiza pp. 457 - 466

Nurturing Politeness and Polite Expressions in English Language Teaching: A Study of Teacher Trainers and Preservice Teachers
Nicholas Isaac Mukwana
Ssebbunga Masembe Connie pp. 467 - 479

Assessing Metacognitive Skills in Mathematical Problem Solving: A Comparative Study of a Task-Specific Questionnaire and Think Aloud Protocol
Uthpala Athukorala
Dileepa Fernando
Chanakya Wijeratne pp. 481 - 498

Investigating the Relationship Between Gender Perception and Women's Representation in Higher Education Management and Leadership Positions
Mercy Olajumoke Kutu
Thoko Mayekiso pp. 499 - 511

Navigating Academic Success: The Impact of CGPA Goal Setting on Student Performance
Tee Hean Tan
Jaime Kwai Foon Yap pp. 513 - 520

Failed Blended Instruction as Remedial Assistance for Underachieving English Language Learners
Nazli Ağgün Çelik pp. 521 - 533

Educational Inequities and Achievement Gap: Which Way Forward
Cordelia Azumi Yates pp. 535 - 552

Gamified Assessment in Higher Education: A Conceptual Framework for Students' Motivation and Engagement
Ying Wu
Malcolm Stewart pp. 553 - 566

Utilization of Information and Communication Technologies in the Administration of Public Universities in South-East Nigeria
Udo Herbert
Nnennaya Kalu-Uche pp. 567 - 574

Cultivating Creative Musicians: Teaching Strategies, Sources, and Challenges of Creativity in Chinese Higher Music Education
Tingyu Yan
Hong Yu
Jiajun Tang pp. 575 - 587

The Impact and Challenges of Artificial Intelligence Technologies on Universities in Southwestern Nigeria
Aderinsola E. Kayode
Adedoyin T. Odumabo pp. 589 - 599

Teacher Self-Efficacy and Emergency Online Teaching and Learning During COVID-19
Tim Dolighan
Michael Owen pp. 601 - 616

Navigating STEM: Challenges Faced by Nigerian Female Secondary School Students
Chika Judith Abolle-Okoyeagu
Ojotule Onoja
Chioma Onoshakpor pp. 617 - 627

Personality and Level of Mental Health on Career Adaptability Among University Students
Mariani Omar
Nurul Nadirah Shaharuddin
Masitah Ab Jalil pp. 629 - 640

Teaching 21st-Century Skills in the EFL Classroom From Saudi EFL Teachers' Perspectives
Khalid Abdullah Alshihri pp. 641 - 653

The Development of Higher Education in Egypt
M. A. Zaki Ewiss
Seddik Afifi pp. 655 - 672

The Financing of Higher Education in Egypt: Issues, Politics, and Trends
M. A. Zaki Ewiss
Seddik Afifi pp. 673 - 686

The Relationship Between the Online Learning Difficulties and Self-Efficacy Among Middle-Aged and Older Adults in Taiwan During the COVID-19 Pandemic
Jing-Yi Lu pp. 687 - 697

From Text to Context: Analyzing Idiomatic Expressions in Psychological Thrillers Through Corpus-Based Study Among Law Students in Uzbekistan Higher Education
Sojida Samandarova pp. 699 - 704

A Comparative Study of Persian Synthesized Intonation Based on Autosegmental-Metrical and PENTA Models
Fatemeh Lotfi
Vahid Sadeghi pp. 705 - 718

A Comparative Evaluation of MOOCs and Classroom Learning in Engineering and Science in India: A MOOC Policy Assessment
Anurag Mehra
Pramath Kant pp. 719 - 738

A Multi-factorial Approach Towards Tackling Plagiarism: A Comparison Between Attitudes and Perceptions Towards Plagiarism at Undergraduate and Postgraduate Taught Level
Carolyn Loveridge
Kimberly Davis
Nathalie Tasler pp. 739 - 771

Assessment of Students' Experiences and Viewpoints in Using Chatbots for Education Practice: A University Case of a Developing Country
Sichelesile Moyo
Phillip Nyoni
Belinda Ndlovu
Sibusisiwe Dube
Catherine Sibanda
Mary Dzinomwa pp. 773 - 783

Counselling Strategies for Improving Self-Esteem Among Secondary School Students in Enugu State, Nigeria
Chinonye Egbo pp. 785 - 796

Entrepreneurship and Creativity in Education: Why Current European Educational Reforms Are Aiming in the Opposite Direction?
Barbara Stamenković Tadić pp. 797 - 804

An Investigative Review: How Well Does the Higher Engineering Education Curriculum Align With the UK's Economic and National Goals?
Mauryn C. Nweke pp. 805 - 816

Enriching and Enhancing Students' Learning Experiences in an Introductory Mechanical Engineering Course Through Demo Kits
Hong Tao pp. 817 - 823

Factors Influencing the Implementation of Formative Assessment as Perceived by Music Teachers: A Mixed Method Research in Macao
Qi Zixiang
Serra Sofia
Tchiang Van Man pp. 825 - 842

Developing an AI-Powered Robotic Assistant for Interactive Video-Based Learning: Engineering Innovations and System Design
Chen Giladi pp. 843 - 852

Exploring Imaginary Worlds: Leveraging Immersive Virtual Reality for Designing & Constructing 3D Environments
Albert Lehrman pp. 853 - 865

Simulation of Situational Tasks as a Method of Developing Safe Behavior Skills
Diana Amirova
Nazigul Muratbekova
Assem Zhomartova
Zhanna Khadessova
Zhaxybek Suleimenkulov pp. 867 - 883

Emotional Colours: Relationship Between Light Wavelengths and Emotional Activation for Enhancing Memory Processes
Elèna Cipollone pp. 885 - 898

Embedding Accredited Qualification and Work-Related Training Into Postgraduate Courses
Susan L. Lindsay
Lesley Graham
Carolyn J. Loveridge
Ana Da Silva Costa pp. 899 - 903

Development of Digital Learning Materials "The Beauty of My Country's Diversity" to Improve Nationalism Attitudes and Learning Outcomes of Elementary School Students
Elvi Mailani
Nurhayati
Fathurrohman
Sekar Purbarini Kawuryan pp. 905 - 919

Implementation and Future Trends of the Japanese Language Teaching Programme for the Undergraduate Programme at Mongolian National University of Education
Ganchimeg Ayurzana pp. 921 - 930

The Unseen Toll of Academic Success: Shadow Education and Student Well-being
Deeksha Sharma
Satvinderpal Kaur
Guru Trisha Singh pp. 931 - 940

Inclusive Education in the Digital Era: Special Education Teachers' Perspectives on Technology Integration and Inclusive Practices
Elif Gülbay
Ylenia Falzone
Savannah Olivia Mercer pp. 941 - 955

Intercultural Competence in a Homogeneous and Monocultural Foreign Language Learning Group: Chances and Limits (A Case Study)
Alanoud Hamouri pp. 957 - 972

Interactive Digital Design Skill Set: Crafting Executive Education Curriculum for the 21st Century
Bruno Nobre
Emília Duarte pp. 973 - 990

Exploring Differentiation of Chinese Public English Education in Middle School
Guiping Yang pp. 991 - 1002

Beyond the Game: Enhancing Emotional and Physical Childhood Resilience With FlexiŠerming
Stephan Drescher
Blanka Drescher
Leonard Bernau pp. 1003 - 1010

Making a Real Difference in Physical Education: The Contribution of Reflection in Initial Conceptions of the Teaching Profession
Ana Rita Águeda
Paula Silva
Paula Queirós pp. 1011 - 1023

Shaping Epistemological Profiles: School Placement Communities' Impact on Preservice Teachers' Personal Discovery and Knowledge Evolution
Margarida Barros
Isabel Mesquita
Paula Queirós pp. 1025 - 1033

Does Financial Support Matter? Scholarships and Study Abroad Preferences for First Year University Students in Japan
Daniel James pp. 1035 - 1044

An Education Platform for Observing the Group Swimming of Steelhead, a Migratory Salmonid Species Vulnerable to Climate Change
Claire H. Shin pp. 1045 - 1057

Students' Visual Attention Distribution on Multilingual Educational Slides – An Eye-Tracking Study
Laksmira K. Adhani
Gerard B. Remijn pp. 1059 - 1065

The Societal Impact of Universities: A Qualitative Evaluation of an Education Innovation
Lorenzo Duchi
Canan Mesutoglu pp. 1067 - 1080

A Monograph for the Teaching of Geometry and Measurement in Initial Teacher Education in South Africa: Foundation and Intermediate Phases
Rajendran Govender
Stanley A Adendorff pp. 1081 - 1104

Syllabus Review as a Leitmotif to Achieving Educational Objectives: The Case of the Botswana Junior Certificate of Education Syllabus of French
Rodah Sechele-Nthapelelang
Obene Bojosi
Boingotlo Winnie Kaome pp. 1105 - 1121

Body Image Perception: Predictor of Risky Sexual Behaviour Among Female University Undergraduates in Southwestern Nigeria

Precious Akintoye, Obafemi Awolowo University, Nigeria
Sehinde Oluwatosin, Obafemi Awolowo University, Nigeria

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Body image perception (BIP) is the interpretation that a person has of his/her physical self, ranging from the shape and colour of hair, head, eyes, nose, lips, teeth, ear, breast, waist, hip, leg, skin and reproductive system functioning and the thoughts and feelings that result from that perception. Current research has focused mostly on age, sex, educational background and socioeconomic factors as contributing to risky sexual behaviour, thereby little is known about the influence of perception of body image on engagement in risky sexual behaviour. Thus, the purpose of this study was to examine female university undergraduates' perception of their body image and to investigate the predictive contribution of body image perception on female university undergraduates' engagement in risky sexual behaviour. Female university undergraduates over 1500 in Southwestern Nigeria constitute the sample size of this analytical study, carried out in 2019. The body image perception of individuals was measured by the Body Image Scale and the risky sexual behaviour of selected females was measured using the Youth Risk Behaviour Scale. The mean age of the participants was 23.4 ±, 57.3% were in their sophomore year, and 74.5% practised Christianity. 67.7% of them demonstrated positive body image perception while 32.3% of sampled female university undergraduates demonstrated negative body image perception. Body image perception was found to contribute to risky sexual behaviour. The findings suggest that closer attention should be given to exhibiting positive body image perception which is a strong predictor of risky sexual behaviour.

Keywords: Body Image, Female Undergraduates, Body Image Perception, Sexual Behaviour

iafor
The International Academic Forum
www.iafor.org

Introduction

Body image portrays the structure, colour and shape of an individual's body component or anatomy. These structures and shapes differ among individuals and are commonly referred to as tall, short, thin and fat/ plump. It can be further categorised into tall and plump, short and plump, tall and thin, and short and thin; the complexion is either dark, brown (chocolate) or light. Body image perception is the interpretation that a person has of their physical self, ranging from the shape and colour of hair, head, eyes, nose, lips, teeth, ear, breast, waist, hip, leg, skin and reproductive system functioning and the thoughts and feelings that result from that perception. The perception one has of its' body may be influenced by a variety of factors which include media, peer pressure, familiar influences, and cultural expectations. This perception may also be due to abnormal body size, physiological variations or abnormalities in the body. For instance, alteration in the secondary sexual characteristics of some females such as a grown-up female without visible breasts, no ova/egg monthly production and release, extreme complexion, and baritone voice, among others, can result in having a positive or negative body image perception.

Thus, positive body image perception is when individuals feel satisfied and accept most aspects of their body structures. A female who has a positive body image perception is likely to be proud of her body despite the projections from social media, environment, culture, religion and family circle (Abamara & Agu, 2014). Such a female appreciates and celebrates the natural shape of her body, and understands that her physical appearance does not determine her value and character. In addition, she is likely to accept and be content with her body's uniqueness. By being confident and comfortable about her body, she is unlikely to be immensely concerned in spending ample time thinking about people's commendation of her look, affection from men, or indulging in risky sexual practices.

On the other hand, negative body image perception is when individuals feel their body structures do not meet the standard of other people's opinions. A female who has a negative perception of her physical appearance will experience dissatisfaction with her body image (Kotanski, Fisher & Gullone; Ugoji, 2014), which may contribute to either accepting themselves or acting in ways to be accepted by society and may result to engaging in risky sexual behaviour.

The structure, shape and colour of the body is a major attention of the bearer from inception which becomes more intense as age increases from childhood to adulthood, with the aged ones not excluded, reflecting in the common saying in Yoruba language that, "*kò sí arúgbó ní Ghana"* (there is no aged in Ghana), purposely to gain attention and commendation either from same or opposite sex. Ironically, children crave to have the adult body physique while adults desire to look younger in size and appearance in a bid to look "catchy". This tussle of attainment of a particular body shape, especially among females, births several behaviours to feel satisfied, accepted or fulfilled.

Body image has been an issue with most individuals especially females, one of which is tagged "body shaming" presently in Nigeria where people are picked on and made jest of about their physical looks by the same or opposite sex. They joke about overweight people in Southwestern Nigeria as orobo, fatty bumbum, and iya panti. They also do the same to skinny people (lepa-*pressed-thin*, tirin gbeku- *thin dead-dry*), dark people (dudu-*black*, ojuju-*scary shadow*, blacky), short people (kukuru sambe, rara- *dwarf*), tall people (opa- *rod*, igala-*antelope*, iroko tree) and even light people (afin- *albino*, oyinbo pepe-*white*), and so on, in

which the recipient of such appellations may get used to it, die in silence of condemnation or try to dislodge their appellate deformities with other act in other to be accepted or feel happy.

Body image is a phenomenon in traditional Nigerian African culture, and language is the poetic way to locate body image and beauty perceptions within traditional Nigerian African mentality. Female beauty in particular is inscribed in traditional cultural codes about body parts, complexion, overall physiology and aesthetic appearance. This inscription of body and beauty in language manifests in names, nicknames, tags, sayings, riddles and extended aesthetic forms such as poetry, and nuptial songs; in sundry oral expressions and cultural practices.

Amongst the Yoruba, largely located in Southwestern Nigeria but with socio-political and cultural influence in many other parts of the country, body parts such as *ẹyinjú* (eyeball(s)), *eyín* (tooth/teeth), *ọmú* (breast(s)) and *ìdí* (buttock(s)) occur frequently as a central focus in traditional description of a female's beauty. Specific aesthetic values are conjoined to the various parts using adjectival modification. For example, from *ẹyinjú* (eyeball(s)), we have *ẹléyinjú-ẹgé* ("one with delicate/graceful eyeballs"). The body parts are adorned, in language, through figures of speech within the names. The complexion and overall appearance are also rhetorised in the language through diverse names and expressions (Oloruntoba, 2017).

Moreover, some females who might be considered physically beautiful may poise themselves as a sexual tool to explore their beautiful endowment and sexually exploit others too. On the other hand, some so-called unattractive ones, in a bid to be more appreciated and accepted, may succumb to any sexual request, perhaps against their wish, resulting in risky sexual behaviour. The degree to which body image perception is associated with risky sexual behaviour has not been well researched in Southwestern Nigeria but has been theorised as playing a role in risky sexual behaviour according to the problem behaviour theory (Ezenna, Stephen & Mark, 2017). Thus, the perception of females about their body structure is an important consideration when looking at the impact of body image perception on risky sexual behaviour.

Undergraduates can be considered to be free from many restricting rules concerning their conduct and behaviours which could provide greater opportunity for engaging in risky sexual behaviour despite the awareness of some of its consequences.

Risky sexual behaviour is considered to be behaviour which increases the chance of contracting or transmitting diseases or increases the chance of unwanted pregnancies this includes; unprotected sex, multiple sex partners, having sex with someone who injects or has ever injected drugs, engaging in sex on a commercial basis, and early sexual activity especially before age 18. These risky practices may result in increased teen pregnancy and sexually transmitted infection (STI) acquisition, inclusive of HIV/AIDS (WHO, 2006).

The study by Oluwatosin and Adediwura (2010) showed a high prevalence (60.9%) of risky sexual behaviour among undergraduate students in Southwestern Nigeria. Consequently, Oluwatosin and Adediwura reported a study conducted by Abimbola (2007) which showed that out of 303 adolescents and youths that attended STD clinic in Ile-Ife, 217 (72%) were students and 85% of the studied population practised risky sexual behaviour. This demands continuous investigation of the probable causal factors that contribute to a subsequent increase in risky sexual behaviour among undergraduates.

Statement of the Problem

Risky sexual behaviour is a concern in our society due to progressively increased engagement in risky sexual practices among undergraduates in the past decades (Ahonsi, 2013) linked with an upsurge in the prevalence of HIV/AIDS and other sexually transmitted diseases among adolescents where females are more infected (Ifeanyi, 2021). Risky sexual behaviour among university undergraduates may be linked to the rise in undergraduates experiencing high levels of sexual health-related problems including unintended pregnancy, reproductive tract infection, for instance, sexually transmitted diseases, human immunodeficiency virus, etc. It may be expected that the aftermath of engaging in risky sexual behaviour such as depression, anxiety and substance abuse-related disorders may even destroy more lives than complications arising from AIDS, heart diseases, wars and accidents. Furthermore, many factors like age, sex, academic level of study and poor parenting styles among others have contributed to students' engagement in risky sexual behaviour according to Oluwatosin and Adediwura (2010), but little information has been provided as to how perceived body image contributes to risky sexual behaviour among female undergraduates in Southwestern Nigeria. Therefore, it raises the question, how prevalent are risky sexual behaviours among female undergraduates and what is the predictive contribution of body image perception on risky sexual behaviour of female undergraduates in Southwestern Nigeria?

Objectives of the Study

The main purpose of this study examined how body image perception contributed to female university undergraduates' engagement in risky sexual behaviour in Southwestern, Nigeria. However, the specific objectives were to:

(a) identify prevalence of risky sexual behaviour among female university undergraduates in Southwestern Nigeria;
(b) investigate female university undergraduates' perception of their body image in the study area;
(c) determine predictive contribution of body image perception on female university undergraduates' risky sexual behaviour.

Research Questions

The following questions were answered in this study:

i. How prevalent is risky sexual behaviour among female university undergraduates?
ii. What is the level of perception of university undergraduate females about their body image in Southwestern, Nigeria?

Research Hypotheses

(i) There is no significant predictive contribution of body image perception on female university undergraduates' risky sexual behaviour.

Methodology

The study adopted survey research design. The study made use of quantitative approach which was descriptive survey.

The population for this study comprised 156,935 female university undergraduates in Southwestern Nigeria (Nigeria University System Statistical Digest, 2017). Southwestern Nigeria is one of the six geo-political zones in Nigeria. The zone is made up of six states which are Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States. Six federal universities, eight state universities and twenty-seven private universities were in Southwestern Nigeria at the time this study was carried out.

The sample for the study comprised 1,527 female undergraduates and was selected using the multistage sampling technique**.** The sample size was considered appropriate and adequate for the study given the sample size formula developed by Barlett., Kotrlik, Haggins (2001) which specified a minimum of 1,527 at 95% level of confidence relative to the population of female university undergraduates which is 156,935. From the six states in Southwestern Nigeria, three states were selected using random sampling technique. Three universities were purposively selected from each of the selected states based on the type of university (Federal, State and Private universities) making a total of nine universities. Furthermore, two faculties were selected from each of the universities using simple random sampling technique, giving a total of 18 faculties. Finally, 85 female undergraduates were selected from each faculty in the university using convenience sampling technique.

Research Instruments

In carrying out this study, one adapted research instrument namely; Female Undergraduates' Body Image Perception on Risky Sexual Behaviour (FUBIPRSB) was used to collect data. The instrument is a combination of different questionnaires packed together as one and was used to collect data.

Techniques for Data Analysis

Data collected were analysed using appropriate descriptive and inferential statistics. The demographic variables were analysed using descriptive statistics such as frequency, and percentage while the contribution of the dependent variable (risky sexual behaviour) on the independent variable (body image perception) was analysed using linear regression analysis. The reliability coefficient for each of the sections was greater than the critical value at 0.05 level of significance (0.639, 0.790, 0.792) and so is acceptable.

Results

Research Questions

Research Question 1: How prevalent is risky sexual behaviour among female university undergraduates?

To measure the most prevalent risky sexual behaviour, the resulting scores of respondents to the risky sexual behaviour section were added up and subjected to descriptive statistics through the use of frequency counts and percentages. The results are presented in Tables 1 and 2.

Table 1: Prevalence of Risky Sexual Behaviour Among Female University Undergraduates

S/N	Risky Sexual Behaviour Inventory	Percentile	Responses
		Yes	No
1.	Sexual intercourse without using condom	188 (12.8%)	1306 (87.2%)
2.	Having more than one sexual partner	203 (13. 8%)	1291 (86.2%)
3.	Use of drugs to enhance sexual activity	156 (10.6%)	1338 (83.1%)
4.	Early sexual debut	333 (22.6%)	1161 (77.4%)
5.	Sexual partner using condom during engaging in sexual activity	435 (29.5%)	1059 (63.4%)
6.	Compulsion to engage in any form of sexual activity	417 (28.3%)	1077 (71.7%)
7.	Sexual partner use of drugs for enhancing sexual activity	179 (12.2%)	1315 (87.8%)
8.	Mouth to genital (private part) sexual activity without using protective/condom	556 (37.7%)	938 (62.3%)
9.	Sexual partner with multiple sexual partners	147 (10.0%)	1347 (90.0%)
10.	Engagement in sexual activity in exchange for money	87 (5.9%)	1407 (94.1%)

Table 1 shows the general statistical analysis of the most prevalent risky sexual behaviour female undergraduates engage in. 37.7% of the respondents attested to having engaged in mouth-to-genital sexual activity without using protective which is most prevalent, 28.3% of female undergraduates were compelled to engage in sexual activity against their wish and 22.6% of them started having sex at an early age.

Table 2: Level of Risky Sexual Behaviour Among Female Undergraduates in Southwestern Nigeria

Risky sexual behaviour	Frequency	Percentage (%)
High	726	48.6
Moderate	333	22.3
Low	435	29.1
Total	494	100.0

Table 2 shows the result of the level of risky sexual behaviour among female undergraduates in southwestern Nigeria. Out of one thousand four hundred and ninety-four (1,494), seven hundred and twenty-six (726) engaged in risky sexual behaviour. Also, three hundred and thirty-three of the sample indicated moderate engagement in risky sexual behaviour which also represents 22.3% of the sample for the study and four hundred and Thirty-five (435) which represents 29.1% of the total sample indicated low engagement in risky sexual behaviour. From this result, it was found that there is high level of engagement in risky sexual behaviour among female university undergraduates in Southwestern Nigeria.

Research Question 2: What is the level of perception of female university undergraduates about their body image in Southwestern, Nigeria?

Table 3: Perception of Body Image Among Female University Undergraduates in Southwestern Nigeria

Body Image Perception	Frequency	Percentage
Negative	482	32.3
Positive	1012	67.7
Total	1494	100.0

Table 3 shows the result of the level of perception of body image among female undergraduate students in southwestern Nigeria. It was observed from the table, that 482 (32.3%) of the respondents projected negative body image perception while 1012 (67.7%) of them projected positive body image perception. From this result, it was found that the level of body image perception is mostly positive.

Research Hypotheses

Research Hypothesis One: There is no significant predictive contribution of body image perception on female university undergraduates' risky sexual behaviour.

To test this hypothesis, the scores obtained for each respondent on body image perception and risky sexual behaviour were computed and represented respondents' measure of body image perception and risky sexual behaviour. These were later subjected to regression analysis using body image perception as the independent variable and risky sexual behaviour as the dependent variable. The result is presented in Table 4.

Table 4: Model Summary of the Predictive Contribution of Body Image Perception on Female University Undergraduates Engagement in Risky Sexual Behaviour

Model	R	R Square	Adjusted RSquare	Std. Error of the Estimate	F	Sig.
1	0.053[a]	0.003	0.002	1.43369	4.196	0.041[b]
a. Predictor: (Constant), Body Image Perception						

Table 4 shows the model summary of the predictive contribution of body image perception on female undergraduate engagement in risky sexual behaviour among female undergraduate students of southwestern Nigeria. The table also showed that the R-square value in the test was 0.003 and adjusted R-square was 0.002. This may be interpreted to mean that body image perception exerts a maximum and minimum of 0.3% and 0.2% of the variance observed on risky sexual behaviour and f-value obtained in test of the model for significance was 4.196 at $p = 0.041$. Since the p-value is less than 0.05, it can be concluded that the model is significant. This may be interpreted to mean that body image perception significantly influences risky sexual behaviour among female undergraduates in southwestern universities. To find the direction of the contribution, the coefficient table attached to the linear regression analysis is presented in Table 5.

Table 5: Coefficient of Predictive Contribution of Body Image Perception on Female University Undergraduates' Engagement in Risky Sexual Behaviour.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	13.731	0.436		31.492	0.000
	Body Image	-0.028	0.014	-0.053	-2.049	0.041
a. Dependent Variable: Risky Sexual Behaviour						

Table 5 shows the direction of the contribution of body image perception on risky sexual behaviour of female university undergraduates in southwestern Nigeria. It shows that body image perception contributed to risky sexual behaviour among the respondents as the B-value obtained is -0.028 with a t-value of -2.049 which is significant at 0.05 level of significance. This means that body image perception negatively contributed to risky sexual behaviour among the respondents (B = -0.028). This implies that the more positive perception of the respondent's body image, the lesser their involvement in risky sexual behaviour.

Conclusion

Risky sexual behaviour among female university undergraduates in Southwestern Nigeria is on the increase. The study concluded that female university undergraduates in Southwestern Nigeria engage in risky sexual behaviour as a result of body image perception.

Recommendations

From the findings and conclusion of this study, various recommendations were proposed to further enhance and assist female undergraduates to channel their body image in more productive activities. Therefore, this study should be applied in various educational institutions. These recommendations are given thus:

1. University Stakeholders should create a platform for cordial and healthy relationships among sexes to enhance open communication about sexual needs.
2. Religious activities should be encouraged and strengthened within universities and outside.
3. Universities authorities within and outside should discourage night party attendance among undergraduates by encouraging more recreational activities with the help of their leaders.
4. Female undergraduates should be encouraged to occasionally attend the sexual and reproductive health centres for check-ups.
5. Awareness creation on condom use and risky sexual behaviour and its consequences should be done through the available media of communication and comprehensive education on sexual and reproductive health issues should be included in the existing curriculum for university undergraduates.

Acknowledgements

My sincere gratitude goes to Dr. S.A. Oluwatosin, Tola and Mr Samuel for contributing to the success of this research.

References

Abamara, N. C., & Agu, S. A. (2014). Relationship between body image and self-esteem among female undergraduate students of behavioural sciences. *IOSR Journal of Humanities and Social Science (IOSR-JHSS) Volume 19*, *Issue 1, PP 01-05* ISSN:2279-0837, ISSN:2279-0845.

Ahonsi, B. A. (2013). Targeting youth for HIV prevention and care in Nigeria: What Role for Governments? *African Journal of Reproductive Health, 17(4)*.

Barlett, J. E., Kotrlik, J. W., & Higins, C. C. (2001). Organizational Research: Determining appropriate sample size in survey research. *Information Technology, Learning, and Performance Journal*, *Vol. 19, No. 1*, Spring 2001.

Ezenna, M. A., Stephen, D., & Mark, D. S. (2017). Social Support, Body Image Perception and Depressive Symptoms, Among University Students in Nigeria, by Gender and Ethnicity. *Science Journal of Public Health 2017*; *5(3): 263-274*.

Kotanski, M., Fisher, A., Gullone, E., & Ugoji, O. (2014). Current conceptualization of body image dissatisfaction: Have we got it wrong? *Journal of Child Psychology and Psychiatry*, *45, 7, 1317-1325*.

Nigerian University System Statistical Digest. (2017). Published in April 2018 by the National Universities Commission, 26, Aguiyi Ironsi Street PMB 237 Garki GPO, Maitama, Abuja.

Oloruntoba, T. O. (2017). Body images, beauty culture and language in the Nigeria-African context. *Africa Regional Sexuality Resource Centre.* University of Ibadan, Nigeria.

Oluwatosin, S. A., & Adediwura, A. A. (2010). Undergraduates' history of sexual abuse, parenting style and sexual risk behaviour in southwestern Nigeria. *An International Multi-Disciplinary Journal, Ethiopia Vol. 4 (2)*.

World Health Organization. (2006). Global Consultation of Friendly Health Services A Consensus Statement. Department of Adolescent and Child Health and Development, Geneva 7-12 March, 2001.Retrieved on September, 14th, 2014 from: https://www.who.int/childadolescenthealth/NewPublications/ADH/WHO_FCH_CAH_02.18.pdf

Microteaching and Microlearning Strategy to Improve the Quality of Education Through E-learning Platforms

Hira Kulsum Natamkar, Jazan University, Saudi Arabia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The evolving needs in the labour market seek for modern trends in the world of digital learning. This paper focuses on 'teaching with technology' and 'learning with technology'. It also discusses the effectiveness of microteaching, a qualitative teacher training technique that allows new teaching assistants an opportunity to boost their teaching skills with real-time teaching experiences via an e-learning platform. The teaching assistants make use of microlearning which is a flexible and cost-effective method that offers a variety of formats to enrich the learning of students. This paper explores the phases, impact and core skills of microteaching and the implementation of microlearning formats in virtual classrooms. Microteaching helps new teachers learn the art of teaching at ease. The new teaching assistants can be monitored for employee development and performance enhancement purposes. An online interview was conducted in this process. The primary data is from the teachers' participation through questionnaires. The analysis of the data suggests a few drawbacks of this strategy, for example, new teaching assistants experienced a small level of anxiety being in virtual classrooms. Despite some problems, it has been found that microteaching and microlearning strategies through e-learning platforms are very useful for teaching assistants, and it is quite easy to apply this strategy in any institution.

Keywords: Microteaching, Microlearning, E-learning, Teaching Assistants, Pre-service Teacher Education, Teaching With Technology, Blackboard Learn

iafor
The International Academic Forum
www.iafor.org

Introduction

The use of technology in the education sector is crucial to enhancing the results of the system at all levels, from early childhood education to continuous education, which keeps up with the demands of the labour market and modern times. It also helps the system adapt to new developments in the fields of education and training. The main objective of the present research is to establish microteaching as one of the easiest and most beneficial training techniques based on the teachers' real-time teaching experiences in English language classrooms via an e-learning platform.

Microteaching is a teacher training and faculty development technique whereby the teacher reviews a recording of a teaching session, to get constructive feedback from peers and/or students about what has worked and what improvements can be made to their teaching technique. Microteaching was invented in the mid-1960s at Stanford University by Dwight W. Allen and has subsequently been used to develop educators in all forms of education. There are other definitions of microteaching such as "Scaled-down teaching encounter in class size and class time" (Allen, 1967). Microteaching is a technique that aims to prepare newly recruited teachers for the real classroom setting Microteaching is especially used in teachers' pre-service education to train them steadily by letting them try out main teacher performances and conduct. With the help of this technique, the teaching assistants can experiment and learn all the teaching skills without meeting the chaotic environment of the crowded classrooms.

As a result of technological advancements, the microteaching approach makes video recordings feasible. Technology, both audio and visual, is a useful and thoughtful tool in pre-service teacher preparation. By exposing pre-service teacher candidates to more authentic teaching situations, video recordings provide them the chance to assess themselves. The video recordings affect the perspectives of teachers in the education process. The video tools sustain reflective learning, and with the help of these tools, the problems that may occur in the teaching and learning process can be perceived and defined. This method boosts the confidence and the trainee becomes aware of personal skills. Video recordings may be utilised to analyse microteaching as well as to indicate the behaviours of instruction assistants.

Another notable advantage is the immediate feedback that is provided after each practice session as microteaching is video recorded (Remesh, 2012). As a result, the viewing of the class recordings followed by the feedback and discussion, and microteaching points out the strengths and weaknesses of each case.

Methodology

Nowadays it is a technique practiced worldwide, providing teachers an opportunity to upgrade their skills (Remesh, 2012, Mergler & Tangen, 2010). For research purposes, a case study was conducted, studying pre-service teacher education of newly recruited teaching assistants in Arab universities. In the original process, the teaching assistants were asked to prepare a short lesson (usually 30 minutes) for three groups of learners and conduct it on an e-learning platform. As this was the first time experience for the new teaching assistants to use an e-learning platform, the researcher gave a workshop on how to use the e-learning platform - Blackboard Learn system. After the teaching assistants were fully trained in using Blackboard, an online class was created and an announcement was made on the system. The

teaching assistants were advised to implement microlearning tools and reusable learning objects in their microteaching sessions. Thus, teachers are given a chance to apply techniques such as brainstorming, group discussion, role play, checking pronunciation and conducting assessments under controlled situations. Such practices enable the teaching assistants with or without experience to easily correct their problems or flaws that may come up during the application of these techniques. The students belonged to levels four and three of the Department of English. More specifically, microteaching allows practicing skills under controlled conditions in a safe and supportive environment (Amobi & Irwin, 2009). It is a practice that is scaled down in terms of teaching time, learning content and number of students involved (Slabbert, 2002). The scaling down of the case study was done in three directions – [1] The duration of the lesson was less than an hour, [2] the participants were around 60 students and [3] the whole process of microteaching and microlearning was content-based.

The topics for microteaching lessons were interesting and paved the way for sufficient microlearning activities as well. The topics were – [1] Sentence Formation & Auxiliary Verbs and [2] Techniques to Improve Pronunciation. The teaching assistants were instructed to teach two groups with the same topic. They were also guided to watch the recording of the first class before teaching the other group following the same procedure described above. Wilkinson (1996) emphasizes that teacher candidates can experience real teaching and teaching rules with the help of this method. Teachers can learn new teaching strategies and have the opportunity to examine and reflect on their teaching styles with this method. Microteaching programs have a lot to offer pre-service teachers. It facilitates pre-service teachers' understanding of the value of preparation and decision-making. It helps them to hone and enhance their instructional abilities. Each micro lesson is complemented by a written lesson plan which serves as the teaching assistants' step by step guide for completing a particular online lesson successfully. A well-developed lesson plan is "the instructor's road map of what students need to learn and how it will be done effectively during class time" (Milkova, 2016). Generally, a lesson plan includes the following: the lesson's topic, a list of learning objectives, the duration of the lesson, teaching techniques and learning strategies, and a list of required materials, resources and references (Fink, 2003).

After the micro lesson is completed, the entire recording is replayed in the presence of the teacher, and with the involvement of the researcher cum supervisor who guided them in every step. Furthermore, the teaching assistants filled out an assessment form with a five-point Likert scale, which helps to highlight the positive and negative aspects of microteaching. The evaluation form considers a number of factors, including appropriate lesson planning, presentation clarity, student participation, the use of collaborative teaching strategies, classroom management, and effective use of instructional time.

The primary goal of the current study was to find out what instructors thought about microteaching as a training method and to what extent they thought it was a useful approach. Additional goals included looking into opinions regarding how microteaching affects different facets of contemporary education and analysing the function of Blackboard Learn, an e-learning platform, in microteaching processes. The case study approach was selected for this research's purpose, and newly hired teaching assistants underwent this pedagogical training with the goal of faculty development.

To be more precise, a combination of qualitative and quantitative research was done to give a comprehensive analysis of the issue's primary causes. Two semi-structured online interviews

were subsequently conducted with renowned researchers with extensive expertise, one synchronous and the other asynchronous. The primary goal of these interviews was to gather data through discussions between the "respondent" and the researcher. As a tactic to raise the standard of education, the respondents offered their unbiased thoughts and insightful observations on microteaching methods and microlearning resources. Additionally, the purpose of the interviews was to identify important topics and establish the conceptual standards for the questionnaire so that they could be used in the subsequent phase of quantitative research. The interviews contributed to clarify the variables later at the quantitative stage of the research. The research objectives were taken into consideration when designing a questionnaire. It is common knowledge that questionnaires are helpful instruments that are frequently employed in scientific research since they make it simple to quantify the results. The surveys were statistically analysed using a Google Forms questionnaire.

Results & Discussion

The interviews which were conducted in the qualitative phase of the research pointed out that microteaching proved to be a very beneficial training technique for every trainee or teacher. Likewise, qualitative interviews demonstrated that self-critique of video-recorded microteaching can also provide useful feedback. Similarly, it should be noted that all participants [teaching assistants and interview respondents] who were part of the research, expressed the opinion that microteaching is an essential situation before being placed in an institution for teaching in reality. It should be noted that the teaching assistants had no previous experience in microteaching training. As far as the profile of the participants is concerned, it is to be noted that all the participants were females. When age distribution is concerned, the teaching assistants were 21-30 years old and the interview respondents were 41-50 years old. As regards the qualifications, the teaching assistants were bachelors and the interview respondents were postgraduates and doctorates at the time, the present research was carried out.

In the interview session, six important questions were raised. The interview respondents are authors who have already published their research on microteaching and microlearning. The interview respondents had a message for the prospective teachers. They explained that microteaching aptly suits prospective teachers as they can employ this method of teaching in small-size classes and hone their skills. It is a highly effective and economical method. Teaching practice can be done in this kind of realistic environment. Therefore, elements of real-time class can be felt and understood easily (Jaikumar, 2018). According to the respondent’s answers, the core components of microteaching are all three domains of teaching, learning and their facets. The interview respondents were asked about the assessment methods that are implemented by them. They replied that in Microteaching, depending on the domain and the subject matter, the assessment method varies and suitable assessment tools are to be used. They were also inquired about microlearning tools and they unanimously agreed that it has variety of activities which leave a lasting impression on the minds of e-learning medium students. Some of the activities are:

- listening to a podcast
- reading an e-mail or a text message
- seeing a short video clip
- sorting a set of (micro-content) items in chronological order
- selecting an answer to a question on a computer screen with digital effects
- playful learning with micro-games

The interview was concluded with their valuable insight that microteaching methodology provides a realistic platform for budding teachers and is an efficient method to tailor make teaching-learning environment.

After their virtual classes, the teaching assistants were asked to evaluate the significance of microteaching's effect on certain aspects of teaching. Bearing in mind the conclusions of the qualitative research and also the literature review (Saban & Çoklar, 2013; Amobi & Irwin, 2009; Fernandez & Robinson, 2006), the present case study focused on five main aspects: lesson planning, learning time management, verbal and non-verbal interaction between teachers-students, classroom management skills and use of pragmatic teaching techniques. Using a five-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree", teaching assistants were asked to determine to what extent microteaching and microlearning tools were beneficial in improving their teaching skills and fill out the questionnaire accordingly (Vagias, 2006).

The following were the 15 questions asked in the questionnaire:

1) I was nervous at first.
2) I enjoyed teaching online.
3) The Blackboard system tools are easy to use.
4) The online tools attract the students' attention.
5) I encountered a new difficulty in teaching online apart from the difficulties of teaching in a traditional class.
6) I identified some flaws in my teaching methods in the recordings.
7) I found some improvement in my teaching methodologies when I taught the second group.
8) Microteaching proved to be very constructive in improving our teaching skills.
9) Two different lesson plans are needed (before & after watching the recordings).
10) Microteaching helps teachers to become more familiar with time management.
11) There is a good opportunity for effective verbal and non-verbal interaction between teacher and students as students overcome their shyness and express themselves well.
12) Microteaching offers the opportunity to practice classroom management skills in a safe but artificially created environment.
13) The learning procedure was more student-centered and students were actively engaged (Use of pragmatic teaching techniques and microlearning tools).
14) I received positive responses from the students.
15) Students can learn quickly and teaching is easier online because of the technology.

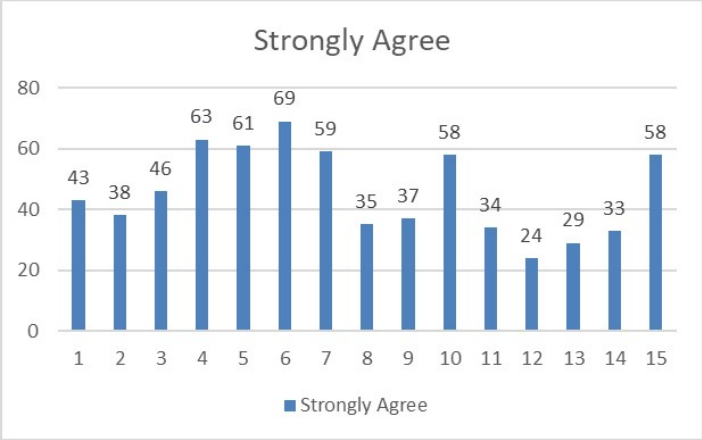


Figure 1: Results of Questions on Strongly Agree

Teaching in an e-learning platform allows self-improvement. Figure 1 indicates that 69% of the teaching assistants identified some flaws in their teaching methods in the recordings. 58% of the teaching assistants claimed that microteaching proved to be very constructive and helped them to become more familiar with time management. 59% of them strongly agreed that they found some improvement in their teaching methodologies when they taught the second group. This outcome is in agreement to the literature review (Ralph, 2014; Remesh, 2012; Mergler & Tangen, 2010; Fernandez, 2005) and specifies the importance of microteaching as a useful tool for teacher training. 61% of them strongly agreed that they encountered a new difficulty in teaching online apart from the difficulties of teaching in a traditional class. 63% also strongly agreed that online tools attract the students' attention and 58% asserted that students can learn quickly and teaching is easier online because of the technology. This parameter proves that microlearning is a powerful tool to attract and retain the attention of the students. In their research findings by Khatoon et al., (2022) it is found that the impact of online tools or applications and mobile phone educational programs on academic achievement of students is higher. The reusable objects and infographics are like magnets which attracts the students towards the lesson due to their innovative and interesting ideas.

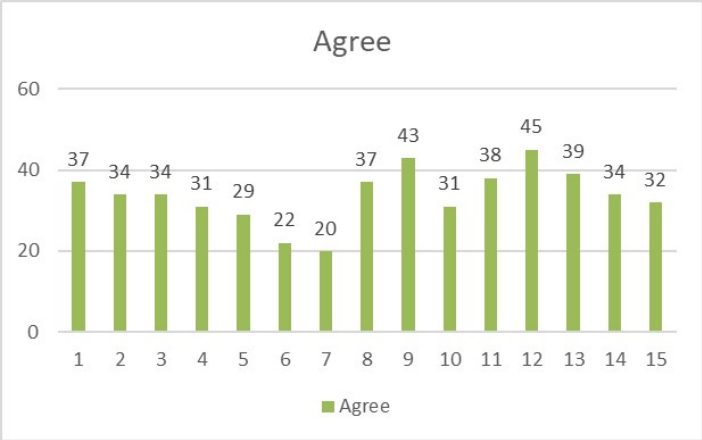


Figure 2: Results of Questions on Agree

Classroom management is another beneficial aspect of modern teaching, as it is strongly correlated to the foundation of an appealing and creative learning environment. Figure 2 illustrates that 45% of new teaching assistants agree that microteaching offers the opportunity to practice classroom management skills in a safe but artificially created environment. The

participants in this case study were asked to determine to what extent video recording was useful in the microteaching situation. The teaching assistants mostly agreed that it was a useful procedure. More particularly, as far as lesson planning is concerned, the participants agreed (43%) that they had to structured two different lesson plans. The second lesson plan was developed after watching the recording and identifying the flaws in their lessons. Another important parameter in modern education is the use of pragmatic teaching techniques and microlearning tools that actively engage the students and make the learning procedure more student-centered. 39% of the teaching assistants agreed that microteaching has a very significant effect on the use of pragmatic teaching techniques and microlearning tools. According to the participants (38%), microteaching's effect is prominent. Effective verbal and non-verbal interaction between teachers and students is a key element in modern teaching.

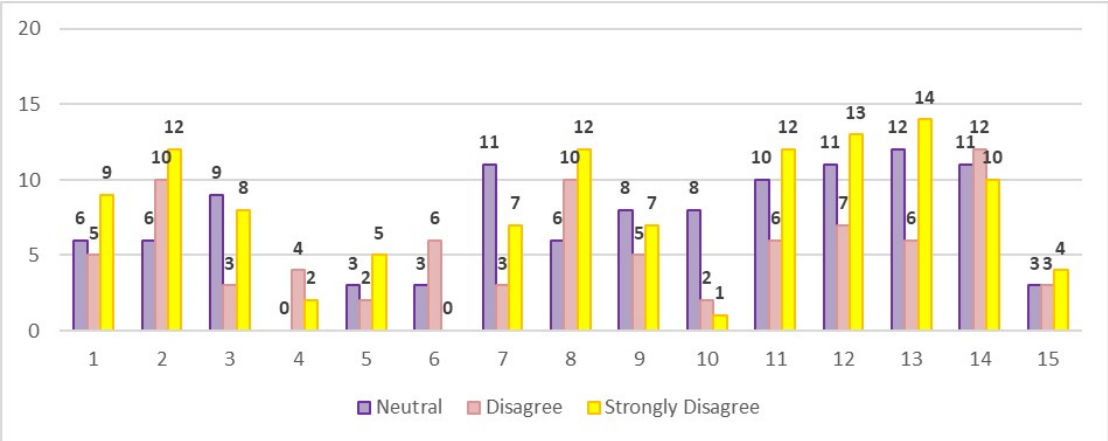


Figure 3: Results of Questions on Neutral, Disagree & Strongly Disagree

Figure 3 shows that a small percentage of participants had indifferent or negative opinions regarding the benefits and practicality of microteaching and microlearning techniques for raising educational standards via online learning environments. They question if using e-learning platforms to enhance education quality through microteaching and microlearning techniques is really beneficial.

Conclusion

At the moment, teacher training seems to be a significant factor in modern education across the globe and UNESCO encourages providing the young generation with digital skills. Even though this situation at first was peculiar and full of nervousness for the young teaching assistants, the valuable feedback provided at the end stimulated the improvement of skills such as lesson planning, learning time management, interaction between teacher and students, use of pragmatic and practical teaching techniques and skills for classroom management. Apart from the noticeable advantages, the microteaching procedure has also some disadvantages. The most commonly observed disadvantage is artificiality, as microteaching takes place in an artificially created environment which may not replicate real-life classroom situations exactly (He & Yan, 2011). Also, it is easy to manage the virtual class students and maintaining discipline. As a result, microteaching seems to some extent limit pre-service teachers' development of real-life classroom teaching competence (He & Yan, 2011).

Nonetheless, microteaching is a useful training tool that bridges the gap between theoretical and practical aspects of teaching (Ralph, 2014). Thus, if it is implemented appropriately,

microteaching can be a beneficial tool for every newly recruited teacher to gain experience and confidence.

References

Allen, D. W. (1967). *Microteaching: A description*. Stanford, CA, USA: Stanford University Press. ED019224.pdf

Amobi, F., & Irwin, L. (2009). Implementing on-campus microteaching to elicit preservice teachers' reflection on teaching actions: Fresh perspective on an established practice. *Journal of the Scholarship of Teaching and Learning*, 27-34.

Fernandez, M. L. (2005). Learning through microteaching lesson study in teacher preparation. *Action in Teacher Education*, *26*(4), 37-47.

Fernandez, M. L., & Robinson, M. (2006). PROSPECTIVE PERSPECTIVES ON MICROTEACHING LESSON STUDY. *Education*, *127*(2).

Fink, L. D. (2013). *Creating significant learning experiences: An integrated approach to designing college courses*. John Wiley & Sons.

He, C., & Yan, C. (2011). Exploring authenticity of microteaching in pre-service teacher education programmes. *Teaching Education*, *22*(3), 291-302.

Khatoon, K., Natamkar, H. K., Mohammed, S. G., Anzar, H., & Khan, R. A. Dyslexia: Impact of mobile phones educational programs on academic achievement of elementary school dyslectic students of India and Sudan. *Int. J. Health Sci. (Qassim)*, vol. 6, no. S4, pp. 8079-8090, Jul. 2022.

Mergler, A. G., & Tangen, D. (2010). Using microteaching to enhance teacher efficacy in pre-service teachers. *Teaching Education*, *21*(2), 199-210.

Milkova, S. (2012). Strategies for effective lesson planning. *Center for Research on learning and Teaching*, *1*(1), 1-29.

Ralph, E. G. (2014). The effectiveness of microteaching: Five years' findings. *International Journal of Humanities Social Sciences and Education*, *1*(7), 17-28.

Remesh, A. (2013). Microteaching, an efficient technique for learning effective teaching. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*, *18*(2), 158.

Saban, A., & Çoklar, A. N. (2013). Pre-Service Teachers' Opinions about the Microteaching Method in Teaching Practise Classes. *Turkish Online Journal of Educational Technology-TOJET*, *12*(2), 234-240.

Slabbert, J. A. (2002). Microteaching in: Basson, N. *Oosthuizen, W., Duvenage, D. & Slabbert, J. Johannesburg: Juta and Kie*.

Vagias, W. M. (2006). Likert-type scale response anchors. clemson international institute for tourism. *& Research Development, Department of Parks, Recreation and Tourism Management, Clemson University*, *4*(5).

Gender Disparities of Teaching Reading in DepEd Northern Mindanao, Philippines

Felix B. Gaviola, Jr., Mindanao State University-Iligan Institute of Technology, Philippines
Loreta L. Fajardo, Mindanao State University-Iligan Institute of Technology, Philippines
Lindy Lou Gaviola, Mindanao State University-Iligan Institute of Technology, Philippines

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Gender disparity reflects the unequal status and opportunities between men and women, influenced by institutional, legal, and cultural factors that often favor male dominance. In the Philippines, educators struggle to address these disparities due to entrenched societal norms and frameworks like Education 2030 and the K-12 program. Textbooks often reinforce gender stereotypes, depicting males as assertive and females as passive. UNESCO promotes the use of diverse and inclusive textbooks that reflect both genders' experiences. To address gender gaps in reading, it is crucial for teachers to create inclusive classrooms and critically assess educational materials for gender biases. This research used qualitative methods and semi-structured interviews to investigate DepEd public primary teachers' awareness of gender disparities in reading in Misamis Oriental and Lanao del Norte, Region 10. The study aimed to uncover the causes of these disparities. Conducted in selected DepEd public primary schools, the research involved random sampling for school selection and purposive sampling for participant identification. It engaged 300 teachers, with 50 participating in in-depth interviews and Focus Group Discussions (FGDs), and 50 parents also involved in FGDs. Semi-structured interviews and FGD questions were used as research instruments. The findings underscore the need for comprehensive interventions, including raising awareness among educators, providing targeted training, addressing socio-economic barriers, and combating gender stereotypes. Teachers need to manage classroom dynamics effectively and create supportive learning environments. Engaging stakeholders in decision-making will ensure diverse perspectives and promote equitable outcomes. A multifaceted approach is essential for effectively tackling gender disparities in reading.

Keywords: Disparity, Gender, Inclusive

iafor
The International Academic Forum
www.iafor.org

Introduction

The term "gender disparity" refers to the inequalities in status, opportunities, and outcomes between men and women, often perpetuated by institutional, legal, political, and cultural factors that disproportionately favor men. In the Philippines, this issue is especially evident in the realm of education. Despite ongoing efforts, gender differences in educational outcomes persist, underscoring a complex problem that remains unresolved. Recognizing the importance of gender equality within the Education 2030 Framework for Action and the K–12 Basic Education Program is crucial for improving educational outcomes for all students (Fontanos & Ocampo, 2019).

To tackle gender disparities at the curriculum level, educators must address gender biases inherent in educational materials, particularly textbooks. A UNESCO study highlighted how gender-exclusive textbooks frequently portray boys and men in dominant roles, while women and girls are depicted in passive or conformist roles. This perpetuates harmful stereotypes and reinforces gender inequality (Flood, 2016). To combat this, UNESCO advocates for textbooks that are inclusive, truthful, affirmative, representative, and integrated, reflecting the experiences and interests of both genders (Perasso, 2017).

Access to quality education is pivotal in breaking the cycle of poverty and creating opportunities for healthier childhoods and better job prospects, impacting future generations (learning English.voanews, 2017). Teachers play a critical role in fostering an inclusive environment by treating all students equitably and encouraging participation. This commitment is essential for creating a learning atmosphere that promotes optimal outcomes for all students, regardless of gender.

Despite the increasing presence of women in higher education, gender-specific challenges continue in classrooms. Studies reveal that teaching approaches, classroom dynamics, and interactions often differ based on gender, even among well-intentioned educators. Both male and female instructors might inadvertently contribute to educational inequities. A pamphlet aimed at raising awareness about gender equity in the classroom provides practical suggestions for educators to enhance the learning environment. Simple yet effective practices, such as learning students' names, maintaining eye contact, and actively engaging with students, can foster inclusivity and positively impact student progress (www.as.wvu.edu/cwc/genderfair.htm).

To dismantle entrenched gender stereotypes, educators should select myths and fables that do not perpetuate hierarchical narratives. Understanding that gender is a social construct while sex is a biological fact is fundamental in challenging societal expectations imposed on boys and girls. Aparna Rayaprol emphasizes that psychological and social differences are learned through societal conditioning, urging educators to reshape narratives to foster a more equitable learning environment.

Textbooks must embody the principles of inclusivity, truthfulness, affirmation, representation, and integration, reflecting the diverse experiences and needs of both genders (Perasso, 2017). For example, traditional fairy tales often depict the handsome prince rescuing the princess, reinforcing gender hierarchies. Educators should be mindful in selecting stories that challenge rather than perpetuate gender roles, recognizing the social constructs of gender and the biological aspects of sex (Aparna Rayaprol, n.d.).

An observable reading disparity exists between boys and girls, with girls consistently outperforming boys in reading skills across various ages and countries (Mullis et al., 2007). This gap is exacerbated by girls' generally higher affinity for reading, which contributes to a self-perpetuating cycle of skill development (Hughes-Hassell & Rodge, 2007; Reese, 2013). Parental support also influences this disparity, as research shows that parents may support their daughters' reading more than their sons' (Reese, 2013). Teachers might inadvertently reinforce stereotypes by perceiving girls as more reliant than boys, leading to tokenism and excluding those who do not fit traditional gender categories (Lynch, 2016; Goldberg, 2016). To address these issues, educators should engage students in discussions to identify gender bias in texts and review teaching materials for outdated stereotypes (Yellamraju, 2020).

Global studies consistently show that girls surpass boys in reading assessments, emphasizing the widespread nature of this gender disparity (Marks, 2008). Socioeconomic factors also play a role, with evidence suggesting that boys from lower socioeconomic backgrounds may be more susceptible to reading failure than girls (Jerrim, 2013; Nuttall and Doherty, 2014). While boys may excel in spatial memory tasks, girls often perform better in verbal memory tasks (Wei et al., 2012).

Addressing the reading gap requires a multifaceted approach involving parental involvement, teacher awareness, and a thorough examination of educational materials to ensure inclusivity and eliminate gender bias. Research should focus on the specific causes of gender disparities in reading and guide the development of targeted intervention programs. For instance, a research project could analyze gender disparities in reading among students in DepEd public primary education across Misamis Oriental, Bukidnon, and Lanao del Norte in Region 10. Findings from such research could inform the design of an intervention program aligned with Sustainable Development Goals (SDG) for gender equality in reading achievement.

By addressing these gender gaps, the aim is to contribute to a more equitable educational landscape, ensuring that all students have equal opportunities and outcomes.

Objectives

This research project aimed to determine and analyze the causes of gender disparities in reading among learners in the DepEd public primary basic education in Northern Mindanao. The following research objectives aim to provide a comprehensive understanding of the causes of gender disparities in reading, laying the groundwork for informed policy recommendations and targeted interventions within the DepEd Public Primary Basic Education system in Northern Mindanao.

1. **Explore Perceptions of Teachers:**
   - To investigate the perceptions of DepEd public primary basic education teachers in Northern Mindanao regarding gender disparities in reading.
   - To understand how teachers perceive the reading abilities and preferences of male and female learners.

2. **Examine Classroom Dynamics:**
   - To analyze the classroom dynamics in terms of teacher-student interactions and participation, with a specific focus on potential gender biases.
   - To explore the influence of classroom environment and teacher practices on the reading performance of male and female students.

3. Investigate Socio-Economic Factors:
- To examine the impact of socio-economic factors on students' access to reading materials and resources.
- To understand how economic disparities may contribute to variations in reading proficiency between male and female learners.

4. Explore Cultural and Gender Stereotypes:
- To identify and analyze cultural and gender stereotypes that may influence the perception and encouragement of reading skills in boys and girls.
- To understand how societal expectations and stereotypes affect the reading habits and attitudes of male and female students.

5. Examine Teacher Bias:
- To investigate the presence of teacher biases, both implicit and explicit, that may contribute to gender disparities in reading.
- To explore how teacher attitudes and expectations towards male and female students impact reading performance.

6. Analyze Learning Environment:
- To analyze the learning environment, including classroom infrastructure and peer interactions, and its role in shaping reading outcomes.
- To understand how the physical and social aspects of the learning environment may contribute to or mitigate gender disparities in reading.

7. Explore Interventions and Best Practices:
- To identify existing interventions and best practices implemented within the Northern Mindanao region to address gender disparities in reading.
- To assess the effectiveness of these interventions and identify areas for improvement.

8. Examine Stakeholder Perspectives:
- To explore the perspectives of parents, administrators, and other stakeholders on gender disparities in reading.
- To understand the roles and perceptions of various stakeholders in influencing reading outcomes for male and female learners.

Methodology

Research Design

This research project employed a descriptive research design to collect data about the study subject without direct intervention, thereby relying heavily on the validity of the sampling method. A qualitative analysis approach was utilized to address the research questions.

Research Environment

The study was conducted within DepEd public primary basic education schools in Misamis Oriental and Lanao del Norte, located in Region 10 (Northern Mindanao).

Sampling Procedure

Random sampling was used to determine the DepEd public primary basic education schools. Then, purposive sampling was employed to determine the participants involved in data gathering.

The Participants

The study involved 300 DepEd public primary basic education teachers who completed survey questionnaires. Additionally, 50 of these teachers participated in individual in-depth interviews and Focus Group Discussions (FGD), alongside 50 parents who also took part in the FGDs.

Research Instruments

The research instruments included questionnaires designed to gauge the awareness levels of teachers regarding gender disparities in reading and the underlying causes of these disparities among learners. Semi-structured interview questions and Focus Group Discussion questions were employed for qualitative data collection.

Validity of Research Instruments

To ensure the validity of the research instruments, face validity, content validity, and construct validity were applied to the researchers' questionnaires. Qualitative analysis methods were used to interpret data from open-ended surveys, interviews, and FGDs, with content and thematic analysis techniques employed. Meta-analysis was applied to review relevant literature and case studies. Additionally, rubrics were utilized to analyze stories and pictures in textbooks, assessing their impact on gender disparities among learners.

Results and Discussion

Based on the gathered data, the following are the significant findings of this study.

Table 1: Perceptions of Teachers on Gender Disparities in Reading

Theme	Sub-theme	Findings
Awareness and Recognition	Recognition of Disparities Understanding of Root Causes Awareness of Impact on Learning	Teachers in Northern Mindanao demonstrated varying levels of recognition of gender disparities in reading. Some recognized the existence of disparities and understood the root causes, while others showed limited awareness of the impact of gender on learning outcomes.

Implication

Teachers who recognize gender disparities in reading and understand their root causes are better equipped to address them effectively. However, limited awareness among some teachers indicates a need for targeted training and professional development to enhance understanding.

Table 2: Teachers' Perceptions of Reading Abilities and Preferences

Theme	Sub-theme	Findings
1. Reading Abilities	Variability in Skills Stereotypes and Expectations Impact of Learning Styles	Teachers recognized the variability in reading skills among male and female learners. Some discussed the impact of stereotypes and expectations on students' self-perception and performance, while others highlighted the importance of considering diverse learning styles.
2.Reading Preferences	Gender Preferences Motivational Factors Influence of Peer Interactions	The preferences of male and female learners regarding reading materials were explored. Teachers identified gender preferences, motivational factors influencing reading habits, and the role of peer interactions in shaping reading preferences.

Implication

Teachers need to adopt flexible teaching strategies that recognize and cater to the individual strengths and preferences of students, irrespective of gender. This involves moving away from one-size-fits-all approaches and embracing personalized instruction.

Table 3: Classroom dynamics in terms of teacher-student interactions and participation with a specific focus on potential gender biases and the influence of classroom environment and teacher practices of male and female students

Theme	Sub-theme	Findings
Teacher-Student Interactions	Verbal communication	Male students receive more frequent and longer responses from the teacher compared to female students. There is a tendency for the teacher to address male students by name, fostering a more personalized interaction.
	Non-Verbal Communication	The teacher tends to make more eye contact with male students during discussions, possibly indicating a subconscious bias. Female students often receive less non-verbal reinforcement, potentially impacting their engagement and confidence.

Implication

Verbal Communication: Disparities in verbal communication, where male students receive more frequent and personalized responses from the teacher, can perpetuate a sense of

favoritism or unequal treatment. This may affect female students' sense of belonging and engagement in the classroom.

Non-verbal Communication: Differential non-verbal reinforcement, such as more eye contact with male students, can affect female students' confidence and engagement. It may contribute to a sense of invisibility or marginalization among female students.

Table 4: Impact of Economic Factors on Students' Access to Reading Materials and Resources

Theme	Sub-theme	Findings
Financial Constraints	Many students face financial barriers, such as the cost of purchasing books and transportation to libraries or bookstores.	Students from low-income families are disproportionately affected by financial constraints, which hinder their access to reading materials and resources.

Implication

Financial barriers limit students' access to reading materials, exacerbating educational disparities. Families facing financial constraints may prioritize basic needs over purchasing books, further widening the gap in educational opportunities.

Table 5: Cultural and gender stereotypes that may influence the perception and encouragement of reading skills in boys and girls

Theme	Sub-theme	Findings
Cultural and Gender Stereotypes	Perception and Encouragement of Reading Skills	Boys and girls may face different perceptions and levels of encouragement regarding their reading skills based on cultural and gender stereotypes. These stereotypes may influence teachers' expectations and interactions with students.

Implication

Differential perceptions and levels of encouragement based on cultural and gender stereotypes can contribute to disparities in reading achievement between boys and girls. When teachers hold stereotypical beliefs about gender and reading abilities, they may inadvertently reinforce these biases through their interactions with students.

Table 6: Teacher Biases

Theme	Sub-theme	Findings
Teacher Biases	Implicit Biases	Teachers may hold implicit biases, which are unconscious beliefs or attitudes, that contribute to gender disparities in reading. These biases may influence teachers' perceptions of students' abilities and their instructional practices.
	Explicit Biases	Some teachers may exhibit explicit biases, which are conscious beliefs or attitudes, that affect their interactions with male and female students. These biases may manifest in differential treatment or expectations based on gender.

Implication

Implicit Biases: Teachers' unconscious beliefs or attitudes, known as implicit biases, can contribute to gender disparities in reading. These biases may lead to differential treatment of male and female students and influence instructional practices, potentially perpetuating inequalities in academic achievement.

Explicit Biases: Some teachers may exhibit conscious beliefs or attitudes, known as explicit biases, that result in differential treatment or expectations based on gender. These biases can manifest in classroom interactions, grading practices, and academic support, further exacerbating gender disparities in reading.

Table 7: The impact of the learning environment, including classroom infrastructure and peer interactions, on reading outcomes, while also investigating how gender disparities are influenced by the physical and social aspects of the learning environment.

Theme	Sub-themes	Findings
Learning Environment	Classroom Infrastructure	The physical layout and resources within the classroom can significantly impact reading outcomes. Factors such as access to books, comfortable seating, and adequate lighting may influence students' engagement and comprehension.
	Peer Interactions	Social interactions among peers play a crucial role in shaping reading attitudes and behaviors. Positive peer relationships can foster a supportive learning environment, while negative interactions may hinder reading motivation and progress.

Implication

The implications of the learning environment on reading outcomes and gender disparities underscore the importance of optimizing classroom infrastructure to facilitate student engagement and comprehension, while also recognizing the significant role of peer interactions in shaping reading attitudes and behaviors.

Furthermore, the investigation into how gender disparities are influenced by both physical and social aspects of the learning environment highlights the need to address disparities in access to resources and create inclusive classroom cultures that promote equitable opportunities for all students, regardless of gender. Addressing these factors can contribute to narrowing the gender gap in reading achievement and fostering a more supportive and conducive learning environment for all students.

Table 8: Interventions and Best Practices with sub-themes focusing on identifying existing interventions and assessing their effectiveness in addressing gender disparities in reading within the Northern Mindanao region.

Theme	Sub-themes	Findings
Explore Interventions and Best Practices	Existing Interventions	Identified existing interventions implemented within the Northern Mindanao region to address gender disparities in reading, including targeted programs, initiatives, and strategies aimed at improving reading outcomes for boys and girls.
	Effectiveness Assessment	Assessed the effectiveness of these interventions in mitigating gender disparities in reading and improving overall reading outcomes. Identified successful practices and areas for improvement to enhance the impact of interventions.

Implication

Identification of existing interventions signifies a proactive approach towards addressing gender disparities in reading. These interventions, including targeted programs and initiatives, indicate recognition of the issue and efforts to mitigate it through tailored strategies.

Action: Building upon these existing interventions can provide a foundation for further progress. Sharing best practices among schools and educational institutions can help leverage successful strategies and promote collaboration in addressing gender disparities in reading.

Effectiveness Assessment

Implication: Assessing the effectiveness of interventions is crucial for determining their impact on mitigating gender disparities in reading. It provides valuable insights into what works and what needs improvement, guiding future efforts to enhance the effectiveness of interventions.

Action: Identifying successful practices from effective interventions can inform the refinement of existing programs and the development of new initiatives. Addressing identified areas for improvement, such as enhancing inclusivity, accessibility, and cultural relevance, can help optimize the impact of interventions on reading outcomes for both boys and girls.

In conclusion, exploring interventions and best practices in addressing gender disparities in reading within the Northern Mindanao region underscores the importance of ongoing assessment and improvement efforts. By leveraging existing successful interventions and continuously refining strategies based on effectiveness assessments, stakeholders can work towards narrowing the gender gap in reading and fostering equitable educational opportunities for all students.

Table 9: Stakeholder Perspectives

Theme	Sub-themes	Findings
Examine Stakeholder Perspectives	Perspectives of Parents, Administrators, and Other Stakeholders	Explored the viewpoints of parents, administrators, and other stakeholders regarding gender disparities in reading, highlighting their perceptions, concerns, and proposed solutions to address the issue.
	Roles and Perceptions of Stakeholders	Investigated the roles and perceptions of various stakeholders, including parents, administrators, and educators, in influencing reading outcomes for male and female learners, identifying their impact and contributions.

Implication: Understanding the perspectives of stakeholders such as parents, administrators, and other community members provides valuable insights into the complexity of gender disparities in reading. Their viewpoints, concerns, and proposed solutions offer diverse perspectives that can inform targeted interventions and policy decisions.

Action: Creating platforms for open dialogue and collaboration among stakeholders can foster a shared understanding of the issue and promote collective efforts to address gender disparities in reading. Engaging stakeholders in decision-making processes ensures that interventions are informed by the needs and priorities of the community.

Roles and Perceptions of Stakeholders

Implication: Investigating the roles and perceptions of stakeholders, including parents, administrators, and educators, highlights their influence on reading outcomes for male and female learners. Understanding their impact and contributions can inform strategies to leverage their roles effectively in promoting reading equality.

Action: Empowering stakeholders to play active roles in promoting reading equality can lead to more effective interventions and initiatives. Providing training and resources to parents, administrators, and educators equips them with the tools and knowledge to support reading

development in both boys and girls, fostering a collaborative and supportive learning environment.

Conclusion

In conclusion, examining stakeholder perspectives on gender disparities in reading emphasizes the importance of inclusive decision-making processes and partnerships in addressing this issue. By valuing and incorporating diverse viewpoints and leveraging the roles of stakeholders, communities can work together to create equitable opportunities for all learners to thrive in reading.

From the findings, these are the implications drawn from the examination of various themes related to gender disparities in reading highlight the multifaceted nature of the issue and the need for comprehensive and targeted interventions. Here are some key conclusions and recommendations based on the implications discussed:

Awareness and Recognition: It is essential to raise awareness among educators about the existence of gender disparities in reading and provide targeted training to enhance their understanding and ability to address these disparities effectively. Educational authorities should invest in awareness campaigns and professional development programs to equip teachers with the knowledge and tools needed to recognize and mitigate gender biases in reading instruction.

Socio-economic Factors: Addressing socio-economic barriers to access reading materials and resources is crucial for promoting equitable reading outcomes. Policymakers should implement policies aimed at reducing economic disparities in education and provide targeted support programs for economically disadvantaged students to ensure equal access to resources.

Cultural and Gender Stereotypes: Combatting cultural and gender stereotypes is essential for creating gender-inclusive reading environments. Schools should implement initiatives to challenge stereotypes, diversify reading materials, and promote gender-inclusive teaching practices to foster a supportive learning environment for all students.

Classroom Dynamics: Teachers play a critical role in shaping classroom dynamics and should be mindful of potential biases in their interactions with students. Professional development programs should help teachers develop strategies to address gender bias in classroom interactions and create inclusive learning environments where all students feel valued and supported.

Learning Environment: Schools must create supportive learning environments that promote reading engagement and provide equal opportunities for all students to thrive. This involves investing in classroom infrastructure, promoting positive peer interactions, and integrating reading-related activities into the curriculum to foster literacy development across all subjects.

Interventions and Support: Existing interventions should be assessed for effectiveness, and areas for improvement should be identified to enhance their impact. Collaboration among educational stakeholders is essential for evaluating interventions, sharing best practices, and continuously improving strategies to address gender disparities in reading.

Stakeholder Perspectives: Engaging stakeholders in decision-making processes and fostering collaboration among parents, administrators, educators, and community members is critical for addressing gender disparities in reading effectively. Creating platforms for open dialogue and incorporating diverse viewpoints can lead to more informed and equitable interventions.

Furthermore, addressing gender disparities in reading requires a multifaceted approach that involves raising awareness, challenging stereotypes, creating inclusive learning environments, and providing targeted support for students from diverse backgrounds. By considering the implications of each theme and taking strategic actions, policymakers, educators, and stakeholders can work together to promote equitable reading outcomes for all students, regardless of gender.

Based on the findings discussed, several grounded theories were formulated:

1. Awareness and Recognition Theory

Theory: Increased awareness and recognition of gender disparities in reading among educators lead to more effective interventions and improved reading outcomes for all students.

Proposition: When educators are equipped with knowledge and tools to recognize and address gender biases in reading instruction, they are more likely to implement inclusive teaching practices and create supportive learning environments, ultimately narrowing the gender gap in reading achievement.

2. Socio-Economic Factors Theory

Theory: Addressing socio-economic barriers to accessing reading materials and resources is essential for promoting equitable reading outcomes.

Proposition: When policymakers implement policies aimed at reducing economic disparities in education and providing targeted support programs for economically disadvantaged students, they create equal opportunities for all students to access resources and succeed in reading.

3. Cultural and Gender Stereotypes Theory

Theory: Combatting cultural and gender stereotypes is crucial for creating gender-inclusive reading environments.

Proposition: When schools implement initiatives to challenge stereotypes, diversify reading materials, and promote gender-inclusive teaching practices, they foster a supportive learning environment where all students feel valued and empowered to succeed in reading, irrespective of gender.

4. Classroom Dynamics Theory

Theory: Teachers play a critical role in shaping classroom dynamics and should address potential biases in their interactions with students.

Proposition: When teachers undergo professional development to develop strategies for addressing gender bias in classroom interactions and create inclusive learning environments, they promote equitable participation and engagement among all students, leading to improved reading outcomes.

5. Learning Environment Theory

Theory: Supportive learning environments that promote reading engagement and provide equal opportunities for all students lead to improved reading outcomes.

Proposition: When schools invest in classroom infrastructure, promote positive peer interactions, and integrate reading-related activities into the curriculum, they create a conducive environment for literacy development across all subjects, ultimately narrowing the gender gap in reading achievement.

6. Interventions and Support Theory

Theory: Continuous assessment and improvement of interventions, coupled with collaboration among stakeholders, are essential for addressing gender disparities in reading effectively.

Proposition: When existing interventions are assessed for effectiveness, and areas for improvement are identified through collaboration among educational stakeholders, targeted interventions can be developed and implemented to address gender disparities in reading, leading to improved reading outcomes for all students.

7. Stakeholder Perspectives Theory

Theory: Engaging stakeholders in decision-making processes and incorporating diverse viewpoints leads to more informed and equitable interventions.

Proposition: When stakeholders are actively involved in decision-making processes and their diverse perspectives are considered, interventions are more likely to be effective and responsive to the needs of all students, resulting in improved reading outcomes and a narrowing of the gender gap in reading achievement.

References

Alvidrez, J., & Weinstein, R. S. (1999). Early teacher perceptions and later student academic achievement. Journal of Educational Psychology, 91, 731-746.

Beech, J. R. (2010). Young readers' strategic approaches to reading unfamiliar words in text. Reading and Writing Quarterly: Overcoming Learning Difficulties, 26(3), 264–284.

Elaine Reese Ph.D. (2013). The Gender Gap in Reading. Available at: https://www.psychologytoday.com/us/blog/tell-me-story/201308/the-gender-gap-in-reading

Goldstein, J. M., Jerram, M., Poldrack, R., Anagnoson, R., Breiter, H. C., Makris, N., et al. (2005). Sex differences in prefrontal cortical brain activity during fMRI of auditory verbal working memory. Neuropsychology, 19(4), 509–519.

Hassett, D. D. (2008). Teacher flexibility and judgement: A multi-dynamic literacy theory. Journal of Early Childhood Literacy, 8(3), 295–327.

Hughes-Hassell, S., & Rodge, P. (2007). The leisure reading habits of urban adolescents. Journal of Adolescent and Adult Literacy, 51, 22-33.

Jerrim, J. (2013). The Reading Gap: The socioeconomic gap in children's reading skills: A cross-national comparison using PISA 2009. London: The Sutton Trust.

Jones, S., & Myhill, D. (2004). 'Troublesome boys' and 'compliant girls':gender identity and perceptions of achievement and underachievement. British Journal of Sociology of Education, 25, 547-561.

Lawton, C. A., & Hatcher, D. W. (2005). Gender differences in integration of images in visuospatial memory. Sex Roles, 53(9/10), 717–725.

Leon, I., Cimadevilla, J. M., & Tascon, L. (2014). Developmental gender differences in children in a virtual spatial memory task. Neuropsychology, 28(4), 485–495.

Linebarger, D. L. (2001). Learning to read from television: The effects of using captions and narration. Journal of Educational Psychology, 93(2), 288–298.

Logan, S., & Johnston, R. (2009). Gender differences in reading ability and attitudes: Examining where these differences lie. Journal of Research in Reading, 32(2), 199–214.

Logan, S., & Johnston, R. (2010). Investigating gender differences in reading. Educational Review, 62(2), 175–187.

Lowe, P. A., Mayfield, J. W., & Reynolds, C. R. (2003). Gender differences in memory test performance among children and adolescents. Archives of Clinical Neuropsychology, 18, 865–878.

Marks, G. N. (2008). Accounting for the gender gaps in student performance in reading and mathematics: Evidence from 31 countries. Oxford Review of Education, 34(1), 89–109.

Matthews, J. S., Ponitz, C.C., & Morrison, F.J. (2009). Early gender differences in self-regulation and academic achievement. Journal of Educational Psychology, 101, 689-704.

McGeown, S. P., Johnston, R. S., Walker, J., Howatson, K., Stockburn, A., & Dufton, P. (2015). The relationship between young children's enjoyment of learning to read, reading attitudes, confidence and attainment. Educational Research, 57(4), 389–402.

Mullis, I. V. S., Martin, M. O., Kennedy, A. M., & Foy, P. (2007). PIRLS 2006 International Report: IEA's Progress in International Reading Literacy Study in primary schools in 40 countries. Boston: Lynch School of Education, Boston College.

Nuttall, A., & Doherty, J. (2014). Disaffected boys and the achievement gap: 'The wallpaper effect' and what is hidden by a focus on school results. Urban Review, 46, 800–815.

Oakhill, J. V., & Petrides, A. (2007). Sex differences in the effects of interest on boys' and girls' reading comprehension. British Journal of Psychology, 98, 223–235.

Price-Mohr, R., Price, C. (2017). Gender Differences in Early Reading Strategies: A Comparison of Synthetic Phonics Only with a Mixed Approach to Teaching Reading to 4–5 Year-Old Children. Early Childhood Educ J 45, 613–620.

Sagrilo, M. C. P. (2013). Difference between verbal and visual span in genders: Pilot study. Revista. CEFAC, 15(3), 552–560.

Scholes, L. (2021). Year 3 boys' and girls' enjoyment for reading across economic demographics in Australia. Implications for boys and students from lower SES communities. International Journal of Inclusive Education. 1-11. https://doi.org/10.1080/13603116.2021.1941319

Shannon, P. (2001). Basal readers: Three perspectives. Theory into Practice, 28(4), 235–239.

Subrahmanian, R. (2005). Gender equality in education: Definitions and measurements. International Journal of Educational Development, 25(4), 395–407.

Wang, L., & Carr, M. (2014). Working memory and strategy use contribute to gender differences in spatial ability. Educational Psychologist, 49(4), 261–282.

Resources

"Boys, Girls and K-12 Classroom Gender Bias." by Lynch, M. (2016). www.theedadvocate.org/boys-girls-and-k-12-classroom-gender-bias/

"The Difference Between What Women and Men Read" by Kusby, A. (2016). https://ryanlanz.com/2016/08/27/the-difference-between-what-women-and-men-read/

"Effects of Gender Relations in Textbooks" by Hewitt, K. (2015). https://borgenproject.org/effects-gender-relations-textbooks

"Gender equality in the classroom" by Aparna Rayaprol, N.D. https://www.teacherplus.org/gender-equality-in-the-classroom/

"Gender in the Classroom." by Goldberg, S. (2016). www.todaysparent.com/kids/school-age/gender-in-the-classroom

"The Gender Disparities in Education" by Yellamraju, S. (2020). https://thenewnormalnj.org/the-gender-disparities-in-education

"The gender gap in reading: Boy meets book, boy loses book, boy never gets book back by Deloitte (2021). https://www2.deloitte.com/us/en/insights/industry/technology/technology-media-and-telecom-predictions/2022/gender-gap-in-reading.html

"How can teachers be more gender-inclusive in the classroom? by Kwauk, C. and Bever,S. (2017). https://www.brookings.edu/blog/education-plus-development/2017/11/02/how-can-teachers-be-more-gender-inclusive-in-the-classroom/

"Re-framing gender disparities in basic education in the Philippines" by Fontanos, N. and Ocampo, D.J. (2019). https://www.researchgate.net/publication/337730906_Re-framing_gender_disparities_in_basic_education_in_the_Philippines

"Textbooks Worldwide Rely on Gender Stereotypes, Report Finds" by Flood, A. (2016). www.theguardian.com/books/2016/mar/08/textbooks-worldwide-rely-on-gender-stereotypes-report-international-womens-day

"We Can't Teach Girls of the Future with Books of the Past" by Perasso (2017). www.bbc.com/news/world-41421406

A Mixed Method Study of Middle School Students' Perception of the Impact of Socio-Economic Status on Academic Intrinsic Motivation

Pallavi Aggarwal, University of Missouri-Saint Louis, United States
Taylor Mae-L. Lawson Smith, University of Missouri-Saint Louis, United States

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Research shows that intrinsically motivated students tend to achieve higher academic growth (Mendoza, 2012). When specific populations of students are labeled "at risk", it becomes difficult for them to realize their intrinsic motivation (Ginsberg & Wlodkowski, 2019). Students identified as "at risk" tend to be from a lower socioeconomic status (Cedeño et al., 2016). Proposed study investigates the relationship between perceived socioeconomic status of students with their academic intrinsic motivation. An urban mid-western middle school with approximately 700 low-income students got equal opportunity to participate in research. 50 students with both signed student and parent consent forms were allowed to participate in the research. Mixed method research design was conducted using a survey that contained a 5-point likert scale which measured academic intrinsic motivation and multiple-choice questions followed by open ended questions which measured the students' perceived socioeconomic status. Multiple choice questions included parents' employment status, income range and their educational level with three open ended questions to deepen the understanding of the choices selected by students. Parental income range was used as the parameter to measure the socioeconomic status. Open-ended questions focused on opportunities provided to students, challenges faced by them and their future goals. Linear regression analysis helped to establish no relationship between the students' perceived parental income range and their academic intrinsic motivation. However, using manual coding open-ended questions shed light on the equal opportunities provided by the school in spite of their parent's income level.

Keywords: Intrinsic Motivation, Middle School, Socioeconomic Factor

iafor
The International Academic Forum
www.iafor.org

Introduction

Student motivation is a critical element in educational success and lifelong learning. Motivation can be broadly categorized into intrinsic and extrinsic types, each influencing students' engagement and performance differently.

Intrinsic Motivation

Intrinsic motivation, the internal drive to engage in activities for their inherent satisfaction rather than for external rewards, is a crucial element in students' academic success and overall well-being. Understanding the factors that foster intrinsic motivation can have significant implications for educational practices and policies.

Factors Influencing Intrinsic Motivation

1) Teacher Practices and Classroom Environment: Teacher practices play a crucial role in fostering intrinsic motivation. Autonomy-supportive teaching, which includes providing students with choices, encouraging self-initiation, and acknowledging students' perspectives, has been shown to enhance intrinsic motivation (Reeve, 2009). A positive classroom environment, characterized by supportive teacher-student relationships and a sense of community, also contributes to higher levels of intrinsic motivation (Wentzel, 1997).

2) Parental Influence and Home Environment: Parental involvement and the home environment significantly affect students' intrinsic motivation. Parents who provide emotional support, encourage autonomy, and emphasize the importance of learning for its own sake foster higher levels of intrinsic motivation in their children (Grolnick, Ryan, & Deci, 1991). Conversely, controlling parenting practices that pressure children to perform can undermine intrinsic motivation (Assor, Kaplan, & Roth, 2002).

3) Socioeconomic Status: Socioeconomic status (SES) influences intrinsic motivation through access to resources, parental involvement, and stress levels. Higher SES families often have greater access to educational resources and extracurricular activities, which can promote intrinsic motivation (Gottfried, Fleming, & Gottfried, 1994). Lower SES, on the other hand, is associated with higher levels of stress and fewer opportunities for self-directed learning, potentially hindering intrinsic motivation (Evans & Kim, 2013).

4) Peers and Social Influence: Peers and social contexts can either bolster or diminish intrinsic motivation. Positive peer interactions and collaborative learning environments enhance intrinsic motivation by fulfilling the need for relatedness and providing opportunities for meaningful engagement (Wentzel, 2009). Conversely, negative social dynamics, such as peer pressure and competitive atmospheres, can undermine intrinsic motivation by creating anxiety and fear of failure (Ryan & Deci, 2000).

Impact of Intrinsic Motivation on Academic Outcomes

1) Academic Achievement: Research consistently demonstrates a strong positive relationship between intrinsic motivation and academic achievement. Intrinsically motivated students tend to engage more deeply with learning materials, persist longer in the face of challenges, and achieve higher academic performance (Gottfried, 1985; Deci,

Vallerand, Pelletier, & Ryan, 1991). This is because intrinsic motivation promotes a mastery-oriented approach to learning, where students focus on understanding and mastering the material rather than merely performing well on tests.

2) Cognitive Engagement and Learning Strategies: Intrinsic motivation is associated with higher levels of cognitive engagement and the use of effective learning strategies. Intrinsically motivated students are more likely to employ deep learning strategies, such as critical thinking, elaboration, and self-regulation, which enhance comprehension and retention of information (Pintrich & De Groot, 1990). They are also more likely to engage in self-directed learning, seeking out additional resources and opportunities to expand their knowledge (Zimmerman, 1990).

Challenges and Future Directions

Despite the clear benefits of intrinsic motivation, several challenges remain in fostering and sustaining it in educational settings. One major challenge is the pervasive emphasis on standardized testing and performance outcomes, which can undermine intrinsic motivation by shifting the focus from learning to performance (Ryan & Weinstein, 2009). Additionally, socio-economic disparities and unequal access to resources continue to pose significant barriers to the development of intrinsic motivation for many students (Evans & Kim, 2013).

Future research should explore strategies for promoting intrinsic motivation in diverse educational contexts, with particular attention to under-resourced and marginalized communities. Interventions that integrate culturally relevant pedagogy, provide opportunities for student choice and autonomy, and emphasize the joy and value of learning hold promise for enhancing intrinsic motivation across different student populations (Gay, 2000).

Intrinsic motivation is a vital component of student learning and achievement, influenced by a complex interplay of individual, social, and environmental factors. Understanding these influences and their impact on academic outcomes can inform educational practices and policies aimed at fostering a love of learning and lifelong engagement in education. By creating supportive and autonomy-enhancing environments, educators and policymakers can help students develop and sustain intrinsic motivation, leading to greater academic success and personal fulfillment.

Socio Economic Status

SES can be defined broadly as the access an individual has to financial, social, cultural, and human capital resources. Traditionally a student's SES has included parental educational attainment, parental occupational status, and household or family income, with appropriate adjustment for household or family composition (National Center for Education Statistics, 2012). Each of these components play an important role in determining the socioeconomic status of the student.

There is a discrepancy when comparing the median annual household income of families living in the United States with the families in with the proposed sample population. As per the data collected from (Data USA, 2018), the median annual household income of families in the sample population studied is $41,657, which is less than the median annual income of $61,937 across the entire United States. The study population of students belonged to lower socioeconomic status. It has been suggested that students from a lower socioeconomic level

may not be prepared for a public school system with a middle socioeconomic status orientation, and this can result in motivation and achievement issues (Aud et al., 2011).

Findings linking poverty and student academic achievement have been found. Lacour and Tissington (2011) stated the following findings in their study:

> "The U.S. Department of Education (2001) found the following key findings regarding the effects of poverty on student achievement in a study conducted on third through fifth-grade students from 71 high-poverty schools: The students scored below norms in all years and grades tested; students who lived in poverty scored significantly worse than other students; schools with the highest percentages of poor students scored significantly worse initially, but closed the gap slightly as time progressed." (p.522)

Living in poverty could impact academic achievement for many reasons, like limited school resources, limited support at home, and other stressors in a student's life. Lacour and Tissington (2011) concluded their research by stating that level of income, source of income, and mother's education level all influence academic achievement.

There is extensive research indicating that students from a low-income background tend to have more gaps in achievement. Multiple studies indicate that academic achievement can be predicted by actual socioeconomic status (Cedeño et al., 2016; McKenzie, 2019). There is a relationship between stress and poverty, which can lead to a negative impact on cognition and increase academic risk (Cedeño et al., 2016). In fact, chronic stress can cause damage to the brain. Specifically, stress may cause a decrease in learning capacity if the hippocampus is damaged (McKenzie, 2019).

There are several ways the stress of having a low socioeconomic background interferes with school performance. Some of these include low test scores, behavioral and emotional problems, and mental health issues (McKenzie, 2019). Despite the challenges, students from low socioeconomic backgrounds can still succeed. With proper interventions and program implementations, these students can grow from their adversity and achieve academically (Cedeño et al., 2016).

Additional challenges are faced by the students in lower socioeconomic homes. Families who live in impoverished neighborhoods are typically in underfunded school districts (Quillian, 2017). Socioeconomic background can determine the school a student attends and what academic opportunities are available to them (Sirin, 2005). The less funding a school has, the fewer resources are available. Therefore, family socioeconomic status plays an important aspect in academic success.

Statement of Purpose

Intrinsic motivation and socioeconomic status (SES) are intricately linked in the context of academic achievement and overall well-being. Intrinsic motivation refers to engaging in activities for their inherent satisfaction and personal rewards, rather than for some separable consequence or external reward. SES, encompassing income, education, and occupation, can significantly influence an individual's environment and opportunities, thereby impacting their intrinsic motivation.

Influence of Socioeconomic Status on Intrinsic Motivation

1. Access to Resources: Higher SES often provides better access to educational resources, extracurricular activities, and supportive environments, which can foster intrinsic motivation by allowing individuals to pursue interests and passions freely. Conversely, lower SES can limit access to these resources, potentially stifling the development of intrinsic motivation (Deci & Ryan, 2000).

2. Parental Involvement and Support: Families with higher SES are often more able to provide consistent support and encouragement for their children's academic and extracurricular activities. This supportive environment can enhance intrinsic motivation by affirming the value of learning and personal growth (Grolnick & Ryan, 1989).

3. Stress and Psychological Well-being: Lower SES is frequently associated with higher levels of stress and fewer psychological resources, which can negatively impact intrinsic motivation. High stress levels can detract from the focus and energy needed for intrinsically motivated pursuits (Evans & Kim, 2013).

4. Expectations and Beliefs: Socioeconomic background can shape expectations and beliefs about education and achievement. Higher SES families often instill a sense of entitlement and expectation of success, which can promote intrinsic motivation. In contrast, lower SES families might emphasize survival and immediate economic contributions over long-term educational pursuits, potentially diminishing intrinsic motivation (Lareau, A., 2011).

Intrinsic motivation is deeply influenced by the socioeconomic context in which an individual is situated. Higher SES typically affords greater access to resources, supportive environments, and positive expectations, all of which can enhance intrinsic motivation. On the other hand, lower SES can pose significant barriers to the development and sustenance of intrinsic motivation due to resource limitations, increased stress, and different cultural values related to education and success.

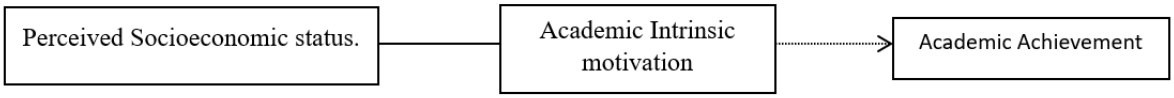
Understanding the interplay between intrinsic motivation and SES is crucial for developing effective educational policies and interventions aimed at fostering motivation and achievement across diverse socioeconomic backgrounds. This leads to the development of the research question:

Research Question - What is the relationship between student perceived socioeconomic status and their academic intrinsic motivation?

Null Hypothesis 1: There is no significant relationship between perceived socio economic and academic intrinsic motivation.

Directed Hypothesis 1: There is a significant relationship between perceived socio economic and academic intrinsic motivation.

The purpose of the current research is to determine if perceived socio-economic status and academic intrinsic motivation influence each other, and to what extent.



Note: The bold lines represent the variables under investigation and the dotted line represents the possible extension of the current research.

Figure 1: A Proposed Relationship of Possible Variables That May Connect Intrinsic Academic Motivation With Academic Achievement

Theoretical Framework

The four theoretical framework that address the impact of environmental factors like socioeconomic factor (income level of the parents) on their academic intrinsic motivation are Self-Determination Theory (Gagne & Deci, 2005), Social Cognitive Theory (Schunk & DiBenedetto, 2020), Achievement Motivation Theory (Elliot & Harackiewicz, 1996), and Ecological Systems Theory of Development (Leonard, 2011).

Methods

Research Design

A mixed-method research design was used to understand the relationship between the students perceived socio-economic status and their academic intrinsic motivation. A Likert scale survey was used to measure the academic intrinsic motivation of the students and a multiple-choice survey followed up with the open-ended questions was developed to measure the perceived socioeconomic status of the students. The concurrent embedded mixed method design was used to understand the relationship between the two variables and also provided a deep insight into the reason for students' choice in the survey and multiple choice questions. Having both qualitative and quantitative data allows a more detailed and reliable resolution of the research questions.

The concurrent embedded design allowed both quantitative and qualitative data to be collected at the same time in one setting. This approach justifies embedding qualitative questions as it will enable participants to give reasoning for the measured variables, which cannot be done with quantitative data alone. The sequence of conducting the qualitative or quantitative research does not matter while working with this method. It is also beneficial to collect the data at one time instead of disturbing the routine of teachers and students on two occasions (Creswell, 2008).

To explore the impact of perceived socioeconomic factor on the students' intrinsic motivation, linear regression was used. Manual coding was used for the open-ended questions.

Setting and Sample Population

A convenience sample of approximately 700-800, 7th and 8th grade students attending a Midwestern suburban public middle school were asked to serve as the research population. The student population consisted of 50% male and 50% female students. All students were given an equal opportunity to participate in the survey. Students were given an assent form (Appendix B) to sign if they chose to participate and a consent form (Appendix C) was also sent to parents/guardians of those students. One month was given to the students to get both

forms signed. The students with both forms signed were allowed to participate in the study. To increase the participation of students, an incentive was given to the students. The entire class received a snack box if 50% of the students participated in that class. A sample pool of N=50 was targeted from the convenience pool of 700-800. The survey was administered by the advisory teachers of the students. The advisory class did not interrupt instructional hours.

Instrumentation

A 5-point Likert scale survey was used to measure academic intrinsic motivation (Appendix A). One survey with two parts (A and B) was used to measure the impact of student-perceived socioeconomic factor on academic intrinsic motivation. Part A measures motivation with the American Motivation Scale (AMS) first validated by Vallerland et al., 1992. Part B measures household income and education as factors for socioeconomic status ("Community needs assessment questionnaire survey," n.d.) (Hanes, 2008). Part A contains 16 questions and Part B contains seven questions including three open-ended responses. In open-ended questions, students were asked to estimate their household income on an incremental scale. Open-ended questions provide more information on their perspectives on academic goals, achievements, and challenges. To maintain the anonymity of the students/participants, the survey was collected with no student identification.

Data Collection

Students submitting both signed parent's consent and student's assent forms were allowed to participate in the research. The study was conducted in the advisory class which was already embedded in the schedule. Advisory teachers were given the log to keep the records of the students submitting both forms. Once forms were collected with the teacher's log, surveys were given to the advisory teachers for those who submitted both forms.

Those students completed the survey at the same time in their advisory class without any interruption. The advisory class was 30 minutes long. To maintain the authenticity of the students' perception of their parents' income level, no student was allowed to take the survey home, even if they were not finished. The advisory teacher did not paraphrase or help the students while filling out the survey to maintain the reliability and truthfulness. Data was collected once in an academic year from all the students. The survey was reviewed by IRB to protect the rights and the welfare of the students involved in the research.

Results

Descriptive statistics were calculated using the program SAS (SAS on demand for academics). AVGAIM (average academic intrinsic motivation) shows the average score academic intrinsic motivation. Perceived income was assigned a corresponding number to the letter the participants chose to represent the income range. For example, a) 10,000-20,000 was assigned the number 1. The responses left blank, or when a participant was unsure, 0 was assigned. The label given to perceived income was INCOME.

Three participants' surveys were excluded because their surveys were left incomplete. The remaining 47 surveys were used to calculate the mean and standard deviation of AVGAIM and INCOME.

The descriptive statistics for average perceived income and academic intrinsic motivation score are shown in Table 1. The mean for INCOME is 3.02. The mean for AVGAIM is 3.80. There was a high standard deviation for INCOME. This suggests data was spread out from the mean and there is a large amount of variation in the participants' perceived household income.

Variable	Mean	Std Dev	Minimum	Maximum	N
INCOME	3.02	2.67	0	9.00	47
AVGAIM	3.80	0.66	2.00	5.00	47

Table 1: Descriptive Statistics

A linear regression analysis was run using AVGAIM as the dependent variable, INCOME as the classification variable.

The linear regression model has one intercept ($\beta 0$) and one slope ($\beta 1$):
$AVGAIM = \beta 0 + \beta 1 * INCOME$

The least squares summary and analysis of variance are shown in Appendix D. The p value from the analysis of variance was 0.06 which is greater than 0.05. This means the null hypothesis cannot be rejected. However, since it is close to 0.05, the parameter of estimates, shown in Table 2 was required.

Parameter Estimates					
Parameter	DF	Estimate	Standard Error	t value	Pr > |t|
Intercept	1	0.740721	1.033956	0.72	0.4786
INCOME 0	1	0.272285	0.460660	0.59	0.5584
INCOME 1	1	0.605106	0.491631	1.23	0.2268
INCOME 2	1	0.319531	0.484118	0.66	0.5137
INCOME 3	1	0.342931	0.555511	0.62	0.5411
INCOME 4	1	-0.167662	0.520287	-0.32	0.7492
INCOME 5	1	0.123791	0.499580	0.25	0.8058
INCOME 6	1	0.147658	0.532331	0.28	0.7832
INCOME 7	1	-0.914378	0.719813	-1.27	0.2126
INCOME 8	1	-0.291095	0.718288	-0.41	0.6878
INCOME 9	0	0	-	-	-

Table 2: Parameter Estimates

For all tests, a Type 1 error rule of 0.05 or 5% was used. If p-value < 0.05 then reject the null hypothesis (Ho). Overall, AVGAIM does not have a significant relationship with INCOME since each p-value for income was higher than 0.05, which means that the academic intrinsic motivation of the students is not related to the parent's income level.

Test for the slope of INCOME:
Ho: $\beta 2 = 0$
Ha: $\beta 2 \neq 0$

Conclusion: Since all income levels had a p-value greater than 0.05, we fail to reject the Ho and conclude the slope is not significantly different from zero. Income does not affect AVGAIM.

The overall result of the research question is there is no significant relationship between students' perceived socioeconomic factor (parental income) and their academic intrinsic motivation.

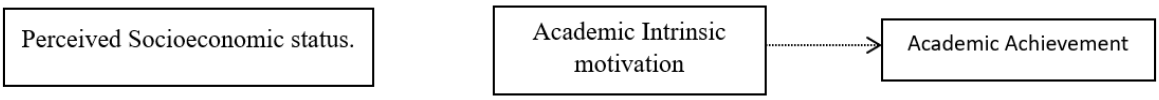


Figure 2: Actual Relatedness of the Variables

Conclusion

Limitations

It was a convenient sample as one of the researchers was teaching at that school and due to the narrow sample, the result of the research cannot be considered generic. There might be self-selection of higher academic intrinsically motivated students since the survey was not part of the grade assignment.

Delimitations

Several delimitations are considered. One of the delimitations was, to increase the participation of students, an incentive was given to the students. Another delimitation was the students' perspectives on their parental income and academic intrinsic motivation tended to change.

Implications for Practice

This study can help to strengthen relationships and bring awareness between schools, families, and communities. Understanding the impact of student-perceived parental income on their academic intrinsic motivation can help parents and educators remove their biases to create an inclusive environment and bring equity to the class.

Appendix A

Student Survey

The University of Missouri-St. Louis

STUDENT SUCCESS SURVEY

Part A - Academic Motivation Survey: Intrinsic Motivation measurement

WHY DO YOU GO TO SCHOOL? Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to school. PLEASE SELECT ONE NUMBER PER ITEM USING THE KEY BELOW.

1 = Not at all 2 = Not very much 3 = A little 4 = Certainly 5 = Definitely

	1	2	3	4	5
1. I need at least a high school diploma in order to find a high-paying job later on.					
2. I experience satisfaction while learning new things.					
3. I think that a school education will help me better prepare for the career I have chosen.					
4. I really like going to school.					
5. I really feel that I am wasting my time in school.					

6. For the pleasure I experience while performing better than my expectations.					
7. To prove to myself that I am capable of completing my high-school diploma.					
8. Eventually it will allow me to enter the job market in a field that I like.					
9. For me, school is fun.					
10. I once had good reasons for going to school; however, now I wonder whether I should continue.					
11. When I succeed in school I feel important.					
12. For the pleasure that I experience in broadening **my knowledge about subjects which appeal to me.**					
13. It will help me make a better choice regarding my career orientation.					

14. For the pleasure that I experience when I take part in discussions with my teachers.					
15. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.					
16. In order to have a better salary later on.					

Part B – Socioeconomic Status Survey

1) What is your age: _____ What grade are you in:_____

2) Educational Background of the guardian/caretaker: SELECT THE HIGHEST EDUCATION FOR THE SAME PERSON YOU CHOSE IN PART A.

a)_____ Elementary

b)_____ Middle School

c)_____High School graduate

d)_____ Some college

e)_____College Graduate

f)_____ Never go the opportunity to go to school

3) What is the employment status of your guardian/caretaker? SELECT ONLY ONE FOR THE SAME PERSON YOU CHOSE IN PART A.

a)_____ Full time d)_____Unemployed

b_____Part Time e)_____Not working (Retired)

c)_____Seasonal

4) What is your parent's or guardian's occupation/job? _____

5) How many people live where you stay? _____

6) Please select the appropriate range of family annual Income: (in dollars) SELECT ONLY ONE RANGE.

a) 10,000-20,000 _____

b) 20,001-30,000 _____

c) 30,001-40,000 _____

d) 40,001- 50,000_____

e) 50,001-60,000_____

f) 60,001-70,000_____

g) 70,001-80,000_____

h) 80,001-90,000_____

i) greater than 90,000_____

Open Ended questions:

1.How does our school provide equal opportunities to all students regardless of how much money their parents make? If our school does not provide equal opportunities to all students, give examples.

_____
_____
_____
_____
_____
_____

2. What do you want to accomplish by attending school?

_____
_____
_____
_____
_____
_____

3. Explain the challenges you face while trying to be successful in school?

_____

Appendix B

Student Assent Form

Assent to Participate in Research Activities (Minors)

The Perception by Middle School Students of the Impact of Parent Involvement and Socioeconomic Status on Their Intrinsic Motivation

1. Hi, our names are Pallavi Aggarwal and Taylor Lawson Smith. We are college students.

2. We are asking 800 students, including you, to take part in a research study because we are trying to learn more about how the involvement of your parents/guardians and social standing impact your motivation in school work.

3. If you agree to be in this study, you will be asked some questions that affect your motivation in school. The questions include how involved your parent(s) or other adult is in your school work, how much you think your parents make, and the education background of your parent/guardian. It will take about 30 minutes. You will take it one time during the advisory class.

4. Being a part of this study should not harm you in any way. Your schooling and grades will not be impacted by choosing to participate in this study.

5. You will probably not get any direct benefits from being in this study but you might enjoy knowing that your honest answers will help teachers teach class in ways that help you to learn.

6. Please talk this over with your parents before you decide whether to participate. We will also ask your parents to give their permission for you to take part.

7. If you don't want to be in this study, you don't have to. Being in this study is up to you, and no one will be upset if you don't want to participate or if you change your mind later and want to stop. Your schooling and grades will not be affected by choosing to not participate in this study.

8. You can ask any questions that you have about the study. If you have a question later that you didn't think of, you can call us at 636-290-6891(Taylor Lawson-Smith) or (252)-290-0478 (Pallavi Aggarwal).

9. Signing your name at the bottom means that you will be in this study. You will be given a copy of this form after you have signed it.

_____ _____

Participant's Signature Date _____ Participant's Printed Name

Participant's Age _____ Grade in School_____

Appendix C

Parent Informed Consent Form

Informed Consent for Participation in Research Activities

The Perception by Middle School Students of the Impact of Parent Involvement and Socioeconomic Status on Their Academic Intrinsic Motivation

Participant _____ HSC Approval Number

_____ Principal Investigator: Pallavi Aggarwal / Taylor Lawson-Smith PI's

Phone Number:(252)-290-0478) / (636)-290-6891

Summary of the Study

The general purpose of this study is to identify the factors that lead to the development of the academic intrinsic motivation in middle school students.

Neither the statistical analyses of anonymous survey rankings by the researchers nor the completion of an open-ended questionnaire by participants poses a significant risk to the physical, psychological, social, economic, or legal well-being of the participants.

We will take multiple precautionary measures to protect the privacy of participants. As part of this effort, the identity of participants will not be revealed in any publication or presentation that may result from this study. No identifying information will be collected by the survey and questionnaire so that at no time will the researchers be able to identify a particular student, their responses, or their participation in this study.

1. Your child is invited to participate in a voluntary research study conducted by Pallavi Aggarwal and Taylor Lawson-Smith, and it is under the supervision of Dr. Charles Granger.

2. a) Your child's participation will involve completing a survey that asks students to respond to the impact of their perceived parental involvement and socioeconomic status on their intrinsic motivation. This is a Likert Scale survey with open-ended questions after the rankings. The survey will be administered during one advisory period to limit the disruption of the school day. There will be no incentive to those who choose to participate, but this information could be used in the future to help educators build classroom environments that will be more equitable in advancing student academic intrinsic motivation. There is no foreseeable risk. Approximately 800 students may be involved in this research at the University of Missouri-St. Louis

Rev 012419

b) The amount of time involved in your student's participation will be 30 minutes during one advisory period.

3. There is a loss of confidentiality risk in that names of students who have both sign parent consent forms and their own student assent forms will be collected. No names or other identifying information will be collected on surveys. Student names are only collected so researchers can distribute surveys to students who have permission.

4. There are no direct benefits for your child participating in this study, however their participation may lead to benefits to education. The results of this study may reveal information that educators can use to improve behavioral, social and academic interventions for all students.

5. Your child's participation is voluntary and you may choose for them not to participate in this research study or withdraw your consent at any time. Your child will NOT be penalized in any way should you choose not to allow them to participate or withdraw.

6. We will do everything we can to protect your child's privacy. As part of this effort, your child's identity will not be revealed in any publication that may result from this study. In rare instances, a researcher's study must undergo an audit or program evaluation by an oversight agency (such as the Office for Human Research Protection) that would lead to disclosure of your data as well as any other information collected by the researcher.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Pallavi Aggarwal at (252-290-0478), Taylor Lawson-Smith at (636-290-6891) or the Faculty Advisor, (Dr. Charles Granger at (314-516-6220). You may also ask questions or state concerns regarding your rights as a research participant to the Office of Research, at 314-516-5897.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I hereby consent to my participation in the research described above.

Participant's Signature_____ Date _____

Signature of Investigator or Designee_____ Date _____

Appendix D

Table 3

Least Squares Summary

LEAST SQUARES SUMMARY			
STEP	Effect Entered In	Number Parms In	SBC
0	Intercept	1	-36.8617*
1	INCOME	12	-5.4405

*Optimal Value of Criterion

Table 4

Analysis of Variance

Analysis of Variance					
Source	**DF**	**Sum of Squares**	***Mean Square***	**F value**	**Pr>F**
Model	12	8.07423	0.67285	1.96	0.0619
Error	34	11.69128	0.34386		
Corrected Total	46	19.76551			

References

Aggarwal, Pallavi and Smith, Taylor Lawson, "The Effect of Student Perception of Parent Involvement and Socioeconomic Status on Academic Intrinsic Motivation" (2023). *Dissertations*.1285. https://irl.umsl.edu/dissertation/1285

Assor, A., Kaplan, H., & Roth, G. (2002). Choice is good, but relevance is excellent: Autonomy-enhancing and suppressing teacher behaviours predicting students' engagement in schoolwork. British Journal of Educational Psychology, 72(2), 261-278.

Aud, S., Hussar, W., Kena, G., Bianco, K., Frohlich, L., Kemp, J., & Tahan, K. (2011). *The Condition of Education 2011.* National Center for Education Statistics.

Carbonneau, N., Vallerand, R. J., & Lafrenière, M. K. (2012). Toward a Tripartite Model of Intrinsic Motivation. *Journal of Personality*, *80*(5), 1147-1178. https://doi.org/10.1111/j.1467-6494.2011.00757.x

Cedeño, L. F., Martínez-Arias, R., & Bueno, J. A. (2016). Implications of Socioeconomic Status on Academic Competence: A Perspective for Teachers. *International Education Studies*, *9*(4), 257. https://doi.org/10.5539/ies.v9n4p257

Community needs assessment questionnaire survey. (n.d.). SurveyMonkey: The World's Most Popular Free Online Survey Tool. https://www.surveymonkey.com/r/3RNQD5Y

Creswell, J. W. (2008). Research design: Qualitative, quantitative, and mixed methods approaches (3rd ed.). SAGE Publications.

Data USA. (2018). *Ferguson, MO.* https://datausa.io/profile/geo/ferguson-mo/#economy

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. Psychological Inquiry, 11(4), 227-268.

Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. Educational Psychologist, 26(3-4), 325-346.

Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology*, *70*(3), 461-475. https://doi.org/10.1037/0022-3514.70.3.461

Evans, G. W., & Kim, P. (2013). Childhood poverty, chronic stress, self-regulation, and coping. Child Development Perspectives, 7(1), 43-48.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. Journal of Organizational Behavior, 26(4), 331-362.

Gay, G. (2000). Culturally Responsive Teaching: Theory, Research, and Practice. Teachers College Press.

Ginsberg, M. B., & Wlodkowski, R. J. (2019). Intrinsic Motivation as the Foundation for Culturally Responsive Social-Emotional and Academic Learning in Teacher Education. *Teacher Education Quarterly*, *46*(4), 53-66.

Gottfried, A. E. (1985). Academic intrinsic motivation in elementary and junior high school students. Journal of Educational Psychology, 77(6), 631-645.

Gottfried, A. E., Fleming, J. S., & Gottfried, A. W. (1994). Role of parental motivational practices in children's academic intrinsic motivation and achievement. Journal of Educational Psychology, 86(1), 104-113.

Grolnick, W. S., & Ryan, R. M. (1989). Parent styles associated with children's self-regulation and competence in school. Journal of Educational Psychology, 81(2), 143-154.

Hanes, B. (2008). The Exploration of Socioeconomic Status and Student Achievement at Beverly Elementary School [Master's thesis]. https://etd.ohiolink.edu/apexprod/rws_olink/r/1501/10?clear=10&p10_accession_num=marietta1208259593

Lacour, M., & Tissington, L. D. (2011). The effects of poverty on academic achievement. *Educational Research and Reviews*, *6*(7), 522-527.

Lareau, A. (2011). Unequal childhoods: Class, race, and family life. University of California Press.

Leonard, J. (2011). *Using Bronfenbrenner's Ecological Theory to Understand Community Partnerships: A Historical Case Study of One Urban High School*. https://doi.org/DOI:10.1177/0042085911400337

McKenzie, K. (2019). The Effects of Poverty on Academic Achievement. *BU Journal of Graduate Studies in Education*, *11*(2), 21-26.

Mendoza, C. D. (2012). *Parental Involvement and Student Motivation: A Quantitative Study of the Relationship Between Student Goal Orientation and Student Perceptions of Parental Involvement Among 5th Grade Students* [Unpublished doctoral dissertation]. University of Southern California.

National Center for Education Statistics. (2012). *Improving the Measurement of Socioeconomic Status for the National Assessment of Educational Progress: A Theoretical Foundation--Recommendations to the National Center for Education Statistics.* https://nces.ed.gov/nationsreportcard/pdf/researchcenter/Socioeconomic_Factors.pdf

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. Journal of Educational Psychology, 82(1), 33-40.

Quillian, L. (2017). Neighborhood and the intergenerational transmission of poverty. *Focus*, *33*(2), 22-24. https://www.irp.wisc.edu/publications/focus/pdfs/foc332e1.pdf

Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. Educational Psychologist, 44(3), 159-175.

Ryan, R. M., & Weinstein, N. (2009). Undermining quality teaching and learning: A self-determination theory perspective on high-stakes testing. *Theory and Research in Education*, *7*(2), 224-233. https://doi.org/10.1177/1477878509104327

SAS on demand for academics. SAS. (n.d.). Retrieved August 30, 2022, from https"//www.sas.com/en_us/software/on-demand-for-academics.html

Schunk, D., & DiBenedetto, M. (2020). Motivation and social cognitive theory. *Contemporary Educational Psychology*, *60*. https://doi.org/10.1016/j.cedpsych.2019.101832

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417-453. https://doi.org/10.3102/00346543075003417

Vallerand, R. J., Pelletier, L. G., Blais, M. R., Briere, N. M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic, and Amotivation in education. Educational and Psychological Measurement, 52(4), 1003-1017. https://doi.org/10.1177/0013164492052004025

Wentzel, K.R. (1997). Student Motivation in Middle School: The Role of Perceived Pedagogical Caring. Journal of Educational Psychology, 89, 411-419. http://dx.doi.org/10.1037/0022-0663.89.3.411

Wentzel, K. R. (2009). Students' relationships with teachers as motivational contexts. In K. R. Wenzel & A. Wigfield (Eds.), *Handbook of motivation at school* (pp. 301–322). Routledge/Taylor & Francis Group. https://doi.org/10.4324/9780203879498

Zimmerman, B. J. (1990). Self-Regulated Learning and Academic Achievement: An Overview. *Educational Psychologist*, *25*(1), 3–17. https://doi.org/10.1207/s15326985ep2501_2

Contact email: pahr7@umsystem.edu

The Study of the Influence of Comparative Literary and Cultural Studies on English Language Acquisition

Gwanza Basilashvili, University of Augsburg, Germany

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Today many representatives of the educational and psychological fields try to find new methods to make language acquisition more interesting, involving, and interactive. Rote memorization is not an option anymore. Reading books, listening to music, watching movies, and observing artworks have positively determined the language acquisition process. Since all these activities help students learn a foreign language, there is a question, of whether a comparison between literary and cultural works can also influence English language learning. As many foreign universities offer courses in Comparative Literary and Cultural Studies (CLCS), my interest was to find out what kind of influence they have on language acquisition. In my investigation, I intended to explore the connection between making comparisons and improvement in language proficiency. To achieve this a 4-week experiment with 8 students majoring in English Philology was conducted. The students compared two literary trends, literary works on similar themes but written in different languages, literary and cultural works on the same topic and literary and cultural created on the same motives. The purpose of this study was to explore how the comparison between literary and cultural works influences lexis enrichment, grammar development, listening, writing, speaking and reading skills improvement. After the experiment was conducted, a self-developed questionnaire was sent to participant students. The analysis of the answers revealed that the majority of the students were engaged in language learning through CLCS, as they viewed the learning process as both interesting and useful. Questionnaire results revealed that the participants' language skills level improved.

Keywords: CLCS, Teaching English, Literary Works, Cultural Works

iafor
The International Academic Forum
www.iafor.org

Introduction

The ways to acquire language have changed a lot over the past century because of linguistic, psychological, educational, and political events that have happened during this time (Hall & Cook, 2012). Today many representatives of the educational and psychological fields try to find new methods to make language acquisition more interesting, involving, and interactive. To force students to sit and learn words and/or texts by heart is not an option anymore.

Nowadays language learning is not a highly demanding process. According to Pang et al. (2003), lexis should be acquired in two ways - directly by finding definitions before/after reading a text and indirectly by doing different activities like projects. Besides vocabulary, language learning consists of acquiring grammar rules and improving speaking, writing, and listening skills. As a student, I remember when my class was taught grammar rules from English course books by translating them. Today it is not an option any more. Today content and language-integrated learning (CLIL) method exists which make language learning more authentic and motivating. CLIL is a motivating approach which arose in the 1990s. In CLIL "both language and subject have a joint role' (Coyle, 2006, p. 2). De Smet et al. (2023) state that CLIL positively impacts language proficiency as well as attitudes towards and motivation of language learning. According to Taylor (2022), CLIL increases learners' cultural competence. Teaching English Literature by a CLIL approach at an English Philology program would mean discussing the literary works under study (read in the original) using the corresponding literary terminology, doing comparison between the target literary works and culture. This is possible through a course called Comparative Literary and Cultural Studies, which is not a language course, however, it can contribute to language skills development as well as to deeper understanding of the target culture (Arens, 2005).

As many foreign universities offer courses in Comparative Literary and Cultural Studies, my interest was to find out what kind of influence it may have on language and literature learning. In my investigation, with my thesis, I intend to explore the connection between making comparisons and improvement in language proficiency and between making comparisons and literature comprehension. I think it was worth investigating, as, if CLCS have a positive influence on English language and literacy acquisition, it should be considered as one of the progressive methods for language acquisition and should be introduced to learners and be implemented in Georgian educational institutions.

Research Questions

1. How do CLCS influence English as a second language acquisition?
2. How do CLCS influence the improvement of language skills (speaking, writing, listening, and reading)?
3. How do CLCS influence the comprehension of the literature?

Reading Literature and Language Acquisition

According to Cambridge Dictionary (n.d., b), to 'speak' means "to say words, to use the voice, or to have a conversation with someone", however, every foreign language learner knows that it takes a lot more than just 'saying words'. By some people speaking is taken for granted. Learners put a lot of effort to develop speaking skills - to express themselves

spontaneously, share their opinion on different topics, speak with grammatical accuracy, and use rich lexis. One way to reach this is by reading literature, as it enriches one's vocabulary and offers exemplary language. Acquisition of vocabulary, in particular, its collocations, happens naturally and incidentally (Pellicer-Sánchez, 2017). Obeidat (1997) in his research offers the finding that through literature his students have learned idiomatic expressions, which is part of native-like competence. "Many studies have shown that good readers have good vocabulary knowledge" (Pang et al., 2003, p. 12). Besides enriching the lexis, we, readers, meet grammatical structures and memorize them, mostly without even noticing (Aka, 2020). According to Aka, while reading, learners do not concentrate on intentionally learning L2 linguistic, instead, they focus on comprehension. However, being relaxed and not fearing that their language skills will be assessed, learners demonstrate incidental gains in vocabulary, grammar, and reading speed.

Hişmanoğlu (2005) states that reading literature helps students to comprehend it by analyzing the plot, characters, and themes. Via literature, students learn comprehension, which is a very important component is language exams. Not only English language exams, but also very many other language exams are compiled with the tasks on reading comprehension (FCE exam, TOEFL exam for the English language, Test-DAF, Goethe Institute examinations for the German language, and DELF for the French language). Reading comprehension is considered one of the major components of language learners' language proficiency. One reason for it is that literature makes students "creative, critical and analytical learners" (Obeidat, 1997, p. 32) Besides, Lao and Krashen (2000) state that using literature as an acquisition tool (comprehensible input) benefits vocabulary acquisition and improves reading speed. Depending on them, we can suggest that people who abundantly read literature are more likely to pass their language exam with better grades, as they manage to finish reading the text in the specific time that is offered, and also they can analyze the text and answer more questions correctly.

Both reading and listening are receptive/perceptive skills, therefore, the development of reading skills comprehension helps develop listening comprehension strategies as well and thus increases its quality. For many learners, it is hard to understand the native speakers or distinguish different accents and dialects. Scholars like Goh (2000) think that a strategy for students to improve listening comprehension is to have pre-knowledge in vocabulary, grammar, and phonology. The unfamiliarity of the words or words having more than one meaning can confuse the listener (Bingol et al., 2014). That is why learners should practice daily, directly (listening) or indirectly (reading) to develop their comprehension skills. There is no richer source for vocabulary besides literature, which indirectly, and unconsciously helps us to enrich our ark of lexis.

Reading literature has a direct positive relationship with the improvement of writing skills. This can be proven by Hiverla's study, where he examined almost 200 students. He divided students into two groups. Both of them read a short novel, the difference was that the first group wrote a response paper in a formal, academic way, and another group in a non-formal style. According to his study more than half were positive towards reading literature in English and 2/3 of the group thought that literature-based writing is a useful tool (Hirvela, 2005). Graham and Hebert (2011) state that reading provides the topics and ideas for writing, vocabulary and structures to be used, while writing about the literature read improves reading comprehension skills and critical reasoning.

Artworks and Language Acquisition

At the first sight, art is very explicit, on the other hand, every artwork carries huge meaning and messages implicitly. It is saturated by personal "values and philosophy of life" (Setyawan & Dopo, 2020, p. 39). The same can be said about literature. The difference is that, while reading, we use our imagination to create images, however when we look at the artwork, we do not need to create an image, that is already there, but we need our cognitive abilities to see what is hidden implicitly in it, to see the wide spectrum behind the artwork.

Art benefits a person in two ways. First, perceiving it is a cognitively demanding process (part of aesthetic education) and second, to watching works of art lets people experience pleasure - to entertain and to have fun (Houghton, 2017). Unfortunately, art does not occupy a significant place (if at all) in curricula not majoring in arts, while it could be very useful to include it in some humanities and social studies.

As art can be useful in many ways, it is reasonable to think that it can influence the development of our language skills, too. Bowkett and Hitchman (2012) believe that comic art can be very useful for kids to improve their reading, writing, and speaking skills. They give quite logical reasons for that. Children draw all the time, besides they get visually literate via paintings in books or the internet, and this is something they feel confident in. Although expressing their opinion about visual images can be quite challenging for them, comic art frees them from tension and makes verbal expression easier for them, as this is like a hook. First, they are interesting and involving, and second, they are easy to follow.

According to Sears (2012), the visual arts might be useful for learners who have trouble with reading and writing to express their thoughts. Through art, they can build their understanding depending on what they see. Bayri in his research dedicates a subchapter to *"Language as a product of culture"* and states that students, who participated in his research believed that a language is a product of a culture and acquiring it is the most effective way is to dive into and explore cultural heritage (Bayri, 2010, p. 171). This is why incorporating art into language teaching / learning is so beneficial.

Describing various pieces of art requires certain vocabulary, which is very useful for language learner. They need to speak about various colours, shapes, objects, landscapes, portraits, etc. Kim et al. (2022) offer different concepts for different principles and elements of art. For instance, a line unites the following vocabulary "blurred, broken, controlled, curved, diagonal, horizontal vertical, thick, thin, active, straight" or the texture can be "bumpy, flat, smooth gestural, rough", we can talk about colors by using a wide variety of adjectives such as calm, cool, chromatic monochromatic, muted, warm, transparent" (p. 2). Through such wide range of vocabulary, students can understand texts not only about art, but also nature, weather, mathematics, and even recipes.

Besides, enriching lexis, visual aids help learners to comprehend the discourse (Deasy et al., 2002 as cited in Thulasivanthana, 2020). Sometimes it is hard for language learners to catch up with the plot, however, hints like images and paintings may help them to follow up.

Music, both with and without lyrics, is useful for language teaching and learning. Due to creating a relaxing atmosphere, songs can be an effective tool in language acquisition (Degrave, 2019), but more specifically in listening skills improvement. Filling the gaps in music lyrics is a very popular technique nowadays. In this way, language learners have to

concentrate and try to 'catch' words, through background noise that musical instruments are creating. Besides, pre-listening activities, or song-oriented activities followed after pre-listening activities such as jumble, provoke interest towards language learning (Scrivener, 2005 as cited in Hadi, 2019) and help language learners get acquainted do the listening exercises and be able to understand native and non-native speakers better.

Research Method

The goal of the research was to study the impact of comparative literary and cultural studies on English language acquisition. As I needed to obtain objective results in order to test the hypothesis, a quantitative – experimental – research design would be best suitable for the research objectives of this study. "Experimental research has had a long tradition in psychology and education…" (Ross & Morrison, 2013, p. 1021) and in education "it might be used to determine if a certain material is fire-resistant or if a new teaching method achieves better results" (Goddard, Melville, 2004. p. 8). Since the current research focuses on language acquisition through a new model, it was interesting to test and observe how students feel about CLCS, and whether they think that their language proficiency can be improved through the course. However, due to time and resource limitations, it was not possible to apply a true experiment with a control and experimental group. The course of comparative literary and cultural studies is not delivered within the program of English Philology at IBSU, so the control group could not be formed. Therefore, a pre-experimental research design (before the true experiment) called 'efficacy study' of a 'post-test only study' type. Efficacy studies "are used to demonstrate if a given treatment can produce positive results under ideal conditions" (Thyer, 2012).

After four weeks of treatment sessions, a self-developed questionnaire was sent to students. Questionnaires are one of primary data collection methods which can be used in quantitative studies, both descriptive and experimental. "The questionnaire is one of the common devices for collecting information and a form or instrument including a set of questions and secure answers that respondents (from a specific population) fill to give the researcher information needed for the study" (Taherdoost, 2021, p. 14). The questionnaire included multiple choice, 5-point Likert scale and open-ended items. While the former permits to assess the percentage of the participants supporting a particular opinion, the latter provides more refined information concerning the degree to which they share the given opinion. "Multiple choice test items can be written to assess various levels of learning outcomes, from basic recall to application, analysis, and evaluation" (Brame, 2013). "The Likert scale is a five (or seven) point scale that is used to allow an individual to express how much they agree or disagree with a particular statement… Likert scales have the advantage that they do not expect a simple yes / no answer from the respondent but rather allow for degrees of opinion and even no opinion at all." (Evans, 2023).

Participants

The population of the study involved IBSU students from School of Education, Humanities and Social Sciences, at English Philology program, more exactly, 33 senior students of this program, as comparative literary and cultural studies can be taught only to a high stage of Bachelor's studies so that students have sufficient field knowledge to do the comparison. The selection method was purposive and convenience. Those students who got interested in the research were asked to contact me directly and were added to the messenger group where they could see who were the other participants. Information about the date and place of the

meetings was spread via Messenger. According to the research ethics requirements, the participants were voluntary; they were informed that the results would be anonymous and that they would be permitted to quit any moment if they thought the research was in some way harmful for them.

For the study, 8 university students who major in English philology were gathered. The level of their English skills was B2+, which enabled them to do deep analysis of the literary work under study. They had taken various literary and culture-related courses before the study, so they had the skills needed to participate in the research. All participants were female students (81.81% of the population are females). They all were volunteers (the participation in the study was voluntary). They were warned that research results would be anonymous and confidential and that they could quit the study at any stage if they wanted. However, none of them did. They were all very motivated to learn something new, to develop new skills and participated actively, despite their busy schedule.

Procedure

The participants attended four-week sessions (the duration of one session was 2 hours and a half). As homework they read the required literary works and in class they compared them to other literary or cultural works. The students compared two literary trends (Realism and Modernism), literary works on similar themes but written in different languages (English and Georgian), literary and cultural (short movie) works on common objectives and literary and cultural (artwork) created on the same themes.

Besides analyzing and comparing those works, the participants focused on the development of communication and linguistic skills. While reading skills were developed in all classes, each week they focused on a particular language skill and were fulfilling relevant exercises, regarding the material they were covering. The first and second weeks were dedicated to the development of speaking skills, especially its vocabulary sub-skill, in the third week students focused on listening skills and its grammatical sub-skills, and the last week was devoted to the development of writing skills and their grammatical sub-skills. Students were engaged in debates in the first and second week, they listened to recordings in the third week, while in the fourth week they wrote comparative essays. They did some matching, multiple choice and gap-filling exercises regarding new vocabulary and grammar. Table 1 reflects the literary and cultural works that the students applied.

Week	Works to be compared	Communicative skills to be developed	Activities held	Sub-skills to be developed	Exercises done
1	• *A short digest of a long novel by* Budd Schulberg • *Indian camp* by Ernest Hemingway	Reading and speaking	Question-answer, oral analysis, debates	Vocabulary	Grouping (synonyms, antonyms; thematic grouping via brainstorming), matching the words and the definitions, brainstorming the vocabulary on the topic, gap-filling and multiple choice
2	• *The model Bernard* Malamud (American) • *Gandegili* Ilia Chavchavadze (Georgian)				
3	*Miss Brill* by Katherine Mansfield *Miss Brill* - a film by Simon Lewis	Reading and listening	Listening to recordings, watching videos	Grammar	Gap-filling, matching, multiple choice
4	*Lamb* with artwork- by William Blake *Tiger* with artwork- by William Blake	Reading and writing	Group work (developing a draft), individual writing, pair work (assessing each other's writing), essays read aloud	writing	Tips to write comparative analysis (via brainstorming, bullet points, collaborative work) Writing a comparison essay

Table 1. Research Design

The questionnaire was held in the fifth week and later its results were analyzed. Some of the exercises were taken from the book *A world of fiction* (Marcus, 2006), but many of the exercises were self-made (see Appendices 1, 2, 3). One of the tasks was to work in pairs and in group of three and to find words connected to certain semantic field. One pair of students had to identify lexis regarding nature, another pair - vocabulary connected to religion, and the group of three had to identify the adjectives describing the appearance of a person. Later on words that they have found and were stuck on a big poster (Appendix 2), where all students could read and ask the meanings of the words if they did not know.

Results

The data revealed that all participants (87.5%), except one (with a randomly given letter as a name-#A) believe that their language skills have improved in some way (see Figure 1.) #A states that she is not sure whether her skills have improved, however, later on the participant in the following sections wrote that her speaking (on a scale from 1-5 where 5 is the highest she chose 4) has improved, which means she does not totally deny the approval. Since the student #A later indicated that some of her language skills have improved, taken together, the results demonstrate that all participants agree on some improvement of their language skills.

Figure 1. Students' Opinions of Language Skills' Improvement

Further questions narrowing down to each particular language skill, the first of which was *speaking* (see Figure 2). Since students analyzed literary and cultural works orally, it was expected that they would improve their oral competency. Seven volunteers (87.5 %) also think that their speaking skills have developed, and only 1 participant is unsure about it. The majority of the students (62.5%) assess the improvement as a fair one, while 37.5% as an average one (which is normal, taking into consideration the short time span of the treatment).

Analogous results were revealed regarding *listening* skills. Here one participant (12.5%) out of 8 rejects her listening skills development (see Figure 3). What else distinguishes those two data is that 62.5% think that their listening has improved fairly, for 25% of the participants it was developed greatly, as for the student #A, sessions were not enough for listening skills development, as she evaluated her development as minor ("2").

Concerning *reading* skills (Figure 4), 75% of the respondents answered that their reading skills developed during the treatment and 25% answered "maybe". However, 12.5% responded that they developed greatly and 12.5% that they developed fairly, while 75% that the development was average.

Concerning *writing* skills (Figure 5), again, 62.5% of the respondents answered that their reading skills developed during the treatment. However, 25% of them responded "maybe" and 12.5% (Student A) - "no". Only 12.5% responded that they developed greatly and 12.5% that they developed fairly. The majority (75%) responded that their development was average.

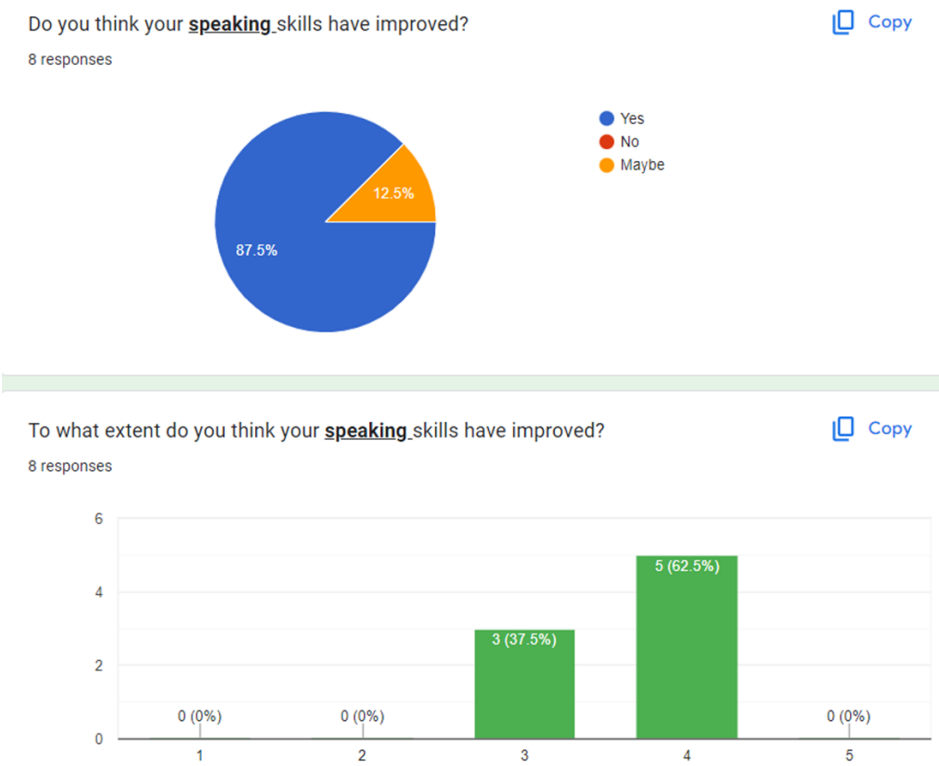


Figure 2. Students' Opinions of Speaking Skills' Improvement

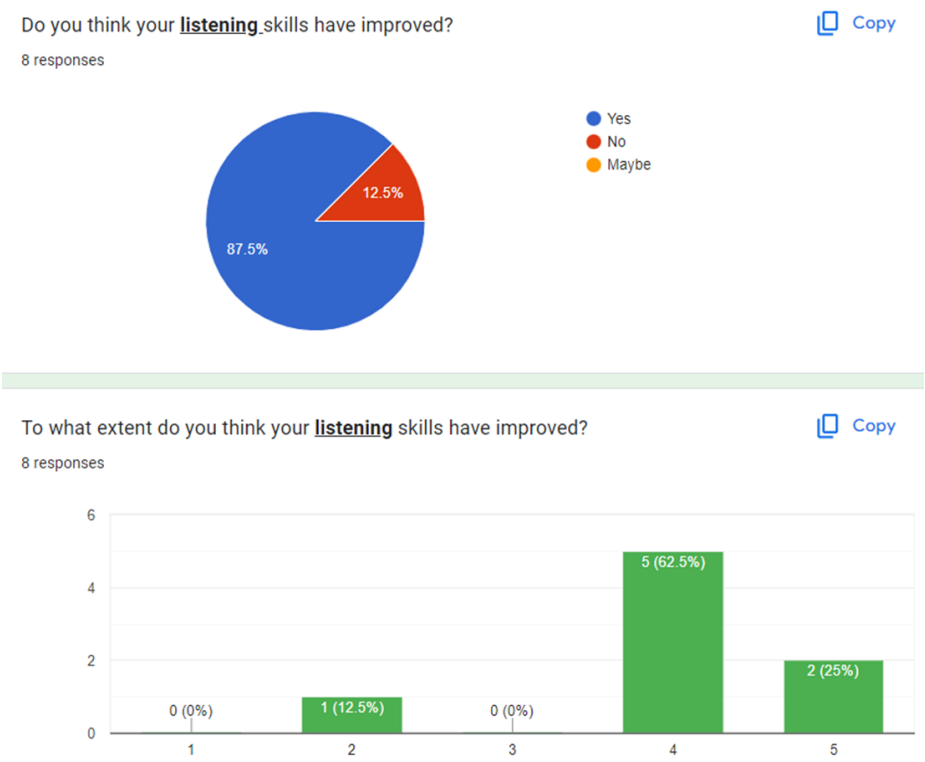


Figure 3. Students' Opinions of Speaking Skills' Improvement

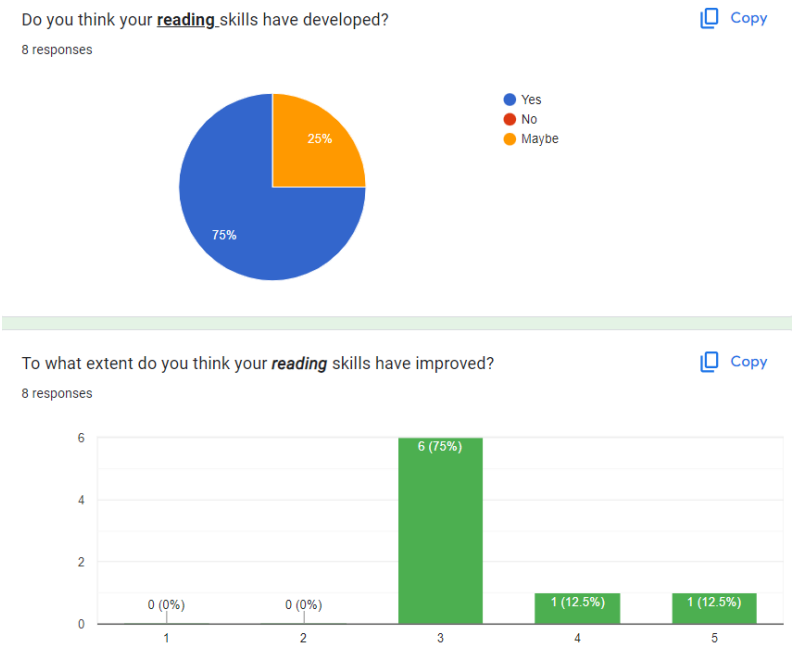


Figure 4. Students' Opinions of Reading Skills' Improvement

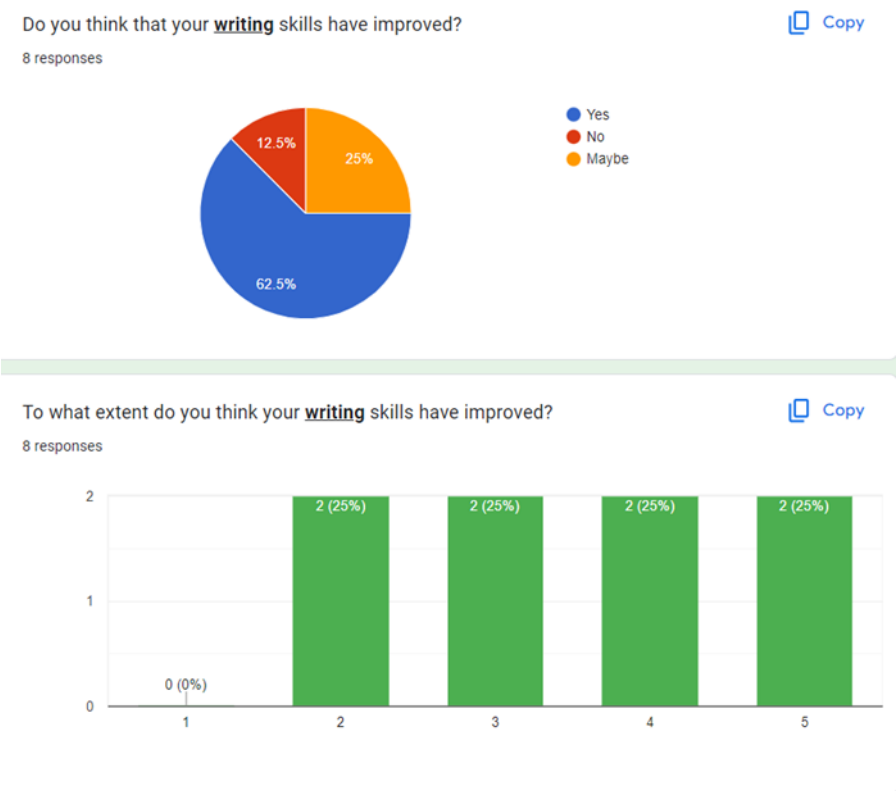


Figure 5. Students' Opinions of Writing Skills' Improvement

Positive answers were revealed regarding vocabulary (see Figure 6). 87.5% of the respondents consider that their vocabulary has been enriched after CLCS application, while 12.5% responded "I am not sure". The degree to which the vocabulary increased was assessed as average by 12.5% of the respondents, while the majority assessed the enrichment of vocabulary as "fair" (50%) or great (37.5%).

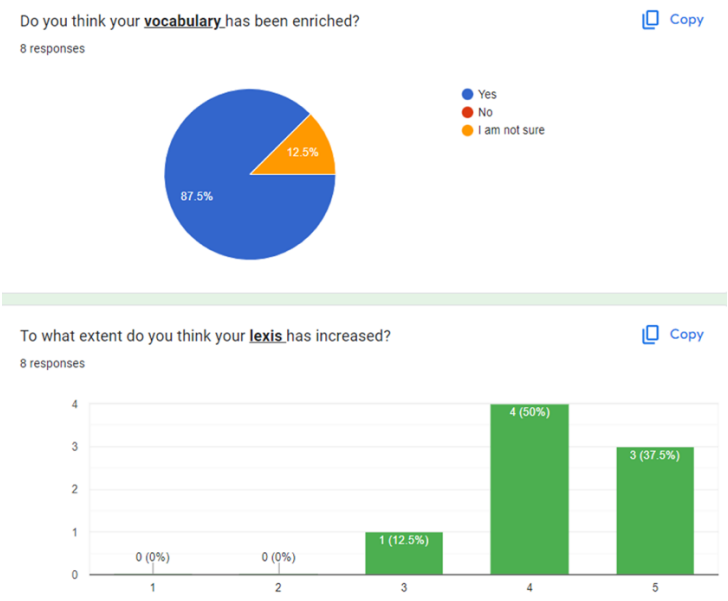


Figure 6. Students' Opinions of Vocabulary Enrichment

The findings (Figure 7) imply an impact of CLCS on the development of grammar skills. Likewise other skills, 62.6% of the respondents agree that their grammar skills have improved, 25% said "maybe" and 12.5% - "no." The degree of the impact was not so high: 12.5% assessed it as minor, 37.5% ad average, while half of them more positively (25% as fair and 25% as great).

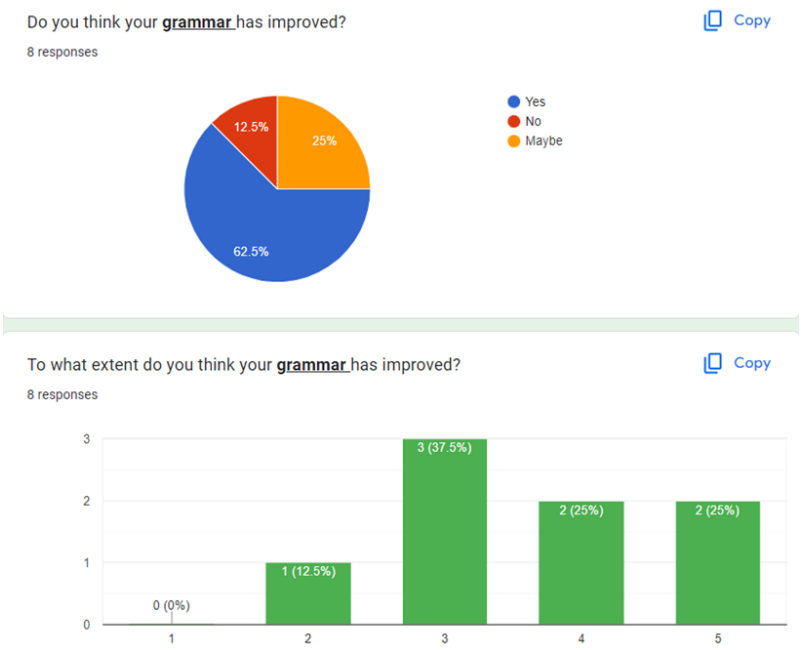


Figure 7. Students' Opinions of Grammar Skills' Improvement

All participants enjoyed the process and evaluated it with the highest score, except student #1 (who selected "4", which is also a very positive assessment). After observation, several reasons appeared why there might be discordance in student #1 answers:

- She did not feel comfortable during the sessions.
- The level of her language skills were higher than those of other students.

- She did not take into consideration that she should have compared CLCS sessions to usual language classes.
- Obviously, only four sessions of CLCS cannot condition an impressive language skills development, but the extent had to be compared to 4 sessions of a traditional language lesson.

Overall, the research has revealed that all of the participants think that their language skills have improved to a certain degree (especially vocabulary and listening skills, least results were shown for grammar skills; surprisingly – as all sessions involved reading – reading skills did not exercise great improvement). What is important that for all of them the process was enjoyable and not difficult.

The participants also support the effectiveness of CLCS in the classroom, as around 90% agree that it was easier to acquire each language skill via the CLCS method rather than the traditional one. (for complete students' answers visit Appendices 4-6).

The results of the experiment indicate that CLCS establishes a baseline for an easy language acquisition process and a positive environment. Because of that, it is suggestible that the CLCS plays a role in the language acquisition process, as for successful language acquisition, motivation plays a huge role (Gardner & Symthe, 1975; Dörnyei & Schmidt, 2001; Norris-Holt, 2001). The data mentioned above leads the study further, as positive environment as a motivation is a positive reinforcement in language acquisition process.

Discussion

The findings of that study provided valuable insights into the connection between making comparisons and improvement in language proficiency, as all of the participants agree that their language skills have improved in some way. Since only four sessions were held, it is difficult to interpret the very precise result, however, this study, in light of the results obtained, supports the idea that further study on the issue of the efficiency of comparative literary and cultural studies is worth holding.

Since comparative literary and cultural studies is a new approach to language acquisition, especially in Georgia, there is a gap and knowledge deficit in the existing literature that studies the influence of these studies on language acquisition, however, there are some researches and studies which in some way overlap current research objectives.

Litualy and Serpara (2021) in their paper state that comparative literary studies help educators to create more and more teaching materials, which will help students to develop all language skills (reading, writing, listening and speaking). Moreover, they state that through this method students can learn the language better, as they concentrate on authentic tasks and language acquisition occurs incidentally (language anxiety is removed). "Learners are trained to listen to dialogues in plays or poetry arrays through video recorders, imitate or repeat them through speaking skills, record them (write) in notebooks, and then read them according to the rhythm and intonation they listen to appropriately" (p. 19). In conclusion, Litualy and Serpara (2021) declare that "comparative literary works can be functioned and used as one of the bases in the learning of language skills through diction, language style, writing style, and expressions used as a medium of literary work" (p. 22). Their conclusion is in line with the findings of the current research.

We can say that reading literary discourse and analyzing cultural work helps language learners to acquire the target language, to improve language skills, and to comprehend the plot better, however, a study conducted for this research paper has shown that it not only helped the students to improve their language skills, but also increased their motivation, as CLCS was more or less easier for them than traditional language learning classes. Moreover, students in open-ended questions named some transferable skills (such as team-working, critical analysis, and social skills) that developed as result of the treatment. This corresponds to Tötösy de Zepetnek (1999) study saying that the comparative perspective and approach have shown to be vital in numerous fields, establishing themselves both cognitively and institutionally. Boroditsky (2007) conducted four experiments that proposed the idea that comparison can play a crucial role in knowledge expansion as people group similar things together, which later aids them to recall one according to another's resemblance. This cognitive function of the learner's brain could assist language learning.

Limitations of the Study

Despite its contributions, it is important to acknowledge that this study has several limitations. One limitation of this study is its narrow scope, which focused solely on the students at the International Black Sea University, more specifically on senior English philology students. Since all of the students major in English and their instruction language is the target language and not Georgian, as it is in the majority of universities in Georgia, it covered the entire spectrum. The results might have been different if students from different universities and different faculties have been mixed for the experiment. One more potential limitation of this study is the small sample size, it was difficult to find more than 8 volunteers who would participate in the experiment, and this may affect the generalizability of the findings. A limitation to be also acknowledged an exclusive emphasis on female participants. Many researchers (Viriy & Sapsirin, 2014; Zoghi et al., 2013; Akram & Ghani, 2013) believe that female and male students acquire language differently, in this case, this study needs a future overview. This research is also limited to a specific nationality, as all of the participants of the study were Georgian, it limits its globalism.

For more generalized results, it would have been better if students from different nationalities, universities, faculties and sex have been mixed.

Conclusion

To conclude, it is important to once again overview the paper. The paper chapter goes through the importance of language acquisition and different ways of it (including reading literature, and analyzing artwork). Through the literature review, it has been uncovered that many researchers have studied those activities independently and they found a positive link between them and language acquisition or/and language skills improvement. For instance, Povey (1979) even in the previous century and Zakarneh and Mahmoud (2021) in this century stated that reading literature plays a huge role in language acquisition. Hirvela's (2005) study proved that reading literature has a direct positive relationship with the improvement of writing skills. Bowkett and Hitchman (2012) believe that comic art can be very useful for kids to improve their reading, writing, and speaking skills. According to Sears (2012), the visual arts might be useful for learners who have trouble with reading and writing to express their thoughts. The second subchapter deals with comparative studies, their definition and role in education. Since the first sub-chapter of the first chapter proved that all those alone standing ways of acquisition help, it was interesting for the current research to

find out whether the combination of these approaches could also influence the learning process. The second chapter concentrates on the process of the research. The questions posed in the research were answered as follows:

How do CLCS influence English as a second language acquisition? –As the study process took place during authentic (communicative) activities, the native-like acquisition of language occurred.

How do CLCS influence the improvement of language skills (speaking, writing, listening, and reading)? - The application of CLCS have a positive impact of the development of all language skills.

How do CLCS influence the comprehension of the literature? – Due to analysis done, the comprehension is deeper.

Acknowledgements

I would like to express my deepest gratitude to my professor and friend Nato Pachuashvili for her invaluable guidance and feedback throughout the research process. She has always been very patient and supportive. She helped me deal with every challenge. I am very happy to have the opportunity to know a highly intelligent and highly diligent person, from whom I have learnt a lot and without whom I would not be able to create the final product.

Appendices

Appendix 1. Students discussing new vocabulary

Appendix 2. Sample of new vocabulary grouped by students

Nature	***Religion***	***Appearance***
• Rays • Sun • Eagle • Vulture • Mountain • Ice-bound wall • Fire • Sky • Clouds • Thunder • Earth • Wind	• Monks • Woe • God • Praise • Saints • Divine • Holy • Sinful • Satan • Faithlessness • Evil • Devil	• Wondering eyes • Youthful maiden • Noble mien • Meek • Graceful • Beauty shed • Fair maid • Divine • Adorned in beauty • Beauty soul

References

Aka, N. (2020). Incidental learning of a grammatical feature from reading by Japanese learners of English as a foreign language. *System, 91*, 1-14.

Arens, K. (2006). When comparative literature becomes cultural studies: Teaching cultures through genre. *The Comparatist,* 29, 123-147. https://doi.org/10.1353/com.2006.0003

Bayri, G. (2010). The student perception of visual arts in the speaking classroom. *International Journal of Arts and Sciences*, *3*(11), 166–180.

Bingol, M., Celik, B., Yildiz, N., & Mart, C. (2014). Listening comprehension difficulties encountered by students in second language learning class. *Journal of Educational and Instructional Studies in the World*, *4*(4), 1-5.

Boroditsky, L. (2007). Comparison and the development of knowledge. *Cognition*, *102*, 118–128. https://doi.org/10.1016/j.cognition.2002.08.001

Brame, C. (2013). Writing good multiple choice test questions. Retrieved June 05, 2023 from https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions/

Cambridge Dictionary. (n.d., b). *Speak.* Cambridge Dictionary. Retrieved February 9, 2023, from https://dictionary.cambridge.org/dictionary/english/speak

Coyle, D. (2006). *Content and language integrated learning. Motivating learners and teachers.* Retrieved from https://blocs.xtec.cat/clilpractiques1/files/2008/11/slrcoyle.pdf

Deasy, R., Catterall, J. S., Hetland, L., & Winner, E. (2002). *Critical links: Learning in the arts and student academic and social development.* Arts Education Partnership.

Degrave, P. (2019). Music in the foreign language classroom: How and why? *Journal of Language Teaching and Research*, *10*(3), 412. https://doi.org/10.17507/jltr.1003.02

De Smet, A., Mettewie, L., Hiligsmann, P., Galand, B. & Van Mensel, L. (2023). Does CLIL shape language attitudes and motivation? Interactions with target languages and instruction levels. *International Journal of Bilingual Education and Bilingualism, 26*(5), 534-553. https://doi.org/10.1080/13670050.2019.1671308

Dörnyei, Z., & Schmidt, R. (Eds.). (2001). *Motivation and second language acquisition* (Vol. 23). National Foreign Language Resource Center, University of Hawai'i at Manoa.

Evans, O.G. (2023). *Likert scale definition, examples and analysis.* Retrieved from https://www.simplypsychology.org/likert-scale.html

Gardner, R.C., & Smythe, P. C. (1975). Motivation and second-language acquisition. *Canadian Modern Language Review*, *31*(3), 218-233.

Goddard, W., & Melville, S. (2004). *Research methodology: An introduction.* Juta and Company Ltd.

Goh, C.C.M. (2000). A cognitive perspective on language learners' listening comprehension problems. *System, 28*(1), 55–75. https://doi.org/10.1016/S0346-251X(99)00060-3

Graham, S. & Hebert, M. (2011). Writing to read: A meta-analysis of the impact of writing and writing instruction on reading. *Harvard Educational Review, 81*(4), 710–744. https://doi.org/10.17763/haer.81.4.t2k0m13756113566

Hall, G., & Cook, G. (2012). Own-language use in language teaching and learning. Language Teaching, 45(3), 271-308. https://doi.org/10.1017/S0261444812000067

Hirvela, A. (2005). ESL students and the use of literature in composition courses. *Teaching English in the Two-Year College*, *33*(1), 70-80.

Hişmanoğlu, M. (2005). Teaching English through literature. *Journal of Language and Linguistic Studies, 1,* 53–66.

Houghton, N. (2017). What are we teaching when we teach art? *Journal of Research in Art Education*, *18*(2), 97–116. https://doi.org/10.20977/kkosea.2017.18.2.97

Lao, C.Y., & Krashen, S. (2000). The impact of popular literature study on literacy development in EFL: More evidence for the power of reading. *System, 28*(2), 261–270. https://doi.org/10.1016/S0346-251X(00)00011-7

Marcus, S. (Ed.). (2006). *A world of fiction: Twenty timeless short stories* (2nd ed). Pearson/Longman.

Norris-Holt, J. (2001). Motivation as a contributing factor in second language acquisition. *The Internet TESL Journal*, *7*(6), 1-8.

Obeidat, M. (1997). Language vs. literature in English departments in the Arab world. *English Teaching Forum*, *35*(1), 30-37.

Pang, E.S., Muaka, A., Bernbardt, E.B., & Kamil, M. L. (2003). *Teaching reading. Educational Practices*. International Academy of Education (IAE), Palais des Academies. https://files.eric.ed.gov/fulltext/ED481186.pdf

Pellicer-Sánchez, A. (2017). Learning L2 collocations incidentally from reading. *Language Teaching Research, 21*(3), 381–402. https://doi.org/10.1177/1362168815618428

Povey, J. F. (1967). Literature in TESL programs: The language and the culture. *TESOL Quarterly, 1*(2), 40-46.

Ross, S. M., & Morrison, G. R. (2013). Experimental research methods. In J.M. Spector, M.D. Merrill, J. van Merrienboer, & M.P. Driscoll (Eds.). *Handbook of research on educational communications and technology* (pp. 1007-1029). Routledge.

Salomone, R. (2022). *The rise of English. Global politics and the power of language.* Oxford University Press.

Scrivener, J. (2005). *Learning teaching: A guidebook for English language teachers*. Macmillan.

Sears, E.L. (2012). Painting and poetry: Third graders' free-form poems inspired by their paintings. *Journal of Inquiry and Action in Education, 5*(1), 17-40.

Setyawan, D. & Dopo, F. (2020). Strengthening national identity through the learning of East culture-based art education. *Harmonia: Journal of Arts Research and Education*, *20*(1), 39–46. https://doi.org/10.15294/harmonia.v20i1.21711

Taherdoost, H. (2021). Data collection methods and tools for research: A step-by-step guide to choose data collection technique for academic and business research project. *International Journal of Academic Research in Management (IJARM)*, 10(1), 10-38.

Taylor, P. (2022). Perceptions of in-service teachers towards CLIL and CLIL teachers' target language and intercultural competences: The context of English-medium instruction schools in Thailand. *LEARN Journal: Language Education and Acquisition Research Network, 15*(1), 565–587.

Thulasivanthana, U. (2020). Incorporating visual arts into English language teaching. *Shanlax International Journal of English*, *8*(4), 52–56. https://doi.org/10.34293/english.v8i4.3320

Thyer, B.A. (2012). Pre-experimental research designs. In *Quasi-experimental research designs, pocket guides to social work research methods* (online edition, Oxford Academic, 24 May 2012), https://doi.org/10.1093/acprof:oso/9780195387384.003.0002, accessed 5 June 2023.

Tötösy de Zepetnek, S. (1999). From comparative literature today toward comparative cultural studies. *Purdue University Press*, *1*(3). https://docs.lib.purdue.edu/clcweb/

Viriya, C. & Sapsirin, S. (2014). Gender differences in language learning style and language learning strategies. *Indonesian Journal of Applied Linguistics, 3*(2), 77-88.

Zakarneh, B. & Mahmoud, M. (2021). Examining the effect of teaching English language through literature. *International Journal of English Language and Literature Studies, 10*(3), 213–223. https://doi.org/10.18488/journal.23.2021.103.213.223

Zoghi, M., Kazemi, S. A., & Kalani, A. (2013). The effect of gender on language learning. *Journal of Novel Applied Sciences, 2*(4), 1124-1128.

Learning Environment on the Move: First Design Concepts to Embrace Embodied Learning in Secondary Education

Lindsay Everaert, Hasselt University, Belgium
Wim Tops, Hasselt University, Belgium
Anouk Agten, Hasselt University, Belgium
Ruth Stevens, Hasselt University, Belgium

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Embodied learning is a recent educational approach that combines learning with simultaneous execution of physical activity. It can enhance well-being and academic performances of pupils. However, in contemporary secondary educational settings, the conventional practice still involves students receiving instruction while being seated. A crucial goal therein is to explore whether classrooms of secondary education schools, given their current architectural design and construction, can embrace the implementation of embodied learning. In pursuit of this goal, a two-track exploratory study was conducted: 1) surfacing which architectural elements in the current classroom environment encourage or restrict the execution of embodied learning, and 2) developing solution-oriented design ideas to facilitate embodied learning. The research focused on secondary school classrooms in Flanders and considered the perspectives of both students and teachers. The results indicated that current classroom environments are not yet optimally equipped to facilitate all forms of embodied learning. However, the solution-oriented designs represented design alterations on diverse architectural scale levels to modify classroom environments, making them more welcoming to embodied learning principles. This exploratory study underscores the need for a more comprehensive focus on embodied learning implementation, the required design adaptations, and further exploration of it.

Keywords: Embodied Learning, Learning Environment, School Architecture, Classroom Design, Secondary Education

iafor
The International Academic Forum
www.iafor.org

Introduction

Movement-Based Learning

Prolonged sitting when learning subject matter in a seated position, is a contemporary phenomenon in secondary education. Extended periods of inactivity are linked with various adverse effects, including low back pain (Mahdavi et al., 2021), alterations in hemodynamic parameters (Tao et al., 2020), increased risks of obesity and insulin resistance (Sisson et al., 2013), and it even affects aspects of well-being such as mood state (Penedo & Dahn, 2005). These consequences explain why it can be beneficial for pupils to implement more active teaching methods at school, such as the integration of physical activity before or during the lessons. Mavilidi et al. (2018) discussed the implementation of school-based physical activity integration for better learning and cognition performances, and mentioned improved cognitive functioning of executive functions such as problem solving, planning, and memory. When learning is combined simultaneously with executing physical activity, it's referred to as embodied learning (Schmidt et al., 2019), deriving from the principle of embodied cognition which emphasizes the importance of the interplay between body and brain (Wilson, 2002). Toumpaniari et al. (2015) found that acquiring a new foreign language using embodied cognition techniques (such as engaging in task-related physical activities), exhibits a significant increase in enthusiasm, which can benefit learning performances. Furthermore, the implementation of embodied cognition caused improvements in learning outcomes of English and mathematics (McClelland et al., 2014), and recalling science course contents (Mavilidi et al., 2017).

Architectural School Landscape

While the learning environments of young children embrace interactive teaching and learning (e.g., learning via playing and outdoor learning) (Rasmussen, 2021; Eberhard, 2009; Brock et al., 2013), the sedentary behavior of secondary school pupils increases (Pearson et al., 2017). This sedentary way of receiving instructions is architecturally linked with classrooms where tables and chairs are prominently present. Unfortunately, these two furniture elements are often not designed to meet the physical and mental needs of every pupil since every individual is different (e.g., posture or supporting optimal performance of school tasks) (Wingrat & Exner, 2005). A solution may be the change towards using flexible furniture. Flexible learning spaces and furniture deviate from passive teaching methods and thus embrace pupil-centered approaches, increasing engagement and autonomy (Kariippanon et al. 2017). This change from traditional passive approaches, which are based on a sedentary classroom environment, to a more inclusive and flexible environment, constitutes a considerable challenge for designing and realizing 'optimal' school environments. A knowledge base for this is still lacking. However, research of the past years focuses on emerging the built environment and the effects on learning and teaching (Gislason, 2010; Tapia-Fonllem et al., 2020), such as 'Teaching Green School Building' where design improves education about sustainability (Cole, 2012). This type of research should be expanded to gain more empirical evidence that links didactical approaches with the classroom environment in which well-being of the users (e.g., teachers and pupils) is incorporated in the built design. Creating environments that foster well-being aligns with the principles of "Design for Human Flourishing" in architecture (Stevens et al., 2019). This approach advocates for the development of design strategies that enable individuals to let them flourish in their environment (Stevens et al., 2019).

Current Study

Research focusing on embodied learning and embodied cognition showed positive results in terms of emotions and academic performances. Pre- and primary school learning environments are well-equipped to support this type of more active learning approaches. However, learning while seated is still the norm in secondary education. A change from these traditional sedentary approaches to a more inclusive, flexible and moving-friendly classroom environment that embraces pupil-centered approaches, constitutes a considerable challenge for designing, building and realizing 'optimal' school and classroom environments, keeping in mind the requirements of its users. A knowledge base and research in this field is lacking.

Current research investigates if classrooms of secondary schools in Flanders (Belgium), based on their current architectural design, are welcoming to embodied learning. Additionally, we seek to enlighten the perspective of teachers and pupils related to this. Based on the aim, the research is divided in a two-track exploratory study: 1) objectifying which architectural elements in the current classroom environment encourage or restrict examples of embodied learning, and 2) developing solution-oriented design ideas to facilitate embodied learning. Hence, the current study screens the present Flemish classroom environment through the lens of its users by addressing design and furnishing on different architectural scale levels. A qualitative research approach, combined with visualization techniques, were used as it is crucial to capture users' perspectives and thoughts about embodied learning within the classroom environment.

Methodology

Design

The current study involved two secondary schools in Flanders, Belgium. Both schools had no expertise or knowhow of embodied learning. In total, eighteen participants of which six teachers and twelve pupils (aged twelve till sixteen), participated in the current study. The Medical Ethics Committee of Hasselt University approved the current research.

Sticky Note Experiment

Conduct of the Experiment.

To objectify which architectural elements in the current classroom environment encourage or restrict embodied learning based on the user's perspective, a sticky note experiment was conducted. Teachers and pupils viewed five distinct photos or video clips of a diverse array of embodied learning examples. Participants were given red and green sticky notes. After viewing each example of embodied learning, they were allotted time to reflect and explore their current classroom. Pupils and teachers were instructed to examine fixed elements (such as windows and doors) and flexible elements (such as furniture) within the classroom, noting which elements either encouraged (green sticky note) or hindered (red sticky note) the example of embodied learning. Additionally, participants were asked to briefly note why each element either encouraged or hampered the example of embodied learning. This process was conducted individually, with each participant's perspective considered. The sticky notes were anonymously completed. The responses from teachers and pupils were put together. The method was repeated for each embodied learning example, for each classroom. In total, the sticky note experiment was repeated three times in three different classrooms. Participants were free to use as many sticky notes as they deemed necessary. If certain architectural

elements were out of reach (e.g., ceiling), participants placed sticky notes nearby and provided detailed descriptions.

Video and Photo Fragments.
Fragment one depicted two individuals sitting on a wobble chair and on a sitting ball while studying subject matter. *Fragment two* featured individuals learning while moving on a bicycle desk (a stationary bike combined with a desk) or a walking desk (a slow treadmill combined with a desk). *Fragment three* showcased a teacher dividing the chalkboard into 'true' and 'false' sections while asking the pupils 'true-false' questions. Pupils indicated their answers by jumping left (false) or right (true), with no equipment involved. During *fragment four*, a small ball was introduced into the embodied learning activity. A teacher divided the chalkboard into two sections, labeled as 'false' and 'true'. The pupils arranged themselves in a row setup. The teacher then proceeded to ask each pupil a question and tossed the small ball towards the first pupil in the row. If the pupil believed the answer was false, they caught the ball and raised their left hand. Conversely, if the answer was true, they caught the ball and raised their right hand. Finally, during *fragment five*, participants engaged in embodied learning while seated. One individual quietly moved a soccer ball back and forth using one or both feet, while another person moved one foot up and down using the tip and ankle while seated.

Solution-Oriented Designs

To develop solution-oriented designs, (interior) architecture design experts and researchers, as well as a researcher in educational studies, compared the participants' answers on the sticky notes together with the floor plans and images of the classrooms discussed (architectural lay-out of the classrooms). These results gave a clear view of encouraging or hindering elements in the classrooms to engage in embodied learning. After this thorough analysis, several possible scenarios for the space were devised, which were brought together in drawn designs to allow more movement. Herewith, possible safety issues and practical feasibility were considered.

Results

For every discussed classroom, firstly, a short description was given of the architectural lay-out of the current state of the room. Secondly, findings were reported of the sticky note experiment. Finally, a solution-oriented design outline was created by combining the architectural lay-out with the sticky note results.

Classroom 1: Technical Classroom

Description Classroom.
The technical classroom is a 7.5-meter by 11-meter space, currently divided into two areas. This division is made by using tables and a movable whiteboard to have a physical boundary between the teaching/theoretical area and the practical area. Within the teaching area, eight double desks are available for sixteen pupils to follow lessons. However, regarding the practical zone, six higher square desks without seating possibilities, fill the room to work on practical subjects. Finally, the practical area where technical labs are executed, is occupied by large closets containing practical materials. Artificial light as well as natural light brighten the room (Figure 1).

Figure 1: Architectural lay-out of the technical classroom.

Sticky Note Experiment.

It was noticeable that many red sticky notes were found on technical infrastructure and equipment in the technical classroom, for fragments one till four. Red sticky notes were also found on the wall which, according to the participants, indicated the poor acoustics of the classroom. Concerning fragment five (embodied learning was executed while seated), green sticky notes were found on tables and chairs. Pupils and teachers indicated that this example of embodied learning would be possible in the current classroom because of sufficient space available for the body to move while sitting on the chairs and using the desks (Table 1).

Solution-Oriented Designs.

The current architectural lay-out of the room and findings of the sticky note experiment were used as a stimulus to develop design alterations for the technical classroom (Figure 2). The purpose of these design efforts was to introduce suggestions for more mobility into the area where theoretical learning is implemented (left area in Figure 2). First, the traditional desks can be replaced with mobile desks that can be placed at the back of the classroom, within the closet that functions as a division between the theoretical and practical area. Secondly, the room can be equipped with an interactive board (e.g., smartboard) on which subject matter is shown (e.g., calculations and outcomes; definitions about technical concepts; …). Pupils can throw a ball (size is of their own choice) in the direction of the board and try to hit the correct answer. Hence, the ball will interact with the board upon impact. A second proposal takes this further, involving a flat board or a wall without a smartboard to which velcro or another substance is attached that can catch and allow a ball to hang. The area where practical subject matter is organized (right area in Figure 2) was more or less retained in order to maintain the goal of executing practical sessions. However, larger tables were designed to create more space for technical infrastructure. Concluding, the design offers a classroom place to sit, stand and move while learning.

Fragment 1: Wobble chair and sitting ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too little space between pupils sitting at the same desk.
	Slippery floor may cause safety issues when using the wobble chair or sitting ball (e.g., falling).
Fragment 2: Walking and bicycle desk	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too much infrastructure (e.g., technical equipment) available in the room causes lack of space for EL.
	Bad acoustics of the room make that the produced noise of EL may hamper focus and concentration.
Fragment 3: Standing without using objects	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too much infrastructure (e.g., technical equipment) available in the room causes lack of space for EL.
Fragment 4: Standing using a ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too much infrastructure (e.g., technical equipment) available in the room may be dangerous for bumping.
Fragment 5: Seated	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
Applicable in the classroom because of sufficient space available.	/

Note: EL: embodied learning. When the same perspectives were given by multiple participants, these results were combined and represented as one row.

Table 1: Overview findings of the sticky note experiment for the technical classroom.

Figure 2: Solution-oriented design for the technical classroom.

Classroom 2: Language Classroom

Description Classroom.
The language classroom has a surface of 6.5 on 10 meters, consisting of fourteen double desks to accommodate 28 pupils. A teacher's desk and whiteboard with beamer projection is even present. A large decorated closet covers the entire right side of the classroom. Two prominent windows above the closet connect the room with the hallway, while the windows on the other side of the room connect the room with the outside environment. Both artificial light and natural light brighten the room (Figure 3).

Figure 3: Architectural lay-out of the language classroom.

Sticky Note Experiment.
According to the pupils and teachers, the language classroom was too small (surface) and too dense (desks/chairs) to execute the shown examples of embodied learning. Hence, a lot of red sticky notes were found scattered throughout the room. However, green sticky notes were pasted on chairs or desks for fragment one (wobble chair) and fragment five, both examples of embodied learning while seated. Participants indicated that sufficient space was available for the seated form (Table 2).

Fragment 1: Wobble chair and sitting ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
Wobble chair is possible to use as an alternative for a chair.	Sufficient space is needed to make room for the sitting ball. Sufficient space is not available.
Fragment 2: Walking and bicycle desk	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too little space in the room for walking- as well as bicycle desks because of the small surface.
	A walking desk is not suited to absorb new subject matter when writing (e.g. fill-in book or making notes) because of the hindering movements made during the example of EL.
Fragment 3: Standing without using objects	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too little space in the room (due to surface and furniture) to jump to the left or right.
Fragment 4: Standing using a ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Too little space in the room because of tables and chairs.
Fragment 5: Seated	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
Sufficient space available.	Moving the feet underneath the desk may produce hindering movements causing difficulties with writing for a language course.

Note: EL: embodied learning. When the same perspectives were given by multiple participants, these results were combined and represented as one row.

Table 2: Overview findings of the sticky note experiment for the language classroom.

Solution-Oriented Designs.

A new solution-oriented design was created by combining the current architectural lay-out of the room and the sticky note experiment's results (Figure 4). The sticky note experiment indicated the lack of space to execute this form of embodied learning in the current classroom. Hence, the novel design allows to create more learning space that goes beyond the boundaries of the traditional classroom. The idea is that the boundary (closed wall) between the classroom and the hallway (2.26m width) becomes an intermediate zone, to create a relationship between these two. Hence, the furniture has the function of a closed wall, a

closet and a desk. Furthermore, the design allows the use of closet doors as extra working desks, by horizontally hanging panels, for the pupils if more work space is needed (e.g., group tasks). Some pupils can take place in the hallway and see their fellow classmates through the opened closet. To link the design with embodied learning, this extension between the classroom and hallway can generate interaction by - for example - throwing a ball to each other to rehearse subject matter or to question each other. Walking or bicycle desks and even other materials can be placed underneath the pupils' desk. Hence, this design adopts a classroom with varying combinations in which the classroom can be more broadened and can be a place to sit and move while learning.

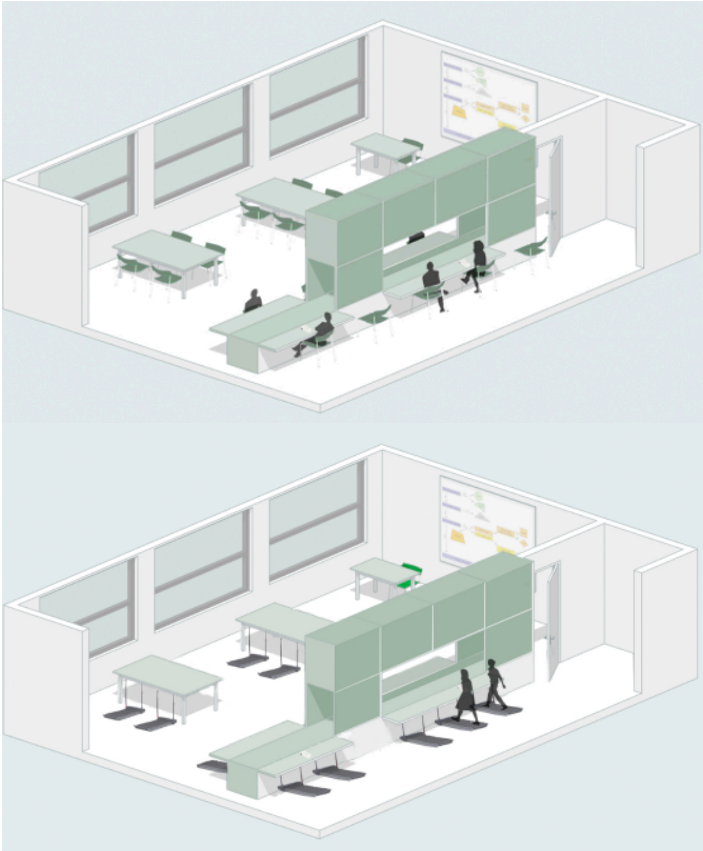


Figure 4: Solution-oriented design for the language classroom.

Classroom 3: Science Classroom

Description Classroom.

The science classroom offers an 8 meter on 11 meters' surface for theoretical as well as practical sessions. At the back of the room, a small storage space (width 2.3 meter) is accessible for teachers and staff. The room is filled with four rows of tables that are higher compared to traditional classroom desks, of which some of them contain a gas valve to be used in practical sessions. Besides the desks, the chairs are higher, compared with the height of a crutch. A large closet with lab material - shielded with closet doors - occupies one side of the classroom wall. The windows on the other side of the room connect the science room with the outside environment. The back of the room is filled with some lab coats and small open closets (Figure 5).

Figure 5: Architectural lay-out of the science classroom.

Sticky Note Experiment.

In comparison to the previously discussed classrooms, the science classroom provided sufficient space (surface and design) for the non-seated examples of embodied learning. However, red sticky notes were pasted on the closet with lab materials (knocking over lab materials) and the high desks (not suitable for executing embodied learning while seated) (Table 3).

Solution-Oriented Designs.

The findings of the sticky note experiment and the present architectural lay-out of the space were combined to develop a new design (Figure 6). The designers opted to ensure that several active learning methods can be executed in this classroom such as practical sessions, groupworks, and embodied learning. The classroom will be equipped with rings, nets will be placed on the walls, and soft balls with a little bounce will be provided. Pupils can throw a ball to the ring or net during rehearsal of subject matter (e.g., interactive quiz) or by classical moments together for studying matter (e.g., every student summarizes subject matter verbally while throwing a ball through a ring - the ball will be passed between students). The lab materials in the closets are protected by a net. Because of the increased height of the pupil's desks, it can also be used as a standing desk. Hence, this classroom offers several opportunities to sit, stand and move to learn.

Fragment 1: Wobble chair and sitting ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
The room provides enough space (surface) for using the sitting balls.	The desks are too high causing a wobble chair or sitting ball cannot be used together with these high desks.
Fragment 2: Walking and bicycle desk	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
The tables are high enough to locate the treadmill (walking desk) or stationary bike (bicycle desk) underneath them.	The bicycle or walking desks can produce noise disturbance causing difficulties with focus and concentration.
	This form of EL is not useful for practical sessions since the movements made during this form of EL may disturb the precision needed for practical sessions.
	The narrow width of the classroom may not be suited to place enough walking or bicycle desks.
Fragment 3: Standing without using objects	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
The room provides enough space (surface).	The group of pupils need to be small enough since the narrow width of the classroom may hinder jumping of the pupils.
Fragment 4: Standing using a ball	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
The room provides enough space (surface).	It may be dangerous to throw a ball (e.g., knocking over lab materials).
Fragment 5: Seated	
Green sticky note (encouraging EL)	**Red sticky note (hindering EL)**
/	Because of the high chairs, the feet of the pupils do not touch the ground. Hence this form of EL is not suitable in this classroom.

Note: EL: embodied learning. When the same perspectives were given by multiple participants, these results were combined and represented as one row.

Table 3: Overview findings of the sticky note experiment for the science classroom.

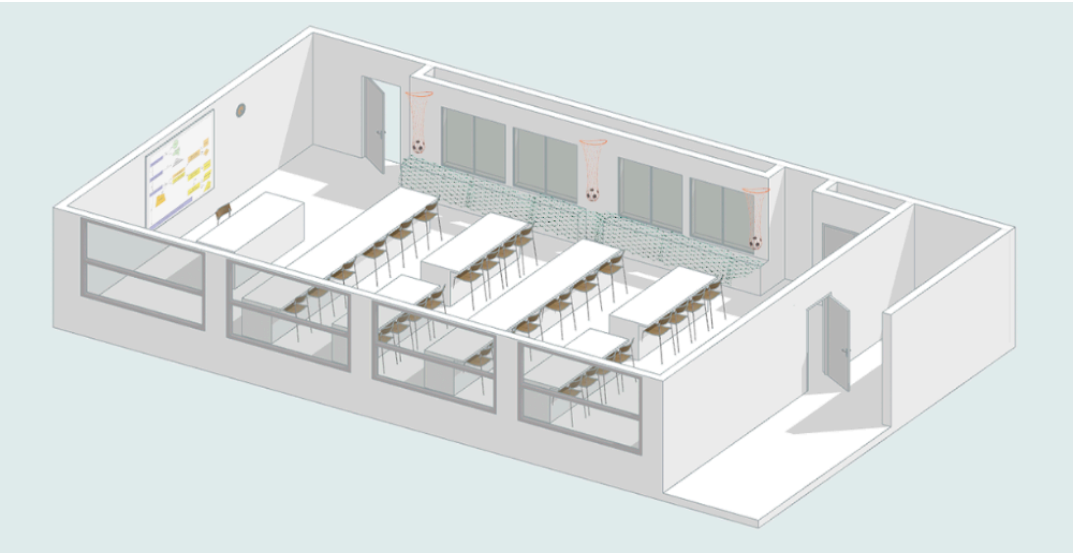


Figure 6: Solution-oriented design for the science classroom.

Discussion and Conclusion

Main Findings

Current research investigated if classrooms of secondary schools in Flanders (Belgium), based on their current architectural design, are welcoming to allow embodied learning to be implemented in the current classroom environment. Based on the aim, the research was divided in a two-track exploratory study: 1) objectifying which architectural elements in the current classroom environment encourage or restrict examples of embodied learning (based on the user's perspective), and 2) developing solution-oriented design ideas to facilitate embodied learning.

The results from current research showed that the examples of embodied learning that were executed while standing, are the most difficult to implement in the current classroom environments due to limited space (surface) as well as the layout and furniture that restricts available space. Forms of embodied learning that involved the use of materials such as walking or bicycle desks, were seen as potentially disruptive for concentration and focus by the pupils and thus making it difficult to pay attention to learn. Finally, embodied learning while seated can mostly be implemented in the current classroom environments as chairs are a part of the traditional classroom equipment in secondary education, and because less surface is needed to execute movements.

Given these results, the solution-oriented designs aimed to offer a range of sitting, moving and standing options to execute embodied learning, but also a range of quick win designs as well as innovative and bigger modifications in the school architecture itself. Hence, the broad range of the designs enhanced the free choice of the pupils to find their ideal learning method to focus in the classroom and it helps to end the prolonged sitting behavior.

Implications

The critical analysis in the current paper of 1) the architectural elements that are encouraging or hindering embodied learning as well as 2) the solution-oriented designs have tried to offer a wide range of possibilities for the teachers and pupils to find their 'ideal' embodied learning

implementations. Research by Putman et al. (2024) supports the reflection that well-being and design are linked with each other. Their study focused on the integration of flexible seating: standard chairs and tables are replaced by different options such as stools, coaches, and standing desks. Higher education students scored better on focus, positive emotions and engagement (Putman et al., 2024). Clear conflict-synergy analyses such as these are important research since design interventions can be linked to user's well-being (Putman et al., 2024).

Furthermore, our solution-oriented designs have sought to provide a mix between gross changes (e.g., extending the language classroom into the hallway), as well as quick wins by rethinking and reusing the purposes of current furniture. An example is the use of the higher desks as standing desks in the science classroom. Such interventions take less effort and are less financially impactful for schools. Within the current school landscape, such quick wins are the way to go to embrace and apply embodied learning. Delving deeper into this, the solution-oriented designs can also serve as a starting guide for designers to design other interventions that have lower financial costs (e.g., one piece of furniture that has multiple purposes, such as the high desk of the science classroom). Other architectural elements that were not adequately discussed (e.g., floor, ceiling) need also be considered more into design processes to delve deeper in all architectural scale levels. Nevertheless, it remains a question to what extent interventions can go (e.g., financial or practical limits through constructive interventions). Furthermore, new solutions and new designs may bring new challenges. An example of the science classroom: the designers wished to implement the use of a ball, so safety solutions have been devised to protect the lab material. The use of other materials such as a wobble chair or sitting ball can also bring safety issues. For designers, this could potentially lead to an intensive process of designing, testing, anticipating and going through the same cycle over again.

Limitations and Strengths

The current research uncovered new innovative designs to implement embodied learning in secondary education through the perspectives of teachers and pupils. The designs even went beyond the classroom space by including other areas of the school space. It should be noted that the designers did not have to take into account financial limits or the cost of interventions, meaning that the in-reality realizations of our designs can be expensive in for example a renovation project. However, the designs provide a knowledge base of inspiration that can be taken into account for new school realization projects. The current study represented a limited number of participants and classrooms. However, both were representative of the average Flemish school landscape, making the findings generally valid. The participants had no prior knowledge about embodied learning, resulting that not every architectural scale level was discussed in detail (e.g., ceiling and floor) during the sticky note experiment. The solution-oriented designs were created by bachelor students in (interior)architecture who were adequately versed in knowledge and regulations of school architecture and furniture, as well as the standards of materials in such buildings.

Conclusion and Future Research

Although embodied learning is very beneficial for the learner, we can conclude that the current secondary school landscape in Flanders, specifically the classrooms, are not yet equipped for this educational approach. Classroom's surfaces are too small, or design elements or furniture limit the freedom of movement. Embodied learning while seated

requires minor adjustments and are therefore easier to apply immediately in the current school environment as a quick win. The current study gave insights into which adaptations are necessary and possible. A question that remains is how feasible these adaptations are (e.g., financially and practically). Future research should therefore focus on typological research of school buildings in Flanders, as well as on their users and policy. What are their views on these adaptations?

Acknowledgements

Stephanie Goossens, Lien Grauls and Charlotte Ooms assisted during the sticky note experiment. Bram Vanorlst, Dina Oechlers, Nayah Van Aerschot, Roeland Hermans, Stijn Boelen, and Lien Coosemans are thanked for realizing the designs. The headmasters, teachers and pupils from GO! Campus van Eyck (Maaseik, Belgium) and Atlas College (Genk, Belgium) are thanked for their participation.

References

Baradaran M. S, Riahi R, Vahdatpour B, Kelishadi R. (2021). Association between sedentary behavior and low back pain; A systematic review and meta-analysis. *Health Promotion Perspectives,*11(4), 393-410.

Brock, D. W., Abu-Rish, E., Chiu, C. R., Hammer, D. P., Wilson, S., Vorvick, L., Blondon, K., Schaad, D. C., Liner, D., & Zierler, B. K. (2013). Interprofessional education in team communication: working together to improve patient safety. *BMJ Quality & Safety*, 22(5), 414–423.

Cole, L. B. (2013). The Teaching Green School Building: a framework for linking architecture and environmental education. *Environmental Education Research*, 20(6), 836–857.

Eberhard, J. P. (2009). Applying Neuroscience to Architecture. *Neuron*, 62(6), 753–756.

Gislason, N. (2010). Architectural design and the learning environment: A framework for school design research. *Learning Environments Research*, 13(2), 127–145.

Kariippanon, K. E., Cliff, D. P., Lancaster, S., Okely, A. D., & Parrish, A. (2017). Perceived interplay between flexible learning spaces and teaching, learning and student wellbeing. *Learning Environments Research*, 21(3), 301–320.

Mavilidi, M. F., Okely, A. D., Chandler, P. and Paas, F. (2017). Effects of integrating physical activities into a science lesson on preschool children's learning and enjoyment. *Applied Cognitive Psychology*, 31(3), 281-290.

Mavilidi M. F., Ruiter M., Schmidt M., Okely A. D., Loyens S., Chandler P., Paas F. (2018). A Narrative Review of School-Based Physical Activity for Enhancing Cognition and Learning: The Importance of Relevancy and Integration. *Frontiers in Psychology,* 9.

McClelland, E., Pitt, A., & Stein, J. (2014). Enhanced academic performance using a novel classroom physical activity intervention to increase awareness, attention and self-control: Putting embodied cognition into practice. *Improving Schools*, 18(1), 83–100.

Pearson, N., Haycraft, E., Johnston, J., & Atkin, A. J. (2017). Sedentary behaviour across the primary-secondary school transition: A systematic review. *Preventive Medicine*, 94, 40–47.

Penedo, F. J., & Dahn, J. R. (2005). Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Current Opinion in Psychiatry*, 18(2), 189–193.

Putman, R. S., Pennington, C. G., Munsey, B. A., Hurless, N., Hill, J. W., & Labansat, H. A. (2024). Does this chair make me look smart? An examination of flexible seating in the higher education classroom. *Learning Environments Research*.

Rasmussen, L. R. (2021). Building Pedagogies. A historical study of teachers' spatial work in new school architecture. *Education Inquiry*, 12(3), 225–248.

Schmidt, M., Benzing, V., Wallman-Jones, A., Mavilidi, M. F., Lubans, D. R., & Paas, F. (2019). Embodied learning in the classroom: Effects on primary school children's attention and foreign language vocabulary learning. *Psychology Of Sport And Exercise*, 43, 45–54.

Sisson, S. B., Shay, C. M., Camhi, S. M., Short, K. R., & Whited, T. (2013). Sitting and cardiometabolic risk factors in U.S. adolescents. *Journal of Allied Health*, 42(4), 236–242.

Stevens, R., Petermans, A., & Vanrie, J. (2019). Design for Human Flourishing: A Novel Design Approach for a More 'Humane' Architecture. *Design Journal*, 22(4), 391–412.

Tao, C., Han, Z., Yan, Y., Pan, Z., Zhu, H., Li, X., Li, H., Wang, Y., Liu, P., Wang, Y., Jiang, M., Tang, C., Jin, H., & Du, J. (2020). Sitting-induced hemodynamic changes and association with sitting intolerance in children and adolescents: a cross-sectional study. *Scientific Reports*, 10(1).

Tapia-Fonllem C., Fraijo-Sing B., Corral-Verdugo V., Garza-Terán G., Moreno-Barahona M. (2020). School Environments and Elementary School Children's Well-Being in Northwestern Mexico. *Frontiers in Psychology*, 11.

Toumpaniari, K., Loyens, S. M. M., Mavilidi, M. F., & Paas, F. (2015). Preschool Children's Foreign Language Vocabulary Learning by Embodying Words Through Physical Activity and Gesturing. *Educational Psychology Review*, 27(3), 445–456.

Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, 9(4), 625–636.

Wingrat J. K, Exner C. E. (2005). The impact of school furniture on fourth grade children's on-task and sitting behavior in the classroom: a pilot study. *Work*, 25(3), 263-272.

Contact email: lindsay.everaert@uhasselt.be

Transformation of the English Courses in the Turkish Educational System From the Ottoman Empire to the Republic of Turkey

Sinem Maden, University of Lodz, Poland

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The education system of the Ottoman Empire was always in a transformation process during its 600-year-history in Anatolia. On the other hand, New Turkish Republic was founded in 1923 based on a completely different regulation system which brought innovations in many areas including education. Accordingly, there were considerable changes in the school types, curricula and the basic elements of education such as the type of the original alphabet and the educational philosophies behind the whole educational system. Despite these significant changes, foreign language education (FLE) has always become a part of curricula, with a recent focus on English language. Therefore, as a part of the educational reforms, there have been many transformations in teaching English as a foreign language (EFL) in Turkey, especially in terms of the objectives and the standards. The aim of this study is to show the transformation and the development process of FLE in Turkish educational system through the Ottoman Empire and Turkish Republic in order to understand the contemporary status and the problems of English as a foreign language in Turkey.

Keywords: English as a Foreign Language, Turkish Republic, Course Materials

iafor
The International Academic Forum
www.iafor.org

Introduction

The New Turkish Republic was founded in 1923, initiating reforms across various sectors, including education. Significant changes were implemented in school types, curricula, and foundational elements such as the original alphabet and the educational philosophies underpinning the system. In the first official curriculum of 1924, teaching English as a foreign language became essential, particularly in middle and high schools. Comprehensive course books from foreign publishers were selected for English courses, aiming to enhance students' reading, writing, and speaking skills. A century later, English remains the most significant foreign language in Turkey, and it is taught even in primary school. However, at the high school level, over two million students still follow an A2 level English curriculum in the 9th grade. Additionally, course materials and exams primarily focus on reading and writing, often neglecting listening and speaking skills.

Educational Reforms in the First Years of Turkish Republic

Turkish Republic was founded in 1923 on the lands of Anatolia after the Ottoman Empire was defeated in World War I. After that, modern Turkish government declared independence to have the new secular, democratic system including country-wide innovative revolutions (e.g. a purified form of Turkish becomes the official language of the country by abolishing the use of Ottoman Turkish which were composed of Arabic and Persian words). The main objective of these revolutions was to provide approval and consistency of the new system by both the citizens of Turkey and other countries. As a part of this modernization movement, Turkish government announced a number of reforms in the educational system in 1924 under the name of *Centralized Educational Law* (Turk. Tevhid-i Tedrisat Kanunu). This law aimed to provide the central rule over the country-wide educational institutions, by abolishing all types of religious schools. Moreover, all types of schools would accept both boys and girls on the contrary to the previous system of separate schools for each sex. These new schools had to follow the common curriculum prepared by the state itself. All of the schools were also announced to be tuition fee free in order to educate as many students as possible for the new country.

In order to provide European style educational institutions, Turkish government invited scientists from various countries so that they can observe the conditions and give suggestions to increase the quality of education in Turkey. One of these scientists was John Dewey who visited different parts of country and wrote two reports on Turkish educational system. The first report was mostly based on how national budget should be used in order to provide improvement in education. On the other hand, the second report included more practical suggestions such as how to design the school objectives and curricula individually based on the differentiating local needs of students in various parts of the country. Following the official declaration of the national language to be Turkish in the new country, Latin alphabet was started to be used in 1928 around the country. The main purpose of this reform was also increasing the literacy rate of the society, which was followed by the foundation of local educational institutions. All of these steps were aiming to provide social and economic development of the whole society of all ages in the newly founded country.

In terms of formal educational guidelines, the first national curriculum of Turkish Republic was announced in 1924, mainly following Dewey’s ideas of progressivism and pragmatism. In this curriculum, the objectives and content of the subjects were also shaped through essentialism to prevent resistance of specific conservative groups against the new values and

reforms. The national values of "being a good citizen" and "being Turks" were repeatedly emphasized in many sections of this curriculum to provide unity of the society. Five-year primary education became obligatory for all children in the country, during which they would learn Turkish, basic mathematics, social and natural sciences, and religion. In primary school curriculum, there were no foreign language subjects. After primary school, there were high schools including two different levels with three years each (similar to three-year middle schools and three-year high schools for contemporary educational system). Both in the first and second level of high schools, foreign languages (French, English and German) would be taught for five hours a week based on the students' preferences and teachers' availability (Can & Kartal, 2020; Dilek, 2016).

According to the English language curriculum of 1924 (Maarif Vekaleti, 1924), in the first grade of high schools, the first half of the course book, *Beginning English for the Levant* would be studied. English would be five hours a week filled with oral and written exercises, translation activities and memorization of vocabulary. That curriculum suggested using two of five hours to teach English grammar by using Turkish for explanations or to make translations from Turkish to English if it becomes necessary during completing the exercises. In the other three hours, teachers would mostly focus on speaking and dialogue exercises without using Turkish. In the second grade, the other half of the same course book (*Beginning English for the Levant)* would be used, by following the same pattern of the first grade in terms of the weekly activities. However, in the third grade, another course book, *Royal Readers No. I* would be used for reading various English texts by focusing on translation activities, written and oral use of language and vocabulary exercises to help students to use the language in classes actively (two hours a week). Teachers would cover *Brackenburry's English Idiom* for other two hours in a week to improve students' vocabulary and grammar knowledge. The last one hour of each week would be reserved for production purposes such as students writing short letters and essays, giving feedback to their peers while teachers would provide guidance. This specific hour would also be used for students' retelling the original stories they read in English through using their own words.

In 1934 and 1938, new forms of curriculum were announced, in which there were slight changes in English courses in terms of weekly class hours and course books. In these curricula, English would still be taught for five hours a week for first and second year students. However, in 3rd year, the students would make selection of fields of specialization to follow different curricula (e.g. science or literature, with four or six hours English in a week respectively). In terms of course books, *Royal Readers No. I* and *Brackenburry's English Idiom* would be used for first year groups, while second and third graders would cover original reading texts from English and American literature to improve their English. Following these revolutionary years for Turkish Republic, two other national curricula (in 1952 and 1956) were declared to provide improvement in the educational system. However, for these new programs, the English course books were prepared by the National Ministry of Education (Türk. Milli Eğitim Bakanlığı). That means *Royal Readers No. I* and *Brackenburry's English Idiom* were used to teach English at high schools for a long period (1924-1952) in the first years of Turkish Republic until the Ministry of Education designed the course books.

In the current educational system of Turkey, there are two types of high schools differentiating in terms of foreign language education. In the first group of high schools, there is one-year obligatory preparatory class before 9th grade, following a special curricula including high number of weekly class hours (20/22 hours) of foreign language. In these less

common schools, students learn English starting from A1 level, and reach B1 level at the end of that year. After that, they become 9th graders and take regular classes of high school education including English courses in low hours (2/4/5 hours a week) (MEB, 2016). On the other hand, in the more common group of high schools in Turkey, which includes more than two million students, there is no obligatory preparatory year to learn foreign language (MEB, 2024a). In this type of schools, students become 9th graders immediately and have English courses (2/4/5 hours a week) as a part of their regular curriculum by starting from A1/A2 level (MEB, 2018). As a result, a huge number of first grade students in high schools use beginner level of English course books in these classes.

By taking all of this information into consideration, this study investigates the research question of "What were the target level, objectives and content of the English curriculum and course books used at high schools in new Turkish Republic compared to the current situation at high schools?" The aim of the current study is to examine the curriculum and content of one of the course books suggested for English course of the first year of high school education in the first 30 years of Turkish Republic in terms of its level compared to the current situation of foreign language education in Turkey. For this research focus, the course book of *Royal Readers No. I* was examined because it was one of the two books that were used for a long period (for 3rd year groups between 1924 and 1934, for 1st year groups between 1934 and 1952). Moreover, *Royal Readers No. I* was available for the analysis, while the other long-term used course book, *Brackenburry's English Idiom,* was not available. Therefore, content of *Royal Readers No. I* has been examined in terms of the variety of its activities and correspondence with the language levels suggested by CEFR standards of communication. In the last part, these findings have been compared with the sample materials recently used for teaching English at 9th grades in 2023-2024.

Method

The current study implements the content analysis of the sample materials of *Royal Readers No. I* suggested for English course at high schools for the first 30 years of Turkish Republic to demonstrate the target language levels based on Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR) standards (Council of Europe, 2001). The sample materials suggested by the Ministry of Education for 9th grade English classes of 2023-2024 were also analyzed to identify the qualifications of their activities. The purpose was to compare the previous materials with the current materials used for English as a foreign language education in Turkey in terms of their range and levels. The first target material to be analyzed is *Royal Readers No I.* (Thomas Nelson and Sons Ltd, 1916?) including reading texts divided into three parts. Through pages and parts, the texts are getting longer and the grammatical structures used in the texts are getting more complicated. The current sample materials suggested for English subject of the 9th graders were reached through the official website of Turkish Ministry of Education. On this website, there are 20 units and two different worksheets for each unit, in accordance with the course book used at that grade (MEB, 2023). The worksheets basically include vocabulary, language use, translation and comprehension questions. Moreover, there are suggested sample exams (Semester 1 Exam No. 1 and 2, Semester 2 Exam No. 1 and 2) on the same website, in which, there are a number of questions (e.g. blank filling, comprehension questions, identification and/or analysis questions) (MEB, 2024b).

Findings

Sample Materials of 9th Grade English Courses Between 1934 and 1952 (Royal Readers No. I)

Before reading sections, there is a part entitled *Preface*, which provides a brief glance for the content of the book. The purpose of the book is stated as "[…] to induce children to take a real interest in what they read, and to make them delight to exercise their power of reading." Accordingly, the book was stated to be designed to include texts related to the things of daily life. The visuals of the book are for helping teacher to draw attention of the students on the texts, which are advised to be closely analyzed through questioning technique to help students to make production. There are also suggestions about using pronunciation parts of the texts through dictation activities so that students could improve their spelling in addition to writing skills.

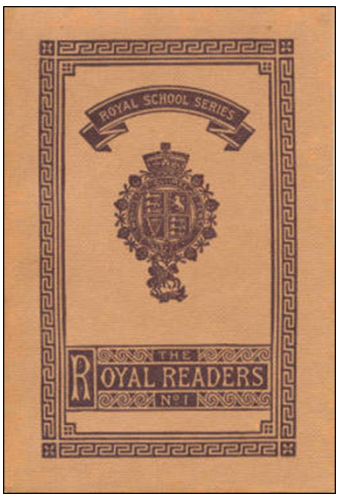
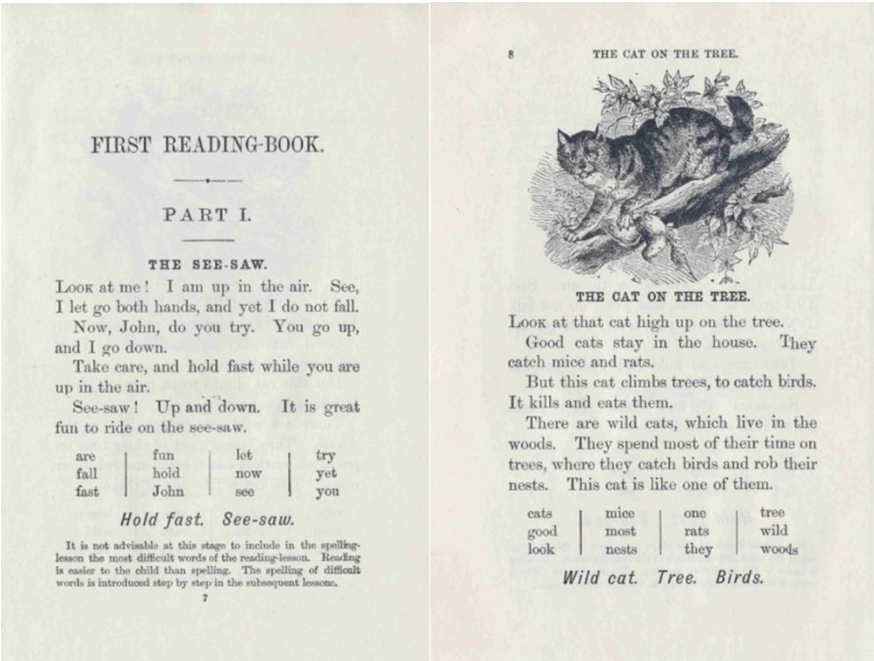


Figure 1: The Cover Page of Royal Readers No. I

The first section of the book starts with a short text (Figure 2) consisting of short, very simple sentences. After each text, the target vocabulary list is suggested, starting from one-syllable words in that part. There are also some advices about pronunciation of these words. Through pages, the texts and the sentences of texts are getting longer and more complicated, which shows the increase in the target level starting from Simple Present Tense (A1/A2 level) to Present Perfect Tense (A2 level). For some texts, related visuals are included in order to help understanding of the texts.



FIRST READING-BOOK.

PART I.

THE SEE-SAW.

Look at me! I am up in the air. See, I let go both hands, and yet I do not fall.

Now, John, do you try. You go up, and I go down.

Take care, and hold fast while you are up in the air.

See-saw! Up and down. It is great fun to ride on the see-saw.

are	fun	let	try
fall	hold	now	yet
fast	John	see	you

Hold fast. See-saw.

It is not advisable at this stage to include in the spelling-lesson the most difficult words of the reading-lesson. Reading is easier to the child than spelling. The spelling of difficult words is introduced step by step in the subsequent lessons.

7

8 THE CAT ON THE TREE.

THE CAT ON THE TREE.

Look at that cat high up on the tree.

Good cats stay in the house. They catch mice and rats.

But this cat climbs trees, to catch birds. It kills and eats them.

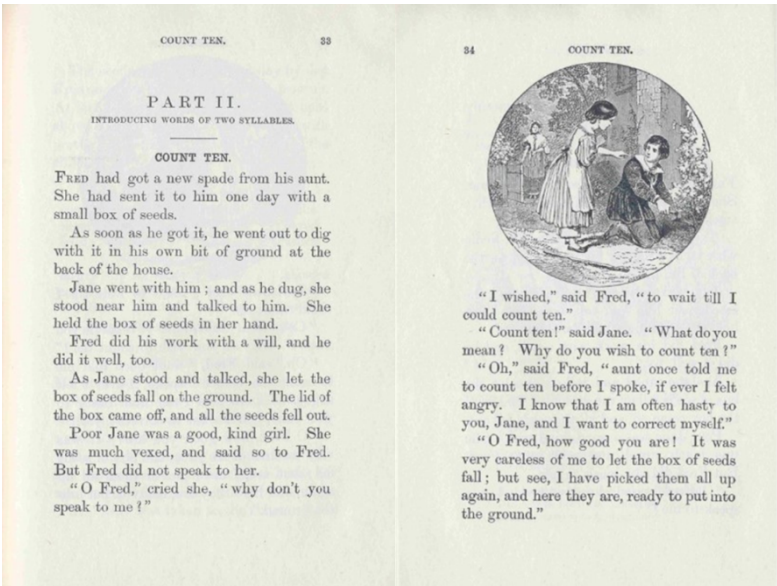
There are wild cats, which live in the woods. They spend most of their time on trees, where they catch birds and rob their nests. This cat is like one of them.

cats	mice	one	tree
good	most	rats	wild
look	nests	they	woods

Wild cat. Tree. Birds.

Figure 2: The First Reading Text of Royal Readers No. I Part I

The second part of the book starts with a two and a half page text including long sentences with Past Perfect Tense (B1 level). That part basically includes texts of at least two pages and also a number of poems.



COUNT TEN. 33

PART II.

INTRODUCING WORDS OF TWO SYLLABLES.

COUNT TEN.

Fred had got a new spade from his aunt. She had sent it to him one day with a small box of seeds.

As soon as he got it, he went out to dig with it in his own bit of ground at the back of the house.

Jane went with him; and as he dug, she stood near him and talked to him. She held the box of seeds in her hand.

Fred did his work with a will, and he did it well, too.

As Jane stood and talked, she let the box of seeds fall on the ground. The lid of the box came off, and all the seeds fell out.

Poor Jane was a good, kind girl. She was much vexed, and said so to Fred. But Fred did not speak to her.

"O Fred," cried she, "why don't you speak to me?"

34 COUNT TEN.

"I wished," said Fred, "to wait till I could count ten."

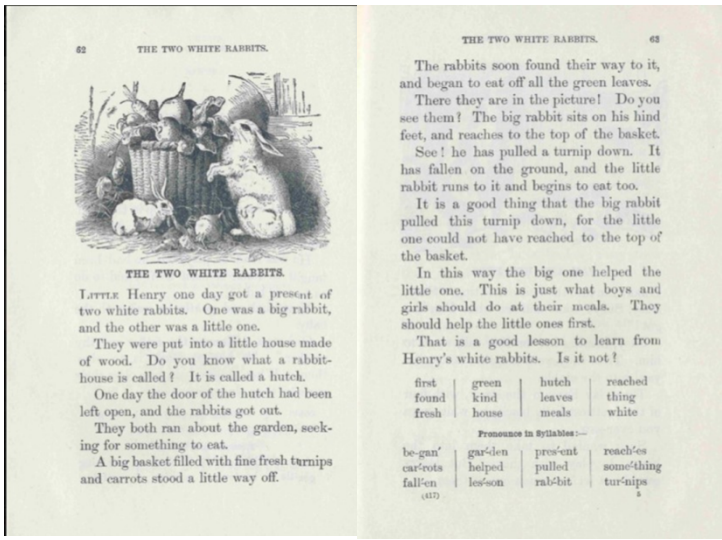
"Count ten!" said Jane. "What do you mean? Why do you wish to count ten?"

"Oh," said Fred, "aunt once told me to count ten before I spoke, if ever I felt angry. I know that I am often hasty to you, Jane, and I want to correct myself."

"O Fred, how good you are! It was very careless of me to let the box of seeds fall; but see, I have picked them all up again, and here they are, ready to put into the ground."

Figure 3: The First Reading Text of Royal Readers No. I Part II

On the other hand, the last part of the book (part three) starts with a text including sentences with the grammatical structures of passive voice, noun clauses and adjective clauses (B1/B2 level). This last part has longer texts related to the concepts that students may personally know or experience such as animals or furniture. For example, there is a text about rabbits (Figure 4) and another one about kitchen equipment (Figure 5).



62 THE TWO WHITE RABBITS.

THE TWO WHITE RABBITS.

LITTLE Henry one day got a present of two white rabbits. One was a big rabbit, and the other was a little one.

They were put into a little house made of wood. Do you know what a rabbit-house is called? It is called a hutch.

One day the door of the hutch had been left open, and the rabbits got out.

They both ran about the garden, seeking for something to eat.

A big basket filled with fine fresh turnips and carrots stood a little way off.

THE TWO WHITE RABBITS. 63

The rabbits soon found their way to it, and began to eat off all the green leaves.

There they are in the picture! Do you see them? The big rabbit sits on his hind feet, and reaches to the top of the basket.

See! he has pulled a turnip down. It has fallen on the ground, and the little rabbit runs to it and begins to eat too.

It is a good thing that the big rabbit pulled this turnip down, for the little one could not have reached to the top of the basket.

In this way the big one helped the little one. This is just what boys and girls should do at their meals. They should help the little ones first.

That is a good lesson to learn from Henry's white rabbits. Is it not?

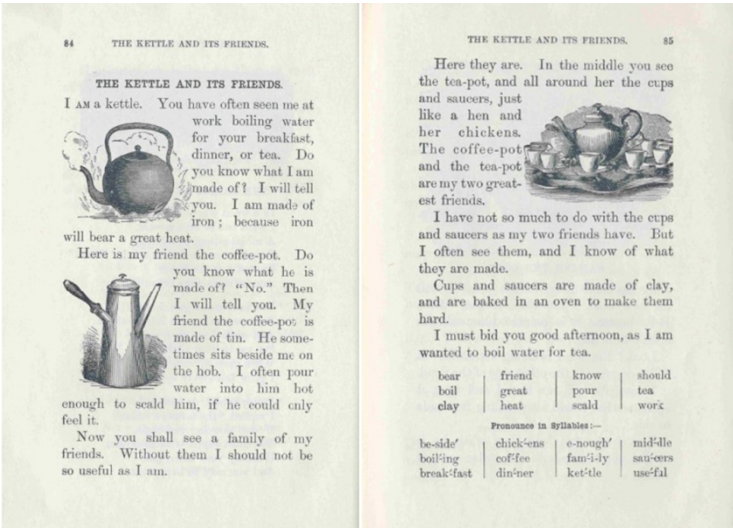
first	green	hutch	reached
found	kind	leaves	thing
fresh	house	meals	white

Pronounce in Syllables:—

be-gan'	gar-den	pres-ent	reach-es
car-rots	helped	pulled	some-thing
fall-en	les-son	rab-bit	tur-nips

(417) 1

Figure 4: Sample Reading Text of Royal Readers No. I Part III



84 THE KETTLE AND ITS FRIENDS.

THE KETTLE AND ITS FRIENDS.

I AM a kettle. You have often seen me at work boiling water for your breakfast, dinner, or tea. Do you know what I am made of? I will tell you. I am made of iron; because iron will bear a great heat.

Here is my friend the coffee-pot. Do you know what he is made of? "No." Then I will tell you. My friend the coffee-pot is made of tin. He sometimes sits beside me on the hob. I often pour water into him hot enough to scald him, if he could only feel it.

Now you shall see a family of my friends. Without them I should not be so useful as I am.

THE KETTLE AND ITS FRIENDS. 85

Here they are. In the middle you see the tea-pot, and all around her the cups and saucers, just like a hen and her chickens. The coffee-pot and the tea-pot are my two greatest friends.

I have not so much to do with the cups and saucers as my two friends have. But I often see them, and I know of what they are made.

Cups and saucers are made of clay, and are baked in an oven to make them hard.

I must bid you good afternoon, as I am wanted to boil water for tea.

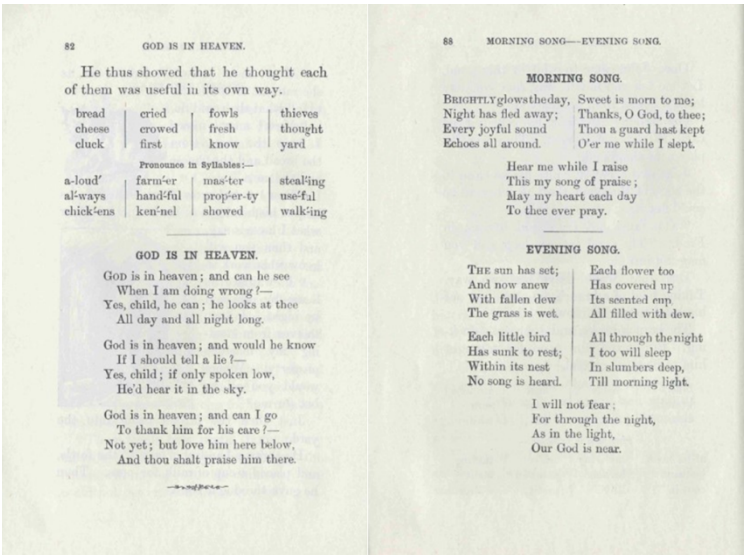
bear	friend	know	should
boil	great	pour	tea
clay	heat	scald	work

Pronounce in Syllables:—

be-side'	chick-ens	e-nough'	mid-dle
boil-ing	cof-fee	fam-i-ly	sau-cers
break-fast	din-ner	ket-tle	use-ful

Figure 5: Sample Reading Text of Royal Readers No. I Part III

This last part of the book ends with a number of poems with the themes of daily life, natural world and religion (Figure 6). Both in part two and three, texts are followed by target vocabulary and pronunciation parts, for some of which visuals are provided.



82 GOD IS IN HEAVEN.

He thus showed that he thought each of them was useful in its own way.

bread	cried	fowls	thieves
cheese	crowed	fresh	thought
cluck	first	know	yard

Pronounce in Syllables:—

a-loud′	farm′-er	mas′-ter	steal′-ing
al′-ways	hand′-ful	prop′-er-ty	use′-ful
chick′-ens	ken′-nel	showed	walk′-ing

GOD IS IN HEAVEN.

God is in heaven; and can he see
When I am doing wrong?—
Yes, child, he can; he looks at thee
All day and all night long.

God is in heaven; and would he know
If I should tell a lie?—
Yes, child; if only spoken low,
He'd hear it in the sky.

God is in heaven; and can I go
To thank him for his care?—
Not yet; but love him here below,
And thou shalt praise him there.

88 MORNING SONG—EVENING SONG.

MORNING SONG.

Brightly glows the day,
Night has fled away;
Every joyful sound
Echoes all around.

Sweet is morn to me;
Thanks, O God, to thee;
Thou a guard hast kept
O'er me while I slept.

Hear me while I raise
This my song of praise;
May my heart each day
To thee ever pray.

EVENING SONG.

The sun has set;
And now anew
With fallen dew
The grass is wet.

Each little bird
Has sunk to rest;
Within its nest
No song is heard.

Each flower too
Has covered up
Its scented cup
All filled with dew.

All through the night
I too will sleep
In slumbers deep,
Till morning light.

I will not fear;
For through the night,
As in the light,
Our God is near.

Figure 6: Sample Poems from Royal Readers No. I Part III

Sample Worksheets and Exams for Current English Courses of 9th Grades (2023-2024)

For the academic year of 2023-2024, Turkish Ministry of Education provided sample materials for various subject areas of each grade. For English course of 9th grade, there are two sample worksheets for each unit of the course book used at schools (20 units and 40 worksheets in total). In addition, there are two sample exams for each semester (Fall and Spring) so that teachers and students could see the expectations in terms of level and question types. In sample worksheets, there are reading comprehension, dialogue completion and vocabulary questions. All of these questions are in multiple choice format with five options and the level of the questions range from A1 to A2 level (MEB, 2023). Figure 7 is a dialogue completion activity in one of the sample worksheets, which suggests sentences of a dialogue in mixed order so that students can turn them into a meaningful dialogue.

5. Jenny : Hello! My name is Jenny. What is your name?

Thomas : Hi! I'm Thomas. - - - -

Jenny : Nice to meet you, too.

A) How are you?
B) Nice to meet you!
C) See you later.
D) How old are you?
E) What is your address?

Figure 7: Dialogue Completion Question in Sample Worksheet1

In another worksheet, there are questions providing introductory information for students so that they can select the best word from the options to complete one of the sentences. (Figure 8).

1. Anna works at a café. She serves food and drinks to people. She is a - - - -.

A) student
B) chemist
C) waitress
D) teacher
E) journalist

Figure 8: Vocabulary Question in Sample Worksheet 2

In Sample Worksheet 3, there are also questions for vocabulary in which students need to match the visuals with the words to name them (Figure 9). For these questions, students need to know the meaning of the words in addition to correctly identifying the objects in the pictures.

6.

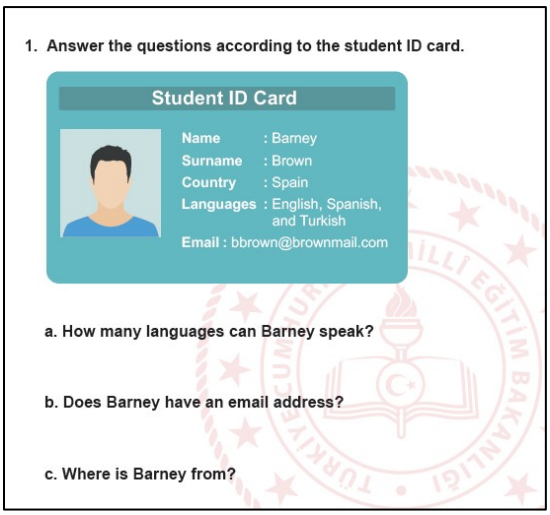
I.	Umbrella	a.	
II.	ID Card	b.	
III.	Mobile phone	c.	
IV	Passport	d.	
V.	Wallet	e.	

Which of the following matchings is CORRECT?

A) I. d / II. a / III.b / IV.c / V. e
B) I. b / II. e / III.d / IV.c / V. a
C) I. d / II. a / III.b / IV.c / V. e
D) I. b / II. e / III.d / IV.a / V. c
E) I. e / II. c / III.b / IV.c / V. a

Figure 9: Vocabulary and Identification Questions in Sample Worksheet 3

In the materials of the sample exams, question types include activities to fill in the blanks and to write answers for comprehension questions by identifying and/or analyzing the information provided in various texts. In the sample exams, there are multiple choice, matching and completion types of questions, which require more writing of the students compared to the sample worksheets. In terms of level, sample exams are consistent with the level of sample worksheets (A1/A2 level) (MEB, 2024b). For example, in comprehension type of exam question, a visual is provided to be scanned by students to find the relevant specific information for the questions (Figure 10). These questions require scanning of the main text and the questions in addition to the identification of the answer of the questions.


1. Answer the questions according to the student ID card.

Student ID Card

Name : Barney
Surname : Brown
Country : Spain
Languages : English, Spanish, and Turkish
Email : bbrown@brownmail.com

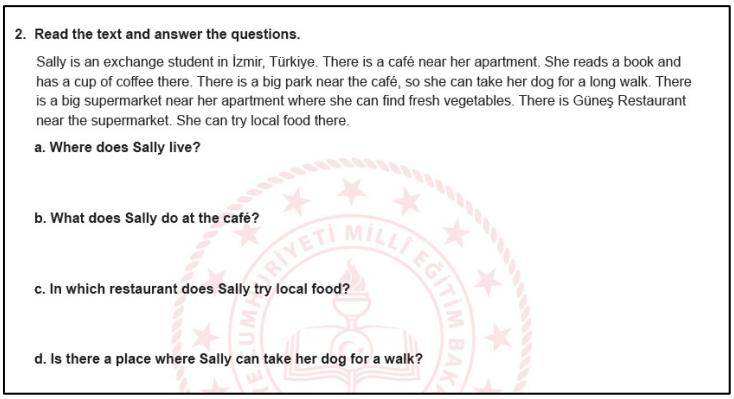
a. How many languages can Barney speak?

b. Does Barney have an email address?

c. Where is Barney from?

Figure 10: Comprehension Question in Semester 1 Exam 1

In the scenario part of the sample exams, there is also a reading text about which three open-ended question appear (Figure 11). In this part, students need to read a short text to identify answers of the questions and then write their answers to the following blank.


2. Read the text and answer the questions.

Sally is an exchange student in İzmir, Türkiye. There is a café near her apartment. She reads a book and has a cup of coffee there. There is a big park near the café, so she can take her dog for a long walk. There is a big supermarket near her apartment where she can find fresh vegetables. There is Güneş Restaurant near the supermarket. She can try local food there.

a. Where does Sally live?

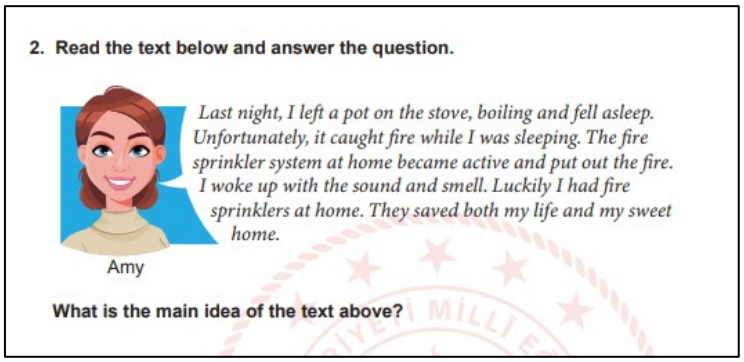
b. What does Sally do at the café?

c. In which restaurant does Sally try local food?

d. Is there a place where Sally can take her dog for a walk?

Figure 11: Comprehension Question in Semester 1 Exam 2

There are also comprehension types of exam question, in which a reading text is provided which should be scanned by students to find the relevant specific information for the following questions (Figure 12).


2. Read the text below and answer the question.

Last night, I left a pot on the stove, boiling and fell asleep. Unfortunately, it caught fire while I was sleeping. The fire sprinkler system at home became active and put out the fire. I woke up with the sound and smell. Luckily I had fire sprinklers at home. They saved both my life and my sweet home.

Amy

What is the main idea of the text above?

Figure 12: Comprehension Question in Semester 2 Exam 2

Discussion

In the first years of Turkish Republic, foreign language education was starting in middle school years while in the contemporary curriculum of Turkey, English language education starts at primary school (specifically in the 2nd grade as two-hours a week). While the materials used for foreign language classes were mostly from the foreign publishers in between 1924 and 1950s, in today's case, Turkish National Ministry of Education is preparing all course materials itself. As it is seen on the sample excerpts, on the contrary to the more advanced level (B1/B2 level) of the first English curriculum of Turkish Republic, current 9th grade English course is designed for A1/A2 level. Accordingly, English course books, sample materials, and sample exams for 9th graders are currently based on this beginner level which interestingly assumes that these students have not previously learned English at all. While the course book of *Royal Reader No. I* was covering texts of various topics and even poems through the end, the currently used materials for 9th graders are lower level with very simple texts.

In terms of the content of the materials, in the older version of the materials, there was a focus on caring students' interests by using topics which might be attractive for them in addition to improving their reading skills. Although the texts of the current materials are attempting to be student-centered, the themes of the texts are not always directly related to the daily life issues. In terms of teaching process, there were suggestions and tips for teachers in *Royal Reader No. I* related to the use of materials in classes so that they can motivate students easily. Unfortunately, in the current materials, there is no guidance provided for teachers about how they could be covered in the classes to use them more effectively. Apart from these, the biggest difference between the older and newer forms of the materials is related to the target skills. While the currently used English course materials are only for improving grammar, vocabulary, reading and writing skills of the students, in the book of the first curriculum, there was a strong focus on active use of English by the students through production activities such as question answering. Improvement of the speaking skills was strongly emphasized not only in the pronunciation parts, but also in discussion parts on the reading texts and related visuals. Finally, the question types on the recently used testing materials are very limited compared to the the first years of Turkish Republic as the current ones are mostly in forms of multiple choice or short answers. Therefore, it seems that the expectations about the English language skills of 9th graders have been lowered to a large extent in one-hundred years of the country.

Conclusion

Based on the analysis of the course book used for English courses during the first 30 years of Turkish Republic, it can be concluded that *Royal Reader No. I* was full of texts of various topics, moving from A1 towards B2 level. Moreover, the book was rich in terms of the visuals and pronunciation-focused materials. On the other hand, the sample materials obtained from the website of the Ministry of Education demonstrates that the target level for current 9th graders is A2 at most. Moreover, in current English courses the main focus is on reading and writing skills of the students without any content for listening and speaking skills. Question types suggested in these materials are also very limited compared to the materials of the first years. That means there has been a big decrease in the expectations from high school students in terms of their English language skills. In order to improve these students' various English skills, it is definitely needed to *suggest some sample materials and exams specifically for listening and speaking skills.* In addition, *the currently used materials*

with the focus on reading and writing skills should be improved in terms of the types of questions. As a result, the students will be able to show improvement in all types of skills in English as a foreign language. In addition, there is the necessity to *revise the beginning and target level of English courses for high school years* as these students have actually learned English through their primary and middle school years. In accordance with the current trends of the world, it will be better to *use more interactive and production-based activities based on the students' needs and interests.*

References

Can, Y., & Kartal, Ş. (2020). Cumhuriyet dönemi ortaöğretim İngilizce dersi öğretim programlarının incelenmesi. *Tarih Okulu Dergisi, 13*(44), 394-426. https://dx.doi.org/10.29228/Joh25888

Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment (CEFR)*. https://rm.coe.int/16802fc1bf (retrieved: 22.02.2024).

Dilek, H. (2016). Cumhuriyet döneminde kesintisiz eğitim: 1924 ilkokul, ortaokul ve lise müfredat programları. *Sosyal Bilimler Dergisi, 6*(12), 1-15.

MEB. (2016). *Hazirlik Sinifi Bulunan Ortaogretim Kurumlari Ingilizce Dersi Ogretim Programi*. http://mufredat.meb.gov.tr/Programlar.aspx (retrieved: 22.02.2024).

MEB. (2018). *Ortaogretim Ingilizce Dersi Ogretim Programi*. http://mufredat.meb.gov.tr/Programlar.aspx (retrieved: 22.02.2024).

MEB. (2023). *9. Sınıf İngilizce Kazanım Testleri*. https://odsgm.meb.gov.tr/www/9-sinif-kazanim-testleri/icerik/858 (retrieved: 22.04.2024).

MEB. (2024a). *Ortaöğretim Genel Müdürlüğüne Bağlı Okul Türleri ve Sayıları*. https://ogm.meb.gov.tr/meb_iys_dosyalar/2024_01/03163055_kurumistatistikleri.pdf (retrieved: 22.04.2024).

MEB. (2024b). *Ortak Sınavlar*. https://odsgm.meb.gov.tr/www/ortak-sinavlar/kategori/133 (retrieved: 22.04.2024).

Memorial University Libraries: Digital Archives Initiative. (2024, April 10). Royal Readers No. I. (1916?). London: Thomas Nelson and Sons Ltd. https://collections.mun.ca/digital/collection/cmc/id/105

Contact email: sinemmaden3@hotmail.com.tr

Empowering Young Minds: A Comprehensive AI Education Framework for 4-5-Year-Olds

Konstantina Tastsi, Palladio School, Greece
Panagiotis Karamalis, Palladio School, Greece

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Children in the early years of schooling grow up in a world where Artificial Intelligence (AI) is ubiquitous and taken for granted in everyday life. However, the international literature lacks references to the potential of integrating educational AI applications for this age group. This gap underscores the urgency of our research. In this research paper, we present a novel pilot educational program that introduces AI concepts, applications, advantages, weaknesses, challenges, and risks in the daily lives of young school children in a simple, understandable, and consistent manner. With its potential to revolutionise early childhood education, this program fills a crucial gap. In the work context, we present the structure of the educational program, the tools, and how it is implemented in the classroom, and we draw initial quantitative conclusions about its effectiveness.

Keywords: Preschool Age, Artificial Intelligence, Machine Learning, Educational Program

iafor
The International Academic Forum
www.iafor.org

Introduction

Artificial Intelligence (AI) has become an integral part of modern life, influencing various aspects often without our immediate awareness. From personalised content suggestions on streaming platforms to voice-activated virtual assistants that aid in daily task management, AI applications are woven into the fabric of our daily lives. AI is present in smartphones, cars, workplaces, and home environments, driving innovation and significantly altering how we interact with the world. Moreover, AI is not a static concept but a highly adaptable and constantly evolving technology, always ready to meet new challenges and needs. This reassures us about its relevance and applicability in our lives (Gibson et al., 2023; Long & Magerko, 2020).

While limited studies focus on preschool and early childhood education, researchers have begun to identify the myriad ways AI applications can be used in educational settings. These include facilitating school administrative needs, analysing student performance, enhancing learning through intelligent teaching systems—especially in special education—utilising chatbots for language teaching and incorporating robotics with AI algorithms in STEM (Science et al.) classes. The potential of AI in early childhood education is vast and promising, offering new avenues for personalised learning and student support. We aim to explore and harness this potential in our pilot program, paving the way for a more optimistic future of education.

Introducing STEM in Kindergarten creates an environment conducive to children's development. Through STEM, children can explore the world, develop essential skills, and foster a passion for education and knowledge. These activities encourage creativity, innovation, and collaboration (Chesloff, 2013). Early childhood education is rapidly evolving due to extensive research on how children learn. According to Morrison et al. (2009), STEM programs can be effectively implemented in kindergarten. This is supported by recent brain development studies suggesting that starting STEM education in kindergarten can lead to positive future outcomes (Torres-Crespo et al., 2014). Furthermore, children's attitudes toward scientific concepts and knowledge are primarily formed in their early years. Research by Archer et al. (2010) indicates that these attitudes are difficult to change once children become teenagers. Katz (2010) also emphasises the importance of involving children in research activities before they start school, encouraging them to ask questions, collect data, and present findings under the guidance of specialised educators for a rich educational experience.

This paper investigates whether preschool-aged children can understand the possibilities and limitations of AI applications through programming and training robots. Despite their lack of technical background, this posed an exciting challenge, transforming theoretical research into a structured program for integration into the school curriculum. Initially, there was uncertainty about how children would respond, but it was essential to remember that this generation is growing up using smart devices. Young children often believe many things happen magically or inherently, so it was crucial to help them understand that these are not living beings with consciousness but machines that can achieve desired outcomes through proper programming and, in some cases, make strategic decisions. This study aims to examine:

- Whether children understood AI after participating in relevant activities.
- If this program can be integrated into the general Kindergarten curriculum after implementation.

Before conducting this study, we explored the importance of AI literacy and preschool-aged children's existing knowledge about AI.

Theoretical Background

AI Literacy

The concept of AI literacy was first introduced by Kandlhofer et al., who described it as the ability to understand the basic principles of AI (Kandlhofer et al., 2016). Later, Long and Magerko expanded this definition to include the skills needed to evaluate, communicate, and interact with AI responsibly and effectively (Long et al., 2020). As AI systems increasingly impact society socially, economically, and politically, understanding how they work has become essential. This includes knowing how AI systems perceive their environment, process data, and make decisions.

Given AI's significant role today, children must learn about AI, as they will encounter it both in their school years and throughout their adult lives. Additionally, understanding the technical aspects of AI is vital. By learning how AI collects and processes data and how these data influence decisions, children can dispel the common misconception that AI is an omniscient and infallible force. Experts believe this knowledge is essential to developing a more informed and critical perspective on AI.

Pre-existing Knowledge

Children live in an environment increasingly dominated by AI and spend significant time using applications that incorporate it. Research indicates that parental attitudes, socioeconomic levels, and cultural differences significantly influence how children perceive AI applications (Druga et al., 2018). Several studies explore how children learn about AI through interactions with pre-trained models or by training models themselves.

Vartiainen et al. found that children aged 3-9 understand the relationship between physical expressions and the outcomes of an interactive image prediction tool, actively engaging in the machine training process (Henriikka Vartiainen, 2020). However, these children tend to overestimate the capabilities of smart devices because they need help seeing how they function internally.

Turkle notes that smart toys have changed how children perceive the liveliness of toys. Children increasingly wonder if smart toys can feel and convey emotions (Turkle et al., 2006).

Examples Connecting Technology With Children's Daily Life

Children's daily contact with technology is systematic, as they frequently observe adults using it, making it an integral part of their lives. Studies have highlighted the benefits of families learning about technology together. For example, Yu et al. demonstrated that parents initially act as spectators and then as teachers to their children when interacting with technology (Yu et al., 2020). Similarly, Michelson et al.'s research emphasised the importance of family collaboration in jointly planning technology-related activities (Michelson et al., 2021).

With the advent of smart devices at home, the entire family becomes involved in understanding interactions with AI. Children's computer games often incorporate AI, with the game's characters making decisions influenced by the child's playing style. Druga et al. showed that parents' perceptions of AI devices affect how children attribute intelligence to machines (Druga et al., 2018).

Examples of the Use of Digital Assistants

We live in an era where learning happens collaboratively and often with the help of digital assistants outside traditional educational settings (Gibson et al., 2023). Children are continuously exposed to AI technologies, yet they underestimate smart devices because they need to understand the underlying technology. Children frequently interact with digital assistants like Siri and Alexa, which perform daily tasks using voice commands. It is common for children to hear the familiar phrase "Hey Siri" when their parents want to send a message, find where they parked, or call a contact.

Methodology

We developed eight lesson plans, totaling 20 teaching hours, conducted over 15 weeks with 29 children aged 5-6 years. The children were divided into two groups: a control group and an activity group involved in the school program.

The first two lessons consisted of preliminary tests to gauge the children's pre-existing knowledge about AI. Subsequent lessons introduced programming, starting from basic principles and progressing to creating robots with sensors—the remaining lessons focused on AI, including Knowledge-Based Learning, Machine Learning, and Generative AI.

The lesson plans were aligned with our Kindergarten's educational goals and guided by Bloom's taxonomy (Bloom et al., 1956), which helped categorise our objectives for the children:

- Knowledge: Describe what AI is
- Knowledge: Recognize where AI exists
- Understanding: Understand programming
- Understanding: Interpret programming instructions
- Application: Apply AI
- Analysis: Compare if something is natural or AI
- Synthesis: Create images using AI
- Evaluation: Interpret how machines work
- Evaluation: Infer the use of AI in daily life.

At the end of the research, questionnaires were given to both groups.

Programming – Coding

The primary goal of the initial lessons was to help children understand that machines cannot function without being programmed. Programming is an unfamiliar concept for children of this age as they only experience the interface and response, not the internal operation. We began with simplified programming forms, such as BeeBots, which are simple floor-programmable robots designed like small bees. They are programmed using buttons to move forward, backwards, or turn 90 degrees right or left.

Figure 1: BeeBots on the Map

The following lessons were dedicated to Kids First Coding, an educational program where children build robots in five different models. Programs are created using a series of command cards that form the algorithm. As the robot passes over the command cards, a sensor reads them and stores the program sequentially. The robot is then placed on a track created by the children and starts executing the commands.

Figure 2: Physical Programming With the Kids First Coding Kit

At this stage, children had learned to create their first algorithm and understood the programming process. The next step involved creating robots from the Lego WeDo 2 series, which includes a central hub, a medium motor, a motion sensor, a tilt sensor, and LEGO building blocks for assembling the robot. The graphical programming software enabled children to program the robot to move, change colour, and make sounds.

Figure 3: Programming with Lego WeDo 2.0

Artificial Intelligence – Machine Learning

Lesson plans at this stage involved AI and Large Language Models (LLMs) like ChatGPT. We aimed to introduce robots into the children's daily lives as additional classmates with whom they could converse and play. One day, Alpha Mini Robot, a humanoid robot programmed to perform choreography and recognise images, appeared in the classroom. The school's IT department utilised the manufacturer's API, an external computer, Raspberry Pi 4, Google's Speech API for Greek voice recognition, and OpenAI's API to facilitate conversations with the children.

The children named the robot Luna after a vote. We programmatically informed Luna about its name, properties, and purpose, and the children were encouraged to ask it questions.

Figure 4: Luna the Alpha Mini Robot

Initially, Luna was trained to recognise common flowers and fruits familiar to the children. The children showed Luna images of daisies, roses, orchids, bananas, apples, pears, and oranges, and it recognised them.

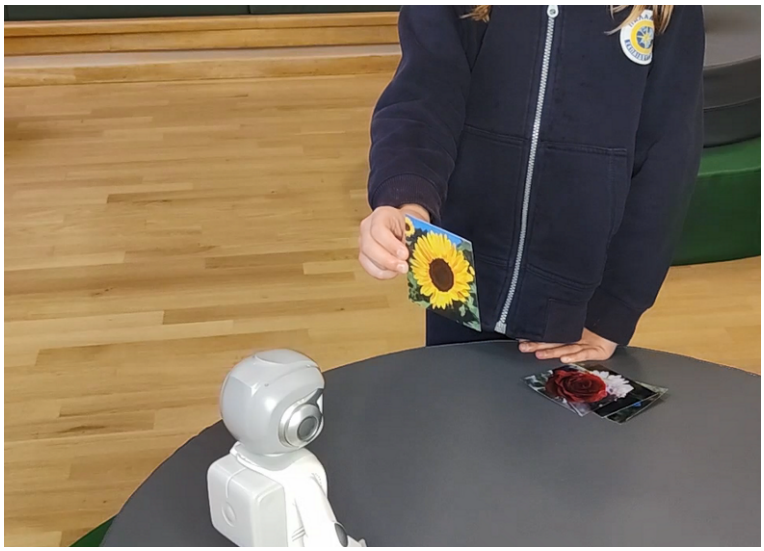


Figure 5: Luna Recognising Images

Subsequent lessons focused on training the machines themselves. Using the Teachable Machine application and cards from the game "Pigs in the Mud," the children showed each image to the camera from different angles. They wrote titles for each image, simultaneously practising keyboard writing. They then trained the machine to recognise the pictures.

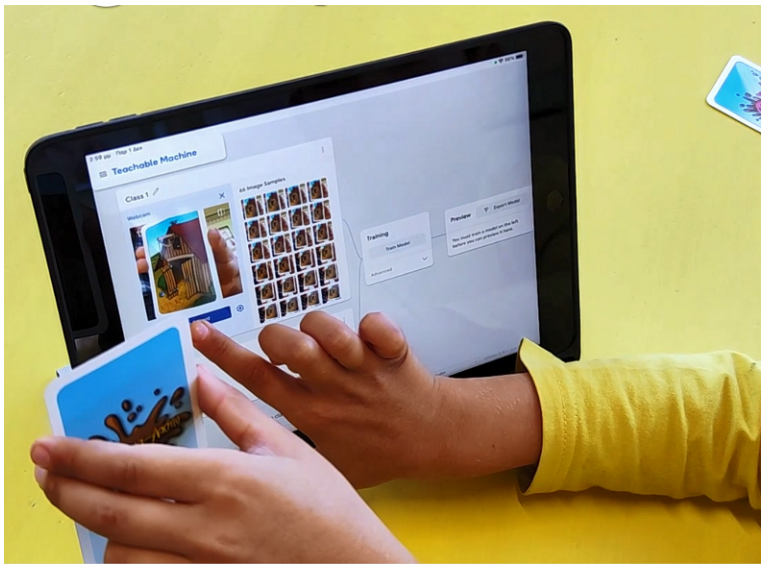


Figure 6: Training a Machine Learning Model

As Christmas approached, the children created images of Santa Claus using AI. They used prompt engineering, suggesting words like Santa Claus, sleigh, gifts, and reindeer. In the following lessons, they inserted photos and had the application describe them in detail.

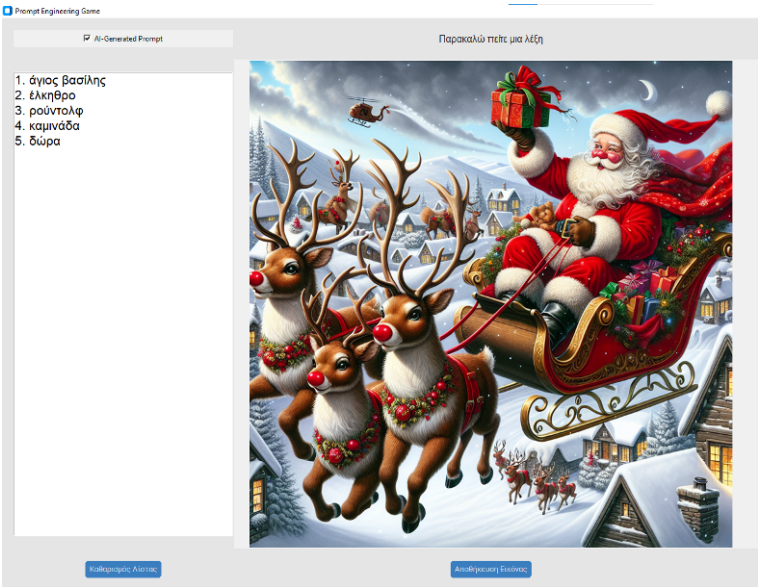


Figure 7: The Application Where Children Create Images Using Prompts

In the final lessons, the children played "rock, paper, scissors" with a new robot built at the school using a 3D printer and Raspberry Pi 5. The children trained the robot to recognise hand movements. They played the game where the robot responded with either a triumphant expression when it won or a sad expression when it lost, thus increasing empathy.

Figure 8: The New AI Robot of the School

Results

We used a questionnaire with images to assess the children's understanding of programming and AI concepts. The first part assessed technological skills acquired, and the second part included general questions about experience and interest in technology. The teacher individually administered the questionnaires to avoid influence from other children's answers.

We statistically analysed the results in the first part by comparing the children's answers with the expected correct answers. In the second part, where there were no correct answers, we compared responses between the Trained Group (TG) and the Control Group (CG).

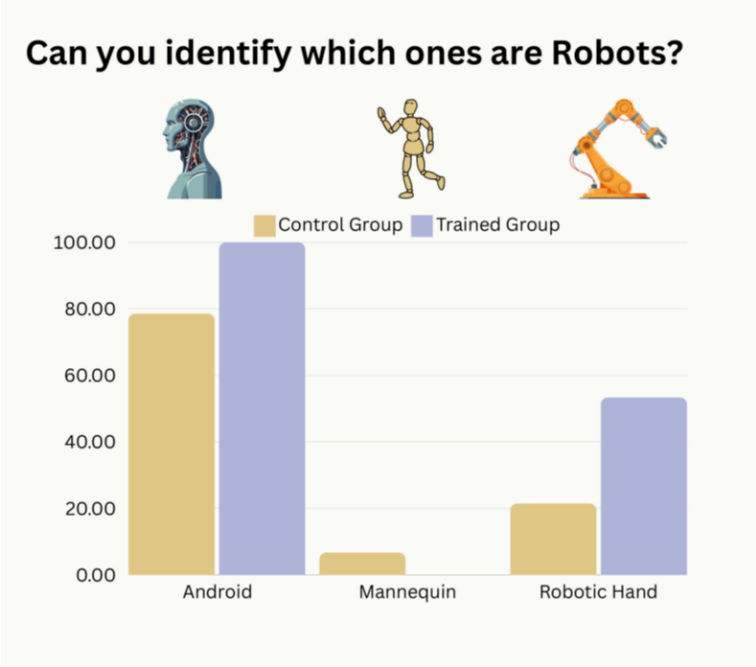


Figure 9: Results and Comparison of the Answers to the First Assessment Question – Robot Identification

This question assessed whether the children's preexisting impressions of robots usually formed through media, changed after the lessons. The trained group better understood robots, recognising that they were programmable devices.

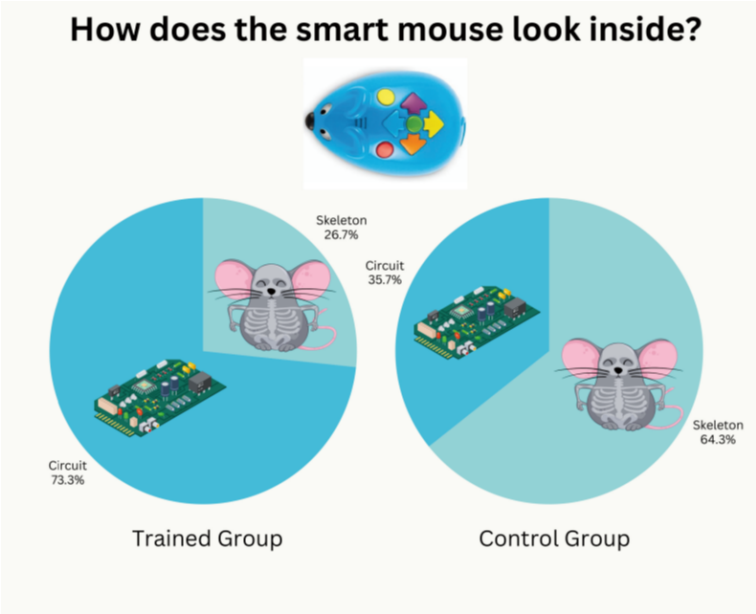


Figure 10: Results and Comparison of the Answers to the First Assessment Question – Machine Identification

This question determined whether children understood that robots do not function like living beings, even if they have animal or humanoid characteristics. The trained group showed a better understanding of robots' internal electronic components.

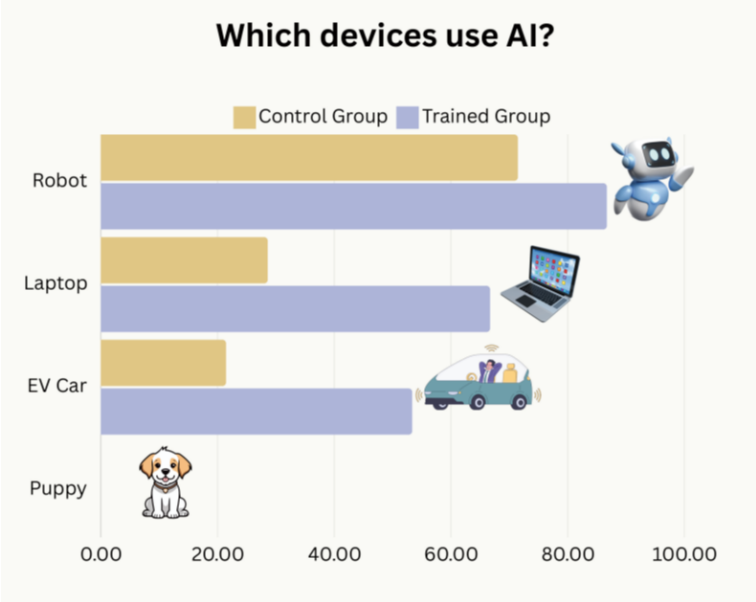


Figure 11: Results and Comparison of the Answers to the First Assessment Question – AI Identification

This figure illustrates the children's ability to identify AI after the lessons. The trained group demonstrated a significant improvement in recognising AI applications compared to the control group, indicating the effectiveness of the educational program in enhancing AI literacy.

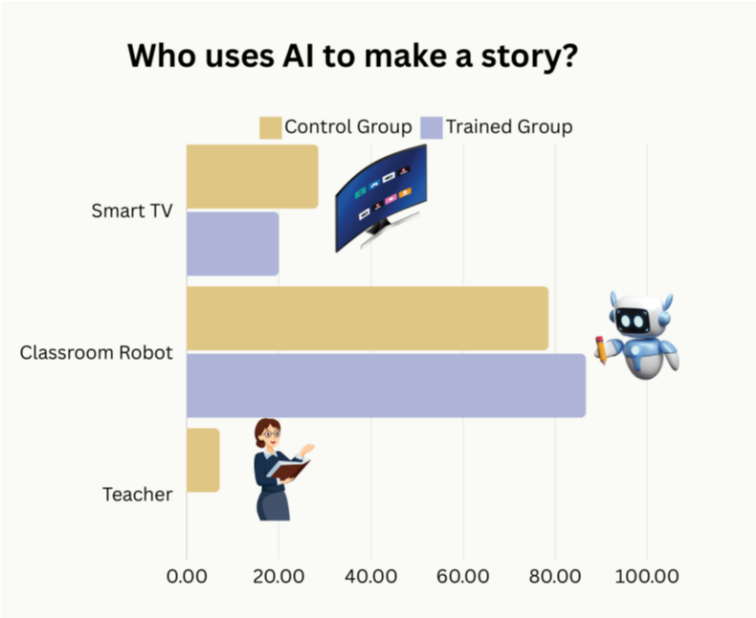


Figure 12: Results and Comparison of the Answers to the First Assessment Question – Generative AI Identification

This figure shows the children's understanding of generative AI concepts. The trained group could better identify and explain examples of generative AI, suggesting that the program successfully conveyed these advanced AI concepts to young learners.

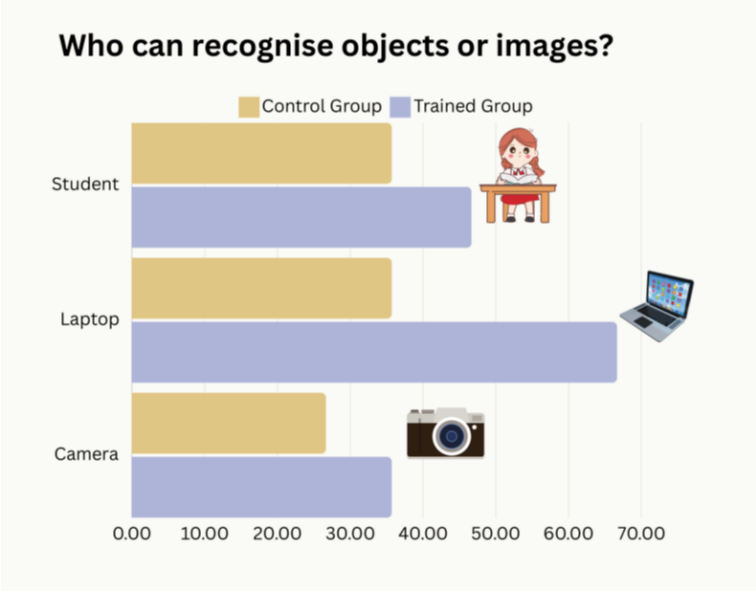


Figure 13: Results and Comparison of the Answers to the First Assessment Question – Machine Learning Identification

This figure compares the children's comprehension of machine learning. The trained group showed a higher ability to recognise and describe machine learning processes, demonstrating the program's impact on their understanding of how AI learns from data.

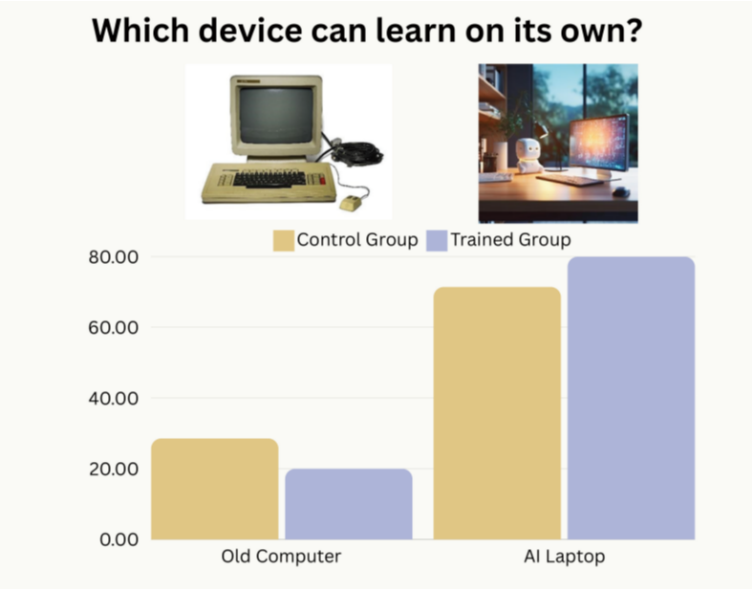


Figure 14: Results and Comparison of the Answers to the First Assessment Question – Self-Training AI Identification

This figure examines the children's grasp of self-training AI systems. The responses indicate that the trained group better understood AI, which can improve over time, highlighting the depth of knowledge gained through the program.

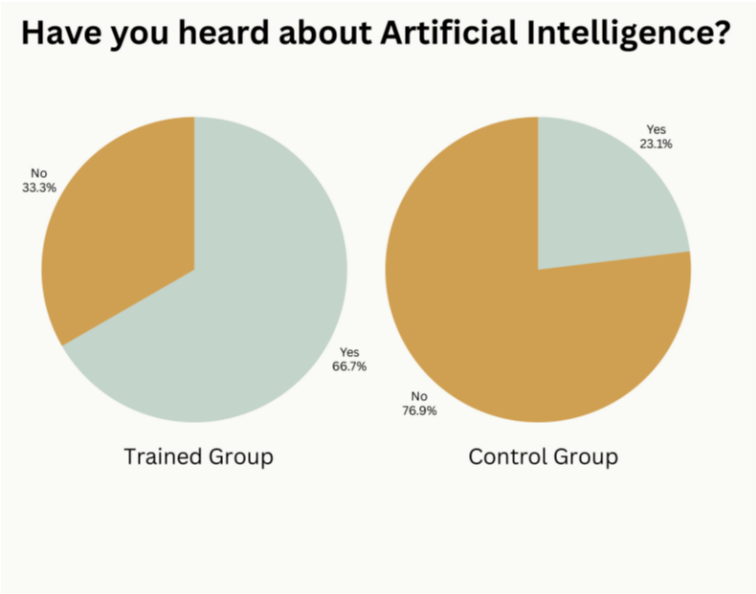


Figure 15: Results and Comparison of the Answers to the First Assessment Question – Self-Assessment

This figure presents the children's self-assessment of their understanding and interest in AI and programming. The trained group reported higher confidence and interest levels, reflecting the program's success in engaging and educating young minds about AI.

Discussion

The results suggest that children's exposure to AI tools enhances their understanding of programming and technology-related concepts. By creating material through applications, they better understood AI and its capabilities. Although children interact with technology daily at home, they previously needed to understand what AI is and recognise it in applications.

The pilot AI applications introduced this year in kindergarten will form the basis for designing a comprehensive program for children aged 4-6. The program aims to continue the research and disseminate information to the school's educators and other interested parties in education.

Conclusions

In this work, we presented lesson plans in an early but coherent and complete form. The goal was to investigate whether children who attended the program acquired additional digital cognitive skills, learned to recognise and use AI applications, and understood the logic behind "smart" machines.

The research showed that despite their lack of prior knowledge and technological skills, children significantly understood the current use of robots and AI. They learned to program and recognise AI in daily functions.

Having two groups of children in the same school, with only one group exposed to the educational program, allowed us to draw valuable conclusions about the program's impact on children's perception of AI.

References

Bloom, B., Engelhart, M., Furst, E., & Krathwohl, D. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain.* New York: David McKay.

Chesloff, J. (2013). Why STEM education must start in early childhood. *Education Week, 32*(23), pp. 27-32.

Druga, S., Williams, R., Park, H., & Breazeal, C. (2018, 6). How smart are the smart toys? pp. 231-240.

Gibson, D., Kovanovic, V., Ifenthaler, D., Dexter, S., & Feng, S. (2023, 9). Learning theories for artificial intelligence promoting learning processes. *54*(5), pp. 1125-1146.

Henriikka Vartiainen, M. T. (2020). Learning machine learning with very young children: Who is teaching whom? *International Journal of child-computer Interaction 25*. doi:100182

Kandlhofer, M., Steinbauer, G., Hirschmugl-Gaisch, S., & Huber, P. (2016, 10). Artificial intelligence and computer science in education: From kindergarten to university. pp. 1-9.

Katz, L. (2010). *STEM in the early years.* SEEDpapers.

Long, D., & Magerko, B. (2020, 4). What is AI Literacy? Competencies and Design Considerations. pp. 1-16.

Michelson, R., Nagar, R., Dewitt, A., Hiniker, A., Yip, J., Munson, S., & Kientz, J. (2021). Parenting in a Pandemic: Juggling Multiple Roles and Managing Technology Use in Family Life During Covid-19 in the United States. doi:https://doi.org/10.1145/3479546

Morrison, J., & Bartlett, B. (2009). STEM as a curriculum: An experimental approach. *Education Week, p. 23*, pp. 28–31.

Torres-Crespo, N., Kraatz, E., & Pallarsch, L. (2014). From fearing STEM to playing with it: The natural integration of STEM into the preschool classroom. *SRATE Journal, 23*(2), pp. 8-16.

Turkle, S., Breazeal, C., Dasté, O., & Scassellati, B. (2006). *Encounters with Kismet and Cog: Children Respond to Relational Artifacts.*

Yu, J., Bai, C., & Roque, R. (2020). Considering Parents in Coding Kit Design: Understanding Parents' Perspectives and Roles. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, (pp. 1–14). Honolulu, HI USA. doi:https://doi.org/10.1145/3313831.3376130

Impact of Music Education on the Developmental Skills of Students With Autism Spectrum Disorder

Tania Eljaam, University of Wollongong in Dubai, United Arab Emirates

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Autism Spectrum Disorder (ASD) presents a complex neurodevelopmental challenge impacting social interaction, communication, emotional expression, and cognitive abilities. The continuous rise of this population, this topic has become a growing interest for educational and governmental bodies to explore effective and innovative approaches to support those affected individuals. Researchers have suggested music education as an emerging technique due to its inherent appeal and multifaceted engagement. However, implementing music education as an intervention strategy is still a fertile area in the literature that demands more research and investigation before putting it into practice, therefore the purpose of this study is to investigate the impact of music education on the developmental skills of individuals with ASD. The research conducts a comprehensive review of case studies involving general music lessons, instrumental training, and integrated music in education. Through a detailed analysis across social, emotional, cognitive, and motor skill domains, the study unveils how music education fosters social interaction, emotional expression, concentration, and motor coordination among individuals with ASD. The immersive nature and universal appeal of music offer promising pathways to enhance developmental capabilities in this population. Synthesizing these findings underscores the positive impact of music education on ASD developmental skills, advocating for its integration into tailored intervention plans to optimize learning experiences. However, further research remains essential to establish precise links between music techniques and targeted developmental needs, facilitating the design of more effective and personalized intervention strategies.

Keywords: Autism Spectrum Disorder, Music Education, Intervention, Developmental Skills

iafor
The International Academic Forum
www.iafor.org

Introduction

Autism spectrum disorder ASD is characterized as a neurodevelopmental disorder that affects individuals mentally and physically from early childhood till late years of life (Joon et al., 2021). The developmental disorder manifests a wide range of symptoms that varies from a person to another and can evolve over time. Based on the American Psychiatric Association (2013), people with ASD commonly display a deficit in social interaction and communication. They struggle in sharing attention, exchanging conversations, and have a lack of interest in interacting with others (Liu et al., 2021). Another symptom of ASD is emotional understanding deficit particularly having trouble in expressing feelings and sharing emotions with others (Joon et al., 2021). Moreover, the mental disorder of ASD affects the intellectual abilities of this population in regard to the process of thinking, maintaining information and concentration (World Health Organization, 2021). All the above symptoms are mainly associated with motor abnormalities that target the physical strength and body synchronization in addition to hands and visual coordination, accompanied with motor repetitive behaviours (Staal, 2015). As a result of its core symptoms, ASD negatively impacts person's quality of life through limiting day-today functions and learning abilities (Joon et al., 2021).

Thus, ASD has recently become a growing area of interest due to the continuous rise of this population (Preis et al., 2015). Based on the World Health Organization (2021), 1 child in every 160 in the world is classified as having ASD. These statistics have led educational systems and governments to take actions in terms of including these individuals in schools and designing appropriate strategies to support their learning. For example, The United Arab of Emirates government has initiated several programs and rules to improve the quality of life and education for children with ASD (UAE government, 2021). In particular, the UAE federal law No.29 2006 protects the rights of people of determination including ASD, to receive equal learning opportunities and guarantees the resources needed to maximize their education. It states that all schools are required to make modifications in their teaching and learning to cater the needs of this population (UAE government, 2021). In 2021, the Minister of Community Development in UAE have also launched 14 new initiatives under the national policy of autism (UAE Ministry of Community Development, 2021). It focuses on educating the community through creating reliable information and guidelines about this spectrum. Additionally, starting new intervention centres to support early diagnosis, high quality intervention plans as well as guidance in their future journey (UAE Ministry of Community Development, 2021).

Moreover, researchers have been remarkably interested in examining a variety of intervention approaches to identify effective plans on individuals with ASD. Findings in the literature proposed different strategies that are deemed to be beneficial on the developmental skills of persons with ASD (National Autism Centre, 2009). For instance, story-based intervention consists of narrating or acting stories to teach children with ASD appropriate behaviours and responses in daily living and learning situations (Wong et al., 2015). Another example is the antecedent package strategy that aims to modify the environment of children with ASD to maximize their learning. This can be applied through reducing factors that trigger symptoms, including the learner's preferences in the choice of peers, resources, and toys in addition to including visuals in instructions (Will et al., 2018).

Music education has been also suggested in the literature as an emerging technique in addressing core deficits of the disorder as well as increasing learning abilities of students with

ASD (National Autism Centre, 2009). Researchers have recommended music as an intervention strategy due to various reasons. To begin with, children are surrounded by music since they are born, and they are observed to be naturally sensitive to it and capable of emotionally responding to it (Constantin et al., 2015). For example, a calm music can sooth them down to sleep or a happy music can lift their mood and increase their interaction. On top of that, music is considered as a universal language that is understood and well received by all children from all ages and abilities (Preis et al., 2015). It is mainly a source of entertainment and interest that can spontaneously trigger attention and focus. It creates an intrinsic motivation that is powerful in terms of enhancing engagement and modifying behaviors (Lakes et al., 2019). Furthermore, practicing music provides a neurological stimulation as it requires a sequence of sensory, auditory, and cognitive skills in addition to motor movement and imitation (Bacon et al., 2020). This multi-engagement of different body and brain parts may have a potential benefit on the developmental skills of children with ASD (Schwartzberg & Silverman, 2016).

Music can become an appealing technique to be adopted by teachers who are facing challenges in finding evidence-based interventions that meet the needs of pupils with ASD. However, implementing music education as an intervention strategy is still a fertile area in the literature that demands more research and investigation before putting it into practice (Dumont et al., 2017). Therefore, the research question of this study is: What is the impact of music education on the developmental skills (social, emotional, cognitive, and motor) of students with ASD. The purpose of this study is to review and examine case studies in the literature to provide more quality evidence in this field and answer the research question. The selected articles are aligned with the research question and cover different techniques in music education: general music lessons, instrumental lessons, and integration of music in other school subjects. The paper will first unpack the results of the studies under 4 different themes: social, emotional, cognitive, and motor. Afterwards, a discussion is presented to summarize the findings, analyse it, and generate new results that will answer the proposed research question.

Body

Research in the field of ASD, have focused on the active use of music education as an intervention strategy for students with ASD, ranging from singing, listening, playing instruments, music-based movements as well as including it in curriculum subjects (Bacon et al., 2020). Researchers state that there is an existing relation between music and autism as they share overlapping mechanisms (Bacon et al., 2020). As a way of explanation, musical practices activate multiple skills such as interaction with musicians, sensory and auditory stimuli through listening and reading music, executive functions through memorizing, and analysing music, in addition to physical movement through playing instruments and dancing. All of the mentioned skills are found to be core deficits in children with ASD. Therefore, researchers declare that music depends upon several physical and mental capabilities that can particularly target the skills of individuals with ASD (Schwartzberg & Silverman, 2016). Hence, this part will present case studies in the literature that investigated the impact of music education on the developmental skills of ASD: social, emotional, motor, and cognitive.

Social

Due to their developmental disorder, students with ASD lack the ability to communicate with their environment (American Psychiatric Association, 2013). They have deficit in the skill of

cocreating meaning of an object or event with another human. In other words, they cannot share attention or thoughts with their entourage, which prevent them from verbally or physically responding (Vivanti et al., 2017). Thus, students with such condition are unable to socially interact with their peers during learning nor participating in any collaborative tasks (Liu et al., 2021). Studies in the literature have discussed the impact of learning music on the social capacity of students with ASD.

For example, the study of Vaiouli et al. (2015) have examined the benefit of implementing music lessons on the social development of 3 autistic kindergarten children in a special education class. Vaiouli et al. (2015) stated that the participants used to only communicate in basic situations such as saying good morning, requesting for something by pointing at it, and their main struggle was to engage in back-and-forth conversations or taking turns in a certain activity. During collaboration time, they avoided participation and displayed aggressive behaviour such as biting and kicking. They have attended 9 months of music classes that consisted of interaction-based activities such as singing, responding to songs with actions, and interplaying instruments with the teacher and other students.

The findings reveals that students' level of engagement has noticeably increased shortly after the implementation. Vaiouli (2015) declared that students were highly enjoying music which spontaneously stimulated their interest and attention to their entourage. They started focusing on faces, singing with their peers, holding their hands, and even initiating conversations. Those findings are aligned with the study of Lakes et al. (2019) which indicates that during music class, the level of engagement of 8 autistic students aged 7 to 12, were similar to typical developing children. Lakes et al. (2019) argued that their amusement in music has involuntarily involved them in group activities which have regulated their social skills and limited their disruptive behavior.

The above-mentioned study of Vaiouli (2015) also discussed another social benefit of music education which is nurturing social relationships. During interviews, parents of the participants have explained that their children are using music as a communicative tool with their peers which helped them in making friendships for the first time. For example, they call their friends in school or their siblings at home to make music performances and sing together. These views echoes the findings of Cook et al. (2018), which argued that the synchronization of singing and moving to music as a group have removed boundaries between students and facilitated their social communication. In other words, music has enabled students with ASD to bond and be friends with typical students inside and outside the classroom.

Furthermore, the study of Cook et al. (2018) highlighted that engaging in music lessons develops the prosocial skills such as displaying positive behaviour and volunteering to help peers in class. Similar findings were concluded in the study of Lowry et al. (2018), which discussed the positive impact of playing the drums on all 18 participants aged 7 to 9, in terms of taking initiatives in class to support their peers and the teacher. The study of Draper (2021) on two G1 ASD students also indicates that taking music lessons have made them feel successful and capable like other students. As a result, they became confident enough to redirect their friends, offer to model how to play the violin and even lead music groups through hand movements.

Verbal expression in conversations have also been examined as one of the benefits of music education on this population. For instance, the above-mentioned study of Lowry, reported

that group drumming have played a role in making students feel that they are part of a community. It has decreased their social anxiety and supported them in becoming more vocal through expressing their needs and communicating with their entourage. Similar findings were present in the study of Foley (2017) which indicated that learning music requires a lot of interaction through speaking such as requesting the desired instrument, asking which rhythm to play, and counting the beats. Students were practicing those skills one class after the other, which has developed their ability of using the appropriate words in each social situation. It should be noted that the teacher was aware of the social difficulties of the 9 participants through observing them in action and reviewing their intervention plan prior to the study. Thus, the teacher has focused on practicing verbal communication based on their needs and embedding it as part of their class routine.

On the other hand, there is a limited number of studies in the literature that have demonstrated negative or neutral impact of music education on social skills of individuals with ASD. As an example, Preis et al. (2015) argued that listening to music have shown no remarkable improvement on the engagement nor the social responsiveness of 5 boys with ASD aged 4 to 6. The teacher have put background music during learning time for 28 weeks, where the chosen playlist was a mix of songs without words and from three different styles: reggae (Jamaican rhythmic music), classical and for kids. The results showed that students could not build any connection with the selected music as there was a lot of different styles and songs that they are not familiar with. Thus, background music did not contribute to any major changes in their social behaviour compared to their learning time without music.

Another example is the study of Mössler et al. (2020), that was conducted on 48 kindergarten students with severe ASD symptoms. The findings revealed that considering music as an intervention was not successful in developing social skills nor increasing participation in class. Although the teacher was well trained in delivering interactive activities, but students' abilities were very low and not receptive to such instructions. Mössler et al. (2020) argued that students with strong ASD symptoms require first lessons that focus on body and vocal expression such as moving around in a big space and singing loudly, which was not present in this study.

Emotional

It is generally recognized that autism is associated with a deficit in emotional processing, particularly understanding own and others' emotions (Elmose, 2016). By way of explanation, students with ASD fail to identify and label their feelings which results in poor and incoherent emotional expression (Costa et al., 2017). On the other hand, they fail perceiving emotions of other people especially reading face expressions, which limit their ability to respond appropriately (Griffiths et al., 2017). Given the emphasis of music as an art of expressing emotions (Tan et al., 2018), many researchers were interested in examining the role of music in addressing emotional problems in this population.

For instance, Wagener et al. (2020) conducted a study on 19 students with ASD aged 9 to 12, to examine the effect of listening to background music on recognizing angry, sad, and happy faces. The researcher selected compatible music for each photo that shows a person doing a face expression. For example, a calm slow music for a sad expression and fast jazzy music for a happy face. The results revealed that students were strongly influenced by the music they were listening while looking at the photos. They demonstrated higher ability of facial expression recognition compared to the same activity without music. Wagener et al. (2020)

argued that music and emotions are interconnected therefore it is recommended to integrate listening to music more in lessons such as storytelling and role play. The findings of this study are consistent with the ones of Brown (2017). It applied the same procedure on 20 elementary and middle schoolers students with ASD and compared it to the response of 30 other neurotypical students. The results indicated that students with ASD were able to identify face expressions while listening to music, like students with typical development.

Katagiri (2009) directed a similar study that investigated the effect of two music techniques on face expression recognition: listening to background music and singing songs about each emotion. After attending 8 lessons of emotional understanding, the findings revealed that both techniques are more beneficial than verbal explanation, whereas background music is found to be the most effective. According to Katagiri (2009), background music stimulates the emotions of students with such condition and allow them to connect it to the body expression or the situation they see. During interviews, parents explained that they rarely show their children any sad or angry feelings which has made it challenging on them to understand it in their social life. Parents believed that background music aided their children to be exposed to such feelings and to read the body language related to it.

Another challenge in the emotional domain of autism is the expression of own emotions (Huang et al., 2017). Individuals with ASD know when they are experiencing a certain feeling, but they are not aware whether it is sadness, happiness, or anger (Elmose, 2016). Hence, they face difficulty in recognizing, describing, and expressing their emotions (Huang et al., 2017). Several studies have found that music is a successful tool to help students in encoding their emotional state. To give an example, the study of Constantin (2015) revealed that after attending intensive music lessons of singing, dancing, and playing instruments, 9 special needs students with high emotional deficit, became capable to identify their emotions in situations that occurred in class. They have also chosen singing and drawing as ways to express it. However, most of the students have displayed difficulty in speaking and choosing the right words to describe what they feel. Constantin (2015) stated that music is a vital tool in encouraging special needs students to build a process of emotional expression, but it does not support them in verbalizing it.

Furthermore, lacking the ability to understand their own feeling is mainly correlated to poor self-regulation of emotions (Cai et al., 2018). Children with ASD get exposed to high pressure when they cannot relate to what they are going through, and lose control over their emotions (Nuske et al., 2017). As a result, they experience high anxiety and display aggressive behavior such as crying, screaming, and hitting (Beck et al., 2020). Researchers considered music as a potential tool of treating the poor regulation of negative feelings of this population.

For example, Rose et al. (2018) declared that taking Horn (blowing instrument) lessons in school have been emotionally beneficial for CB, an 8-year-old boy diagnosed with ASD. It has created in him a self-accomplishment feeling which has reduced his negative feelings and boosted his emotional well-being. His parents declared that CB suffers from anxiety and depression accompanied by aggressiveness, but as a result of Horn sessions, CB became more in control of those feelings and less agitated in public. It is also reported that CB started using his Horn as an outlet of his feelings in school and at home. Whenever he is stuck with his emotions and not able to translate it, he would go to the music room and play the Horn as a way of getting distracted from what he is going through. Additionally, the results showed that performing the horn in front of the class, has lifted CB's confidence, and trained him to

find adaptive strategies in challenging situations. For example, during a class concert, instead of screaming or crying to express his stress, CB has shared a laugh with his friends, which has protected his feelings and calmed him down to resume his performance. Having said that, Rose et al. (2018) argued similarly to Constantin (2015), that music supports students with ASD in choosing better ways to control and express their emotions, but it does not fully help them in verbalizing or solving their negative feelings.

Motor

Individuals with ASD are generally characterized by a delay in their motor function due to a neurodevelopmental disorder (American Psychiatric Association, 2013). It affects gross motor skills such as physical activity and body coordination, which are often accompanied by motor repetitive behaviors like body swaying, tapping hands and rocking feet (Hollander et al., 2018, p. 146). They also experience problems in fine motor skills such as hands movement, visual coordination and words pronunciation (American Psychiatric Association, 2013). These issues have troubled their daily living in terms of limiting their independence in school tasks and their participation in activities (Memari et al., 2015). Literature have discussed music as a beneficial technique on the gross and fine motor skills of students with ASD.

For example, Woodman et al. (2018) investigated the effect of music on the physical activity of 13 ASD students between 5 and 13 years old in a private special education school. The purpose of the study was checking the changes that occurred on their morning jog after combining it with listening to music. Data of the study were collected from observing students, checking their waistbands, and interviewing their teachers. The results highlighted motivational impact of slow music on the intensity and speed of their physical ability. Woodman et al. (2018) stated that slow music has aided students to regulate their strength and enable their focus. Woodman et al. (2018) also recommended including slow in any sort of movement lessons, in the purpose of not only increasing their physical intensity but also strengthening their motor skills and body muscles.

Similar findings were present in the study of Imankhah et al. (2018) that aimed for embedding music in an intervention plan for 30 Grade 3 students with ASD. High experienced music educators created 15 music lessons aligned with the “Orff” teaching approach. It is based on delivering music in an active setup where the body is engaged in intense movements such as dancing, singing, and playing percussion instruments. The results reported a progress in the motor involvement and body coordination of the participants. Imankhah et al. (2018) argued that students were naturally understanding and following the rhythm while applying all music instructions. This sort of rhythmic practice has balanced their body posture and movements. In addition, listening and playing music stimulated all their sensory functions which maintained their focus during music activities. For example, when playing a triangle, its high pitch triggered their listening and awakened them to stay on the rhythm. Their consistent repetition of fast responses contributed to adapting their body to voluntary well-rhythmic actions such as symmetrical walking, turning, and bending.

In support of those findings, Sanglakh et al. (2017) argued that musical rhythmic activities are more efficient on motor proficiency than free movements. In this study, 22 elementary participants with ASD, were blindly assigned to two groups, one experimental that consists of playing percussion instruments, and another control group of only movements such as hopping, crawling, and climbing. The results documented a progress in both groups, whereas

the experimental group displayed higher effectiveness. As students were shaking or banging the drums on beats, their upper limbers have noted to be strengthened. Moreover, the structured movements based on music beats improved their motor timing which created a sense of balance between their body and time and reduced their repetitive behaviors. For example, when an individual with ASD is trying to eat, he will be aware of his movement towards his mouth and understand when the next movement should be done. He will no longer expresses confusion about motor functioning which will limit his irrelevant pattern of behaviors.

Furthermore, research studies have investigated the influence of learning music instruments on the fine motor skills of this population. The previously mentioned study of Rose et al. (2018) stated that playing the Horn, like all wind instruments, requires blowing, lips vibration and fingers pressure, which triggers the face, tongue, and hands muscles. As a result, CB (8 years old boy diagnosed with ASD) have displayed improvement in daily motor skills such as catching a ball, whispering, and articulating words. Moreover, reading music notes and concentrating on different signs on music sheets, resulted in reinforcing CB's visual coordination and enhancing his control over his eyes in tasks and during conversations.

Those results match the study of Spak and Card (2019), which conducted a 1-year intervention plan of drumming sessions for a 12-year-old boy with severe motor impairments. The outcome of the study revealed that after few months, Reily attained remarkable progress in his hands and feet movements such as speed control, catching, grabbing and balanced jumping. Additionally, playing on a full drum set involved Reily in different actions at the same time. He was asked to kick the pedal with his feet while flipping the stick or banging the drums with his hands. Spak and Card (2019) stated that the multifunction of different body parts during drumming have extended Reily's perception and allowed him to view and anticipate the motions around him.

This study does not reflect the findings of Lowry (2019), which indicated no significant changes on the fine motor skills of 18 elementary students with ASD, after participating in 10 drumming lessons. Lowry (2019) declared that those results are due to different reasons. First, the starting point of the participants is very low as music is not embedded in the curriculum and students were never exposed to any music lessons before. In addition, students were showing signs of worry and anxiety before and during the lesson because of all the changes that they were experiencing. They were not only disturbed by the sound of the drums but also the lessons were delivered by new teachers and in a different setup from what they are used to. Lastly, the drumming exercises were not complex enough to target all fine motor skills of the students. Therefore, Lowry (2019) recommended further research in this domain while taking in consideration all those limitations.

Cognitive

For ASD individuals**,** impaired cognitive development is one of the core symptoms resulting from brain disfunction. They experience a difficulty in processing information leading to a restriction in several cognitive skills such as memorizing, spatial ability, problem-solving, and language acquisition (Åsberg Johnels et al., 2021). To elaborate more, children with ASD are unable to maintain information in their memory, connecting it to other ideas and generating new concepts based on previous knowledge (Ramain et al., 2021). Those problems are preventing students with ASD from having a purposeful learning experience and high academic achievement (Erickson & Geist, 2016). Supporting the developmental

cognition of this population requires a learning experience that emphasizes on language, communication, and teaching of symbols, which can occur in music education (Erickson & Geist, 2016). Thus, researchers were interested in assessing the effect of music on different cognitive abilities of this target group.

For instance, Koolidge and Holmes (2018) explored the impact of three musical conditions on the spatial ability of 87 primary students in a private school. Participants were asked to complete a 12 pieces jigsaw puzzle while listening to music without words, music with words and without music. The purpose of this study was to check their ability of recognizing different shapes, memorizing it, and connecting it together. The choice of the music was based on children's preferences and parents' advice to establish familiarity. It is important to mention that researchers have met several times with the participants and played with them to build a trusting relationship and ensure that they are ready to participate in the game. The findings demonstrated that listening to background music without vocals was the most beneficial condition, whereas the two other conditions presented the same low results. Koolidge and Holmes (2018) indicated that there are several factors associated with the superiority of background music. First, music with words exhausts the brain and consumes the focus needed for the task whereas background music decreases external distractions and sustains their focus-task. Second, the familiarity of the song enabled students to connect to the music which facilitated their concentration. Lastly, the joyful background music has boosted their mood and aided the performance of their cognitive skills.

Literature have also reported the benefit of music-based learning on the cognitive skills that contribute to academic achievement of this population. Mastropieri and Scruggs (1997) consider reading comprehension as one of the most essential learning skills in schools. In fact, children with ASD might be able to read accurately, however they lack the skill of forming connections and structure of what they read (Ramain et al., 2021). Hence, Schwartzberg and Silverman (2016) conducted a study to compare the comprehension of reading a short story for 3 days on two groups: control group with no music and experimental group with listening to the story in sort of singing. The story chosen included visuals in addition to being short and with appropriate vocab to meet the needs of the participants. The results revealed that the experimental group have displayed higher potential of comprehension than the control group.

Schwartzberg and Silverman (2016) hypothesized that the stimulation of multiple auditory senses through singing and visuals, activated the nervous system and enabled different cognitive domains specially the ones responsible for memory, concentration, and speech. Moreover, the memory retrieval of the participants got associated with the music they hear and the photos they see, which have facilitated the process of comprehension.

Those findings are in line with the study of Simpson et al. (2013) which argued that language acquisition increased when embedding singing in lessons. This study aimed to compare learning new vocabulary in verbal explanation and sung condition. Twenty-two participants received 15 lessons of learning about the theme garden using the music of "Twinkle Twinkle" where the lyrics was replaced by the lesson explanation. The results show a higher acquisition of language in the sung condition. Simpson et al. (2013) indicated that the engagement of students with the music have maintained their concentration for a longer period and enhanced their memory function. Additionally, the familiarity of the song "Twinkle Twinkle" has also contributed to increasing their interest on the new terms.

Similarly, Said and Abramides (2020) investigated the impact of music lessons on reading and writing of 40 students with ASD. The outcome of the study documented higher academic achievement in both skills compared to other 40 participants who are not exposed to music lessons. Said and Abramides (2020) declared that learning music pushes the brain to work in a network, where the students are reading notes, sending messages to the brain to play it, translate it through a hand movement and then listening to it. As a result, a communication is built between different areas in the brain responsible for verbal language, memory, and analysis.

Furthermore, several studies have considered music as potential strategy to improve problem-solving in this population. For example, Rose et al. (2018), a previously mentioned study, indicated that after few months of taking Horn lessons, CB's IQ has elevated as well as his skills in problem solving and far transfer effects. In other words, CB became capable of adapting to any new challenge, analyzing it, and finding appropriate solutions. For example, during Horn practices, CB struggled in reading the music notes, but he came up with a solution for himself by color coding the lines and spaces on the staff. According to Rose et al. (2018), his cognitive skills and specially reasoning has reached the same level of a typical developing child.

This finding is consistent with another previously mentioned study of Foley (2017) which explains that after implementing music lessons for 3 elementary students with ASD, their problem-solving skills were noted to be developed. For example, when the teacher gave Alberto a new complex rhythm to play on the drum, he analyzed the previous rhythm content and successfully solved the task. Another example was during Casper's practice on the instruments where he was meant to hit a tambourine every time the teacher gives a sign. Casper was struggling to pick and hit the tambourine on time, so he figured out a way to solve this issue, by putting the tambourine on the desk as it closer and will take less time to grab it.

Discussion

The overall findings generally present positive impact of music education on all developmental skills of students with ASD. First, it indicates that learning music enhances different social aspects in this population: engagement, interaction, verbal conversation, social bonding, and prosocial attitudes (Vaiouli et al., 2015; Cook et al., 2018). Moreover, the results show that music supports children with ASD in emotional understanding of their own feelings and others' facial expressions (Rose et al., 2018; Wagener et al., 2020). However, the insights of some studies confirm that music only aids in venting emotions but has no role in encouraging children with ASD to verbally express it (Constantin, 2015; Lowry 2018). Furthermore, the findings prove that music provides opportunities for individuals with ASD to increase their physical ability, body coordination and synchronization in addition to reinforcing fine motor skills such as hands movement, speech control, and visual coordination (Sanglakh et al., 2017; Spak & Card, 2019). Lastly, music activities stimulate a range of cognitive skills in the brain such as concentration, memory, spatial task, language acquisition and problem-solving (Simpson et al., 2013; Schwartzberg & Silverman). There were very few results that presented no significant impact of music education but that was mainly due to some limitations within the studies. For example, design of music lessons that does not meet the age and needs of the participants (Lowry et al., 2019). Another existing limitation is the wrong choice of music that students were not able to connect to (Preis et al.,

2015). Lastly, the limited access to resources that prevented teachers and students from reaching their full potentials (Mössler et al., 2020).

Moreover, based on the analysis of the findings, several music techniques are observed to be more beneficial on some developmental skills than others. For example, music lessons that include collaborative singing and movement, are found to be the most efficient on the social capacity of this population (Vaiouli et al., 2015; Foley, 2017). On the other hand, instrumental practices are reported to serve the gross and fine motor skills in terms of rhythmic body movement and muscles training of hands, feet, face ad eyes (Rose et al., 2018; Spak & Card, 2019). Additionally, instrumental lessons are observed to enhance the brain function and cognitive skills due to the requirement of several intellectual and sensory function. Regarding integrating music in other subjects, listening to slow joyful music is noted to be effective in maintaining students' focus, reducing distractions, and enhancing emotional understanding (Woodman et al., 2018; Wagener et al., 2020). Whereas, singing spoken songs is mostly beneficial in lessons that demand new vocabulary acquisition such as reading and science (Simpson et al., 2013; Schwartzberg & Silverman., 2016).

On top of that, the analysis of the results allows us to point at several factors that are responsible for successful implementation of music practices for students with ASD. First, it is essential to build a positive relationship with the students before starting music lessons as they need time to adapt to new faces and new routines (Koolidge & Holmes, 2018). Second, taking in consideration the music preferences of the students contribute to building familiarity and optimizing their execution (Simpson et al., 2013). Third, incorporating other sensory stimuli with music such as photos and videos raises the involvement and response of this population (Wagener et al., 2020). Lastly, music teachers must be aware of students' intervention plan, their weaknesses, and strengths in order to design lessons that focus on solving their difficulties and meeting their needs (Foley, 2017).

To sum up the discussion of findings in correspondence to the research question, music education has a positive impact on the developmental skills (social, emotional, cognitive, and motor) of students with ASD. The new concluded results provide teachers with evidence to consider music education as part of the designed intervention plan for these individuals. Additionally, it redirects their planning and teaching strategies to the right music technique based on the skill that they are working on improving. Lastly, it gives them factors to consider and other mistakes to avoid, to ensure a successful implementation of the music practices.

Conclusion

ASD is defined as a neurodevelopmental disorder causing impairments that are observed on individuals from an early age and continues later in their adulthood (Joon et al., 2021). Children with ASD exhibit a wide range of symptoms that mainly consists of social interaction deficit, lack of emotional understanding, limited intellectual abilities and motor abnormalities (American Psychiatric Association, 2013). The severity of the symptoms changes from a person to another but can improve with appropriate interventional strategies (World Health Organization, 2021). Therefore, researchers were interested in investigating several intervention techniques to improve the skills of this population as well as their learning experience. Given the enjoyment approach of music and its multiple engagement of several physical and mental functions, researchers recommended music education as one of the promising strategies to be applied on students with ASD (Bacon et al., 2020). Hence, this

study aimed to examine existing case studies in the literature and connect its findings to answer the research question: What is the impact of music education on the developmental skills (social, emotional, cognitive, and motor) of students with ASD?

The findings of this study show that music lessons unvoluntary engage students with ASD in social interaction, remove the social barriers between peers and facilitate their communication (Vaiouli et al., 2015; Cook et al., 2018). Moreover, music is a beneficial tool in teaching students how to label their emotions, express it and decode the emotions of others particularly face expressions (Rose et al., 2018; Wagener et al., 2020). Regarding cognitive skills, music is responsible for limiting distraction and reinforcing concentration during tasks. In addition, the involvement of several tasks during music practices provokes the brain function and ameliorate intellectual skills such as memory, spatial tasks, problem-solving and literacy (Simpson et al., 2013; Schwartzberg & Silverman). Lastly, findings present that rhythmic music contributes to balancing the body coordination and symmetric movements. Additionally, the occupation of different body parts such as hands, mouth and eyes during instrumental lessons reinforce fine motor skills, eye control and words articulation (Sanglakh et al., 2017; Spak & Card, 2019).

Considering all the given findings and discussions in this research, we can conclude that music education has a positive impact on the developmental skills (social, emotional, cognitive, and motor) of students with ASD. It allows us to recommend music education as an intervention tool to be adopted in schools to meet the educational needs of this population and improve their learning experience inside and outside the classroom. However, further research is needed to validate the proposed connection between the music technique used and the desired developmental skill to facilitate the process of designing interventional plans where the music practices match the targeted need.

References

American Psychiatric Association. (2013). DSM-5 Diagnostic Classification. *Diagnostic and Statistical Manual of Mental Disorders*, *25*(5), 50–59. https://doi.org/10.1176/appi.books.9780890425596.x00diagnosticclassification

Åsberg Johnels, J., Fernell, E., Kjellmer, L., Gillberg, C., & Norrelgen, F. (2021). Language/cognitive predictors of literacy skills in 12-year-old children on the autism spectrum. *Logopedics Phoniatrics Vocology*, 1–5. https://doi.org/10.1080/14015439.2021.1884897

Bacon, A., Beaman, C. P., & Liu, F. (2020). An exploratory study of imagining sounds and "hearing" music in autism. *Journal of Autism and Developmental Disorders*, *50*(4), 1123–1132. https://doi.org/10.1007/s10803-019-04346-w

Beck, K. B., Conner, C. M., Breitenfeldt, K. E., Northrup, J. B., White, S. W., & Mazefsky, C. A. (2020). Assessment and treatment of emotion regulation impairment in autism spectrum disorder across the life span. *Child and Adolescent Psychiatric Clinics of North America*, *29*(3), 527–542. https://doi.org/10.1016/j.chc.2020.02.003

Brown, L. S. (2016). The influence of music on facial emotion recognition in children with autism spectrum disorder and neurotypical children. *Journal of Music Therapy*. https://doi.org/10.1093/jmt/thw017

Cai, R. Y., Richdale, A. L., Uljarević, M., Dissanayake, C., & Samson, A. C. (2018). Emotion regulation in autism spectrum disorder: Where we are and where we need to go. *Autism Research*, *11*(7), 962–978. https://doi.org/10.1002/aur.1968

Constantin, F. A. (2015). Emotional Effects of Music Therapy on Children with Special Needs. Journal Plus Education / Educatia Plus, 12A, 178-183.

Cook, A., Ogden, J., & Winstone, N. (2018). The impact of a school-based musical contact intervention on prosocial attitudes, emotions and behaviours: A pilot trial with autistic and neurotypical children. *Autism*, *23*(4), 933–942. https://doi.org/10.1177/1362361318787793

Costa, A. P., Steffgen, G., & Samson, A. C. (2017). Expressive incoherence and alexithymia in autism spectrum disorder. *Journal of Autism and Developmental Disorders*, *47*(6), 1659–1672. https://doi.org/10.1007/s10803-017-3073-9

Draper, A. R. (2021). Music education for students with autism spectrum disorder in a full-inclusion context. *Journal of Research in Music Education*. https://doi.org/10.1177/00224294211042833

Dumont, E., Syurina, E. V., Feron, F. J., & van Hooren, S. (2017). Music interventions and child development: A critical review and further directions. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01694

Elmose, M. (2016). A conceptual framework for understanding characteristics of self-awareness associated with autism spectrum disorder. *Scand. J. Child Adolesc. Psychiatr. Psychol.* 4, 109–114. doi:10.21307/sjcapp-2016-017

Erickson, K. A., & Geist, L. A. (2016). The profiles of students with significant cognitive disabilities and complex communication needs. *Augmentative and Alternative Communication*, *32*(3), 187–197. https://doi.org/10.1080/07434618.2016.1213312

Foley, S. V. (2017). *He Benefits of Music Education on Academic, Behavioral, and Communicative Skills with Middle School Students with Autism Spectrum Disorder* (thesis). Graduate Master's Theses, Capstones, and Culminating Projects.

Griffiths, S., Jarrold, C., Penton-Voak, I. S., Woods, A. T., Skinner, A. L., & Munafò, M. R. (2017). Impaired recognition of basic emotions from facial expressions in young people with autism spectrum disorder: Assessing the importance of expression intensity. *Journal of Autism and Developmental Disorders*, *49*(7), 2768–2778. https://doi.org/10.1007/s10803-017-3091-7

Hollander, E., Hagerman, R., & Fein, D. (2018). *American Psychiatric Association Publishing.* (1st ed.). American Psychiatric Association Publishing.

Huang, A. X., Hughes, T. L., Sutton, L. R., Lawrence, M., Chen, X., Ji, Z., & Zeleke, W. (2017). Understanding the self in individuals with autism spectrum disorders (ASD): A Review of Literature. *Frontiers in Psychology*, *8*. https://doi.org/10.3389/fpsyg.2017.01422

Imankhah, F., Hossein Khanzadeh, A. A., & Hasirchaman, A. (2018). The effectiveness of combined music therapy and physical activity on Motor Coordination in children with autism. *Iranian Rehabilitation Journal*, 405–412. https://doi.org/10.32598/irj.16.4.405

Joon, P., Kumar, A., & Parle, M. (2021). What is autism? *Pharmacological Reports*, *73*(5), 1255–1264. https://doi.org/10.1007/s43440-021-00244-0

Katagiri, J. (2009). The effect of background music and song texts on the emotional understanding of children with autism. *Journal of Music Therapy*, *46*(1), 15–31. https://doi.org/10.1093/jmt/46.1.15

Koolidge, L., & Holmes, R. M. (2018). Piecing it together: The effect of background music on children's Puzzle assembly. *Perceptual and Motor Skills*, *125*(2), 387–399. https://doi.org/10.1177/0031512517752817

Lakes, K. D., Neville, R., Vazou, S., Schuck, S. E., Stavropoulos, K., Krishnan, K., Gonzalez, I., Guzman, K., Tavakoulnia, A., Stehli, A., & Palermo, A. (2019). Beyond Broadway: Analysis of qualitative characteristics of and individual responses to creatively able, a music and movement intervention for children with autism. *International Journal of Environmental Research and Public Health*, *16*(8), 1377. https://doi.org/10.3390/ijerph16081377

Liu, Q., Wang, Q., Li, X., Gong, X., Luo, X., Yin, T., Liu, J., & Yi, L. (2021). Social synchronization during joint attention in children with autism spectrum disorder. *Autism Research*, *14*(10), 2120–2130. https://doi.org/10.1002/aur.2553

Lowry, R. G., Hale, B. J., Draper, S. B., & Smith, M. S. (2018). Rock drumming enhances motor and psychosocial skills of children with emotional and behavioral difficulties. *International Journal of Developmental Disabilities*, *65*(3), 152–161. https://doi.org/10.1080/20473869.2018.1429041

Mastropieri, M. A., & Scruggs, T. E. (1997). Practices in promoting reading comprehension in students with learning disabilities: 1976 to 1996. *Remedial and Special Education, 18*, 198–213.

Memari, A. H., Panahi, N., Ranjbar, E., Moshayedi, P., Shafiei, M., Kordi, R., & Ziaee, V. (2015). Children with autism spectrum disorder and patterns of participation in daily physical and play activities. *Neurology Research International*, *2015*, 1–7. https://doi.org/10.1155/2015/531906

Mössler, K., Schmid, W., Aßmus, J., Fusar-Poli, L., & Gold, C. (2020). Attunement in music therapy for young children with autism: Revisiting qualities of relationship as mechanisms of change. *Journal of Autism and Developmental Disorders*, *50*(11), 3921–3934. https://doi.org/10.1007/s10803-020-04448-w

National Autism Center. (2009). National standards report. Retrieved March 21, 2022, from http:// mn.gov/mnddc/asd-employment/pdf/09-NSR-NAC.pdf

Nuske, H. J., Hedley, D., Woollacott, A., Thomson, P., Macari, S., & Dissanayake, C. (2017). Developmental delays in emotion regulation strategies in preschoolers with autism. *Autism Research*, *10*(11), 1808–1822. https://doi.org/10.1002/aur.1827

Preis, J., Amon, R., Silbert Robinette, D., & Rozegar, A. (2015). Does music matter? the effects of background music on verbal expression and engagement in children with autism spectrum disorders. *Music Therapy Perspectives*, *34*(1), 106–115. https://doi.org/10.1093/mtp/miu044

Ramain, J., Mohr, C., & Abu-Akel, A. (2021). How cognitive control, autistic and schizotypal traits shape context adaptation of divergent thinking. *The Journal of Creative Behavior*, *55*(3), 783–799. https://doi.org/10.1002/jocb.489

Rose, D., Jones Bartoli, A., & Heaton, P. (2018). Learning a musical instrument can benefit a child with special educational needs. *Psychomusicology: Music, Mind, and Brain*, *28*(2), 71–81. https://doi.org/10.1037/pmu0000209

Said, P. M., & Abramides, D. V. (2020). Efeito da Educação musical na promoção do Desempenho Escolar em Crianças. *CoDAS*, *32*(1). https://doi.org/10.1590/2317-1782/20192018144

Sanglakh, G. A. A., Akbarfahimi, M., & Alizadeh, Z. M. (2017). The effect of movement activities in synchronization with music on motor proficiency of children with autism. *Journal of Advanced Medical Sciences and Applied Technologies*, *3*(2), 61. https://doi.org/10.18869/nrip.jamsat.3.2.61

Schwartzberg, E. T., & Silverman, M. J. (2016). Effects of a music-based short story on short- and long-term reading comprehension of individuals with autism spectrum disorder: A cluster randomized study. *The Arts in Psychotherapy*, *48*, 54–61. https://doi.org/10.1016/j.aip.2016.01.001

Simpson, K., Keen, D., & Lamb, J. (2013). The use of music to engage children with autism in a receptive labelling task. *Research in Autism Spectrum Disorders*, *7*(12), 1489–1496. https://doi.org/10.1016/j.rasd.2013.08.013

Spak, D., & Card, E. (2019). Music, movement, and mind: Use of drumming to improve strength, balance, proprioception, stamina, coordination, and emotional status in a 12-year-old with agenesis of the corpus callosum: A case study. *Journal of Holistic Nursing*, *38*(2), 186–192. https://doi.org/10.1177/0898010119871380

Staal, W. G. (2015). Autism, DRD3 and repetitive and stereotyped behavior, an overview of the current knowledge. *European Neuropsychopharmacology*, *25*(9), 1421–1426. https://doi.org/10.1016/j.euroneuro.2014.08.011

Tan, D., Diaz, F. M., & Miksza, P. (2018). Expressing emotion through vocal performance: Acoustic cues and the effects of a mindfulness induction. *Psychology of Music*, *48*(4), 495–512. https://doi.org/10.1177/0305735618809873

UAE Government. (2021). *Education for people of determination*. Education for people of determination - the official portal of the UAE Government. Retrieved March 25, 2022, from https://u.ae/en/information-and-services/education/education-for-people-with-special-needs

UAE Ministry of Community Development. (2021). *The National Policy for Autism*. The National Policy for Autism | Autism | People of Determination | Target Audience | About MOCD | Ministry of Community Development. Retrieved March 21, 2022, from https://www.mocd.gov.ae/en/about-mocd/autism/the-national-policy-for-autism.aspx

Vaiouli, P., Grimmet, K., & Ruich, L. J. (2015). "Bill is now singing": Joint engagement and the emergence of Social Communication of three young children with autism. *Autism*, *19*(1), 73–83. https://doi.org/10.1177/1362361313511709

Vivanti, G., Fanning, P. A., Hocking, D. R., Sievers, S., & Dissanayake, C. (2017). Social attention, joint attention and sustained attention in autism spectrum disorder and Williams Syndrome: Convergences and divergences. *Journal of Autism and Developmental Disorders*, *47*(6), 1866–1877. https://doi.org/10.1007/s10803-017-3106-4

Wagener, G. L., Berning, M., Costa, A. P., Steffgen, G., & Melzer, A. (2020). Effects of emotional music on facial emotion recognition in children with autism spectrum disorder (ASD). *Journal of Autism and Developmental Disorders*, *51*(9), 3256–3265. https://doi.org/10.1007/s10803-020-04781-0

Will, M. N., Currans, K., Smith, J., Weber, S., Duncan, A., Burton, J., Kroeger-Geoppinger, K., Miller, V., Stone, M., Mays, L., Luebrecht, A., Heeman, A., Erickson, C., & Anixt, J. (2018). Evidenced-based interventions for children with autism spectrum disorder. *Current Problems in Pediatric and Adolescent Health Care*, *48*(10), 234–249. https://doi.org/10.1016/j.cppeds.2018.08.014

Wong, C., Odom, S. L., Hume, K. A., Cox, A. W., Fettig, A., Kucharczyk, S., Brock, M. E., Plavnick, J. B., Fleury, V. P., & Schultz, T. R. (2015). Evidence-based practices for children, youth, and young adults with autism spectrum disorder: A comprehensive review. *Journal of Autism and Developmental Disorders*, *45*(7), 1951–1966. https://doi.org/10.1007/s10803-014-2351-z

Woodman, A., Breviglia, E., Mori, Y., Golden, R., Maina, J., & Wisniewski, H. (2018). The effect of music on exercise intensity among children with autism spectrum disorder: A pilot study. *Journal of Clinical Medicine*, *7*(3), 38. https://doi.org/10.3390/jcm7030038

World Health Organization. (2021). *Autism spectrum disorders*. World Health Organization. Retrieved March 21, 2022, from https://www.who.int/news-room/fact-sheets/detail/autism-spectrum-disorders#:~:text=Epidemiology,figures%20that%20are%20substantially%20higher

Contact email: Ta.jaam@hotmail.com

Using Artificial Intelligence to Teach and Learn the Formal Languages and Automata Course at the University of Nariño

Jesus Insuasti, University of Nariño, Colombia
Felipe Roa, University of Nariño, Colombia
Carlos Mario Zapata-Jaramillo, Universidad Nacional de Colombia at Medellín, Colombia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Representing knowledge can be a challenging task in undergraduate education. In the Formal Languages and Automata course, developing the ability to depict knowledge is crucial, and graphical methods are highly beneficial. Pre-conceptual schemas are graphs using controlled language, and they are simple to use and represent knowledge in any context. Despite their widespread use in academic circles, no computational tools currently incorporate artificial intelligence into such Pre-conceptual schemas, making it hard for computers to understand them. This study investigates a new method for computer interpretation of knowledge using artificial intelligence, aiming to enhance teaching, and learning in the Formal Languages and Automata course at the University of Nariño in Colombia. The outcomes of the validation process indicate a positive impact on educational practices, laying the groundwork for future innovations in the fields of didactics and computer-aided educational tools.

Keywords: Knowledge, Representation, Pre-conceptual Schema, Artificial Intelligence, Formal, Languages, Automata

iafor
The International Academic Forum
www.iafor.org

Introduction

Knowledge representation in undergraduate education presents a notable challenge, particularly in technically demanding courses such as Formal Languages and Automata, where clarity and precision in presenting information are paramount. In such contexts, using graphical techniques emerges as a highly effective strategy. By their very nature, these visual tools provide a lucid and engaging way to demonstrate complex concepts, making them more accessible to students. Through graphs, abstract theories and principles are transformed into tangible visuals, facilitating a deeper understanding and retention of the subject matter. Despite the simplicity of graphs, their eminently mathematical and algebraic nature makes the knowledge representation a task that demands a significant effort in abstraction.

Pre-conceptual schemas stand out for their simplicity and effectiveness in encapsulating complex knowledge using straightforward graphs and a controlled vocabulary. These schemas excel in adapting to many scenarios, making them a favoured tool in educational environments for their ability to distil and communicate intricate ideas. However, a notable gap exists in integrating these schemas with computational technologies, particularly in artificial intelligence (AI). This lack of AI-enhanced tools to work alongside Pre-conceptual Schemas limits the capacity of computers to interpret and interact with the knowledge these schemas represent. Overcoming this hurdle is essential for advancing pre-conceptual schemas in digital and AI-driven educational platforms, which have immense potential for enhanced learning and knowledge processing.

This study delves into a pioneering methodology aimed at empowering computers to decipher and assimilate knowledge via artificial intelligence, focusing on refining the educational journey within the Formal Languages and Automata course at the University of Nariño in Colombia. By harnessing the capabilities of artificial intelligence, the research seeks to bridge the gap between complex academic concepts and their digital comprehension, facilitating a more interactive and practical learning environment. This innovative approach promises to enhance students' grasp of intricate subjects and to pioneer new frontiers in the application of AI in educational settings, potentially transforming traditional pedagogical techniques and setting a novel approach to academic experiences.

The initial findings from the validation stage of this research indicate a promising potential for this novel method to improve educational approaches. These early successes lay a solid groundwork for future enhancements in teaching methodologies and the creation of new computer-assisted learning tools. This approach paves the way for innovative educational practices by demonstrating significant benefits in conveying and understanding knowledge. It opens avenues for further research and development in digital learning resources, potentially revolutionising the traditional classroom experience and setting new benchmarks for integrating technology into education.

This article is organised into six sections. The second section includes a literature review. The third section depicts the problem statement and methodological aspects. The fourth section describes the proposed solution. The fifth section contains the validation process and its results. Finally, the last section includes the discussion, conclusions, and future work.

Literature Review

Teaching formal languages and automata has seen significant advancements over the years. This chapter explores various research contributions that focus on enhancing this area's teaching methodologies, tools, and theoretical underpinnings. The literature reviewed includes dissertations, journal articles, conference papers, and educational tools, providing a comprehensive overview of current research and practice in teaching formal languages and automata.

Aruleba (2020) explores a novel approach to teaching automata by extracting finite automata from hand-drawn images. This dissertation highlights the potential of integrating image processing techniques with automata theory to create an engaging learning experience. The study demonstrates how hand-drawn sketches can be converted into digital representations of finite automata, providing an intuitive way for students to understand complex concepts. This method bridges the gap between abstract theory and practical visualisation, making automata theory more accessible to learners.

Askarpour (2021) discusses the challenges and observations related to the transition to online teaching in computer science, which includes the teaching of formal languages and automata. The paper, published on arXiv, provides insights into the adaptations required for effective online education. It emphasises the importance of interactive and adaptive learning environments, which can support the unique needs of students learning complex theoretical concepts remotely. The shift to online education has necessitated the development of new teaching tools and methodologies, which are critical for maintaining the quality of education in this field.

Cleaveland (2022) contributes to the theoretical enhancement of automata by integrating process algebra. This work, part of a collection of essays dedicated to Frits Vaandrager, demonstrates how process algebra can be used to improve the design and analysis of automata. By leveraging the formalism and rigour of process algebra, educators can provide students with a deeper understanding of automata's operational behaviours. This integration also offers new perspectives and techniques for teaching complex automata concepts, enriching the educational curriculum.

Goyal and Sachdeva (2009) propose a method to enhance the teaching of the theory of computation by integrating it with other courses. Published in the International Journal of Recent Trends in Engineering, their work suggests that a multidisciplinary approach can make theoretical concepts more relevant and understandable. Students can see the broader context and significance of their learning by connecting automata theory with practical applications in other computer science courses. This approach reinforces theoretical knowledge and fosters a holistic understanding of computer science.

Jordaan, Timm, and Marshall (2023) present AutomaTutor, an educational mobile app designed to teach automata theory. Presented at the Brazilian Symposium on Formal Methods, this app uses interactive exercises and real-time feedback to enhance student engagement and learning outcomes. The mobile app format allows for flexible, self-paced learning, which is particularly beneficial in the current educational landscape, where digital tools are increasingly important. AutomaTutor exemplifies the use of technology to make learning more accessible and practical.

Ramos (2022) evaluates the usability of the OFLAT platform, a tool designed to support the teaching and learning of formal languages and automata. This study focuses on how usability impacts students' learning experiences and outcomes. The findings suggest that user-friendly interfaces and intuitive design are crucial for successfully adopting educational tools. The usability evaluation provides valuable feedback for developers and educators aiming to create effective learning platforms.

Tecson and Rodrigo (2021) explore the impact of a self-paced tutoring system, ILSA, on learners' goal orientations. Their research at the International Conference on Information and Education Technology highlights the alignment between system utilisation and students' learning goals. The self-paced nature of ILSA allows students to engage with automata theory at their own pace, accommodating different learning styles and paces. This approach supports personalised learning experiences essential for mastering complex theoretical content.

Vayadande *et al.* (2022) investigate the simulation and testing of deterministic finite automata (DFA). Their work, published in the International Journal of Computer Sciences and Engineering, provides practical insights into applying DFAs in computational simulations. This research underscores the importance of hands-on experiences and practical applications in teaching theoretical concepts. By engaging in simulation and testing, students can better grasp the operational aspects of DFAs, enhancing their overall understanding of automata theory.

The reviewed literature demonstrates diverse approaches and tools to improve the teaching of formal languages and automata. These studies collectively contribute to a richer, more effective educational experience, from innovative technological solutions to theoretical enhancements and practical integrations. As the field evolves, ongoing research and development will be crucial in addressing the challenges and opportunities in teaching formal languages and automata.

Problem Statement and Research Methodology

Despite numerous tools designed to promote the teaching of formal languages and automata courses, the integration of AI in this domain remains in its initial stages. Many educational tools focus on traditional methods and digital aids, such as mobile apps and online platforms. However, the potential for AI to revolutionise this field is significant. AI can offer personalised learning experiences, automate assessment, and provide real-time feedback, enhancing learning. Nonetheless, the adoption of AI in teaching formal languages and automata is still emerging, indicating a need for further research and development to leverage its capabilities thoroughly.

One application of artificial intelligence is using alternative methods for representing knowledge through a controlled language. Pre-conceptual Schemas prove invaluable in this context as they offer a versatile way to depict knowledge, regardless of the specific domain or applied context. Given this situation, previous computational tools have yet to be capable of interpreting Pre-conceptual Schemas. This characteristic is the motivating factor for the development of this research, the direct application of which is developed during a Formal Languages and Automata course.

Knowledge representation can be performed using Pre-conceptual Schemas, as illustrated in Figure 1.

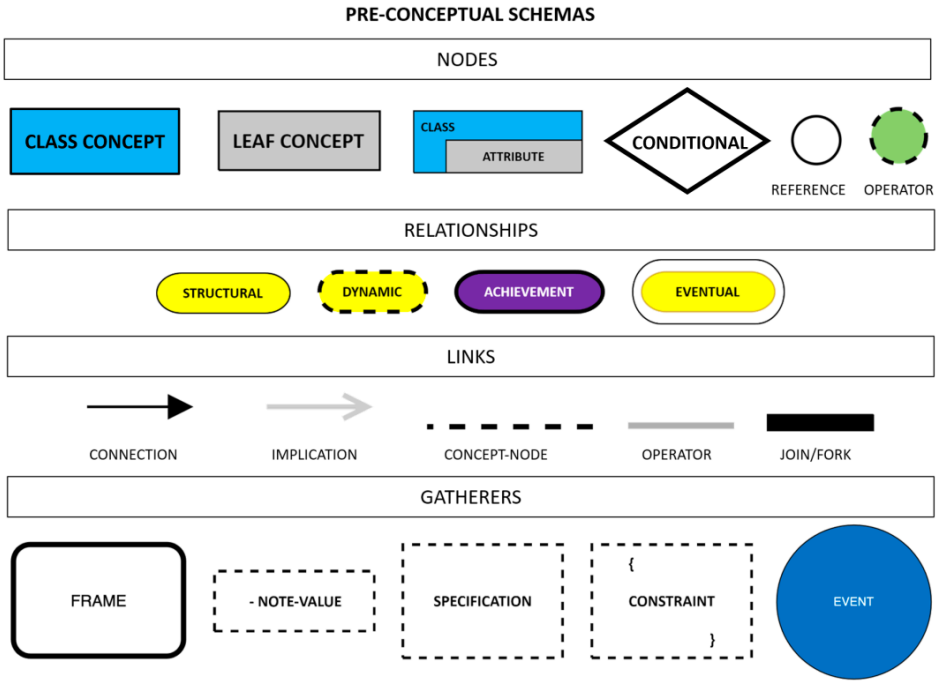


Figure 1: Pre-conceptual Schemas' Notation (Noreña, 2020)

Pre-conceptual Schemas serve to represent knowledge with well-defined semantics graphically. As Zapata (2007) noted, a Pre-conceptual Schema provides a way to specify structured ideas using a controlled language. Additionally, these schemas feature simple notation, are easy to comprehend, and can be adapted to any knowledge domain (Zapata, 2007). Thus, knowledge representations can be effectively conveyed through Pre-conceptual Schemas. Figure 2 depicts an example of how a Pre-conceptual Schema represents knowledge.

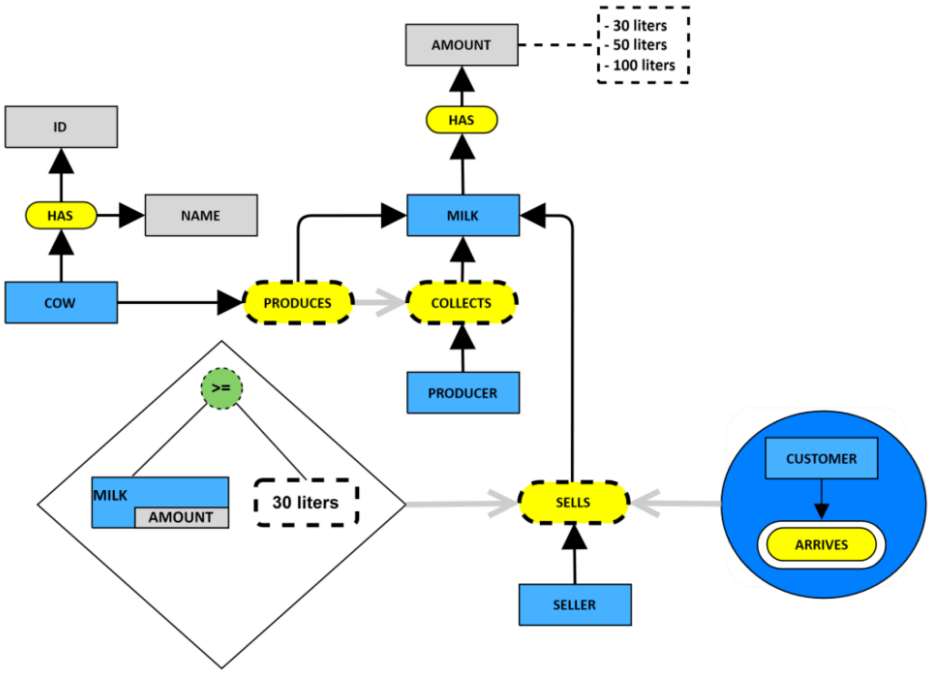


Figure 2: An Example of Representing Knowledge With a Pre-conceptual Schema

Our research is grounded in a qualitative paradigm, supplemented by elements of the quantitative paradigm, with an emphasis on the depth and richness of the collected data. This approach allows us to examine complex phenomena within their natural environments, providing the flexibility to understand and interpret the nuances of human behaviour and experiences. The qualitative method aligns well with our research objectives, enabling us to explore the subjective interpretations and meanings participants assign to their experiences, thereby offering a thorough understanding of the research topic (Fugard & Potts, 2015).

For this study, we employed a quasi-experimental approach, which involves deliberately manipulating or introducing a variable into a natural setting to observe the effects. This method allows for a combination of qualitative and quantitative research, enhancing the validity of the results like triangulation but leveraging the strengths of both approaches simultaneously (Daly *et al.*, 1992). Unlike traditional experimental methods, the quasi-experimental approach does not necessitate random assignment to control and experimental groups. This approach is particularly suitable for our study, as it permits a practical examination of phenomena where complete control over variables is impossible, thus balancing experimental rigour with real-world relevance (Asgari & Baptista, 2011).

The educational experience was developed with fifteen undergraduate students in systems engineering, who attended the course on formal languages and automata at the University of Nariño in Tumaco. We created the computational tool, and its application in such an educational experience was the basis of this study. We use eXtreme Programming (XP) as an agile methodology for designing and creating the computational tool. This way, we create a web-based computational solution called PCS-AI v1.0 (Pre-conceptual Schemas with Artificial Intelligence). The web-based tool is available online, and it is deployed at https://pcsaitech.com/.

Figure 3 depicts a photograph and some screenshots of students using PCS-AI v1.0. This computational tool allows users to create Pre-conceptual Schemas using predefined symbology.

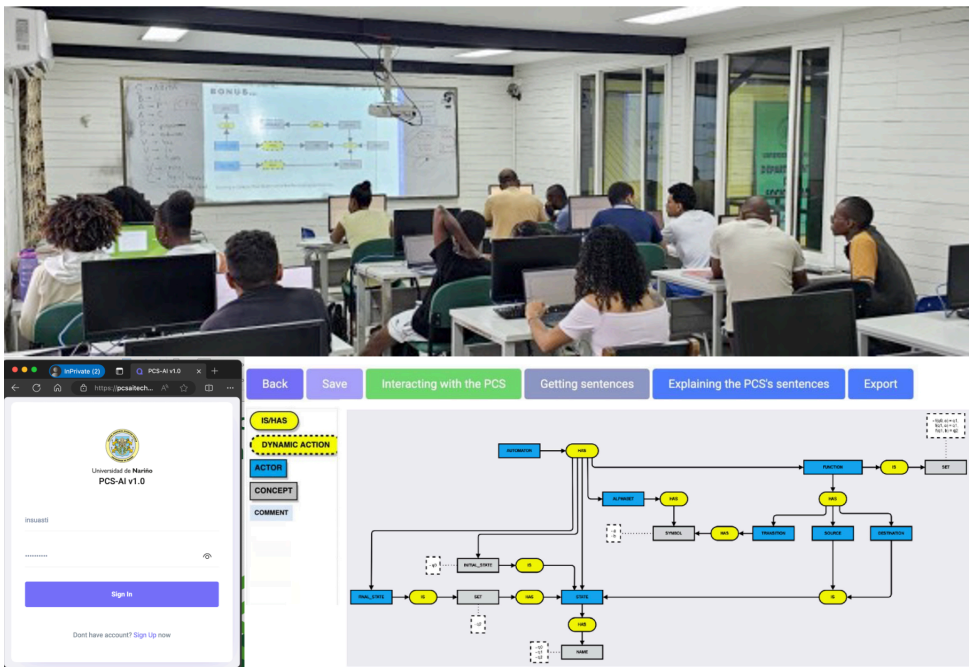


Figure 3: Educational Experience With PCS-AI v1.0

With the computational solution, students represent the knowledge associated with the formulation of a deterministic finite automaton (DFA), according to automata theory. A DFA is a theoretical model of computation used to recognise patterns within input data. A DFA consists of a finite set of states, a finite set of input symbols, a transition function that maps each state-symbol pair to a single state, an initial state, and a set of accepting states. The automaton processes an input string one symbol at a time, transitioning between states according to the transition function. It accepts the string if it reaches an accepting state at the end of the input (Hopcroft *et al.*, 2006). DFAs are crucial in the design of lexical analysers and other applications where precise and unambiguous pattern recognition is required (Sipser, 2013). They provide a clear framework for understanding the behaviour of simple computational devices and are foundational in the study of formal languages and automata theory (Lewis & Papadimitriou, 1998).

Findings and Discussion

The fifteen students' experience using the computational tool PCS-AI v1.0 within the Formal Languages and Automata course proved insightful and enriching. The students adeptly managed the computational tool, engaging with its advanced artificial intelligence features with remarkable ease. The intuitive interface of PCS-AI v1.0 allowed the students to quickly familiarise themselves with its functionalities, particularly the natural language processing (NLP) interface and the generative characteristics of the associated linguistic model.

Throughout the course, students used the NLP interface to generate Pre-conceptual Schemas, which served as the foundation for understanding complex topics within formal languages and automata theory. This interaction prompted the students to critically analyse and question the Pre-conceptual Schemas they generated. The tool's ability to provide comprehensive and coherent outputs based on the students' inputs allowed for a dynamic learning process where students could iteratively refine their understanding and approach to the subject matter.

The generative characteristics of PCS-AI v1.0's linguistic model further enhanced the learning experience. Students found that the tool could generate relevant examples and counterexamples, offering a robust mechanism for testing and validating their conceptual models. This feature was particularly beneficial in exploring the intricate nuances of formal language constructs and automata behaviour, as students could experiment with different inputs and observe the outcomes in real-time.

To gauge the effectiveness and impact of PCS-AI v1.0, a survey was administered at the end of the educational experience. The survey results were overwhelmingly positive, indicating that students found the tool user-friendly and educationally valuable. Most students reported that the AI-driven interactions significantly enhanced their comprehension of the course material. They appreciated the immediate feedback and the ability to explore formal language concepts hands-on and interactively.

Integrating PCS-AI v1.0 into the Formal Languages and Automata course facilitated a more engaging and effective learning environment. The student's ability to interact with the AI features of the tool not only supported their learning but also encouraged a deeper level of critical thinking and analysis. The favourable outcomes observed in the survey underscore the potential of AI-powered tools to enhance educational experiences, particularly in complex and abstract subjects like formal languages and automata theory.

According to the survey results, this real-time interaction has allowed students to understand more clearly the concepts associated with the representation of DFA. Figure 4 shows some screenshots of the activities conducted by the students in terms of interaction with the computational solution's artificial intelligence features.

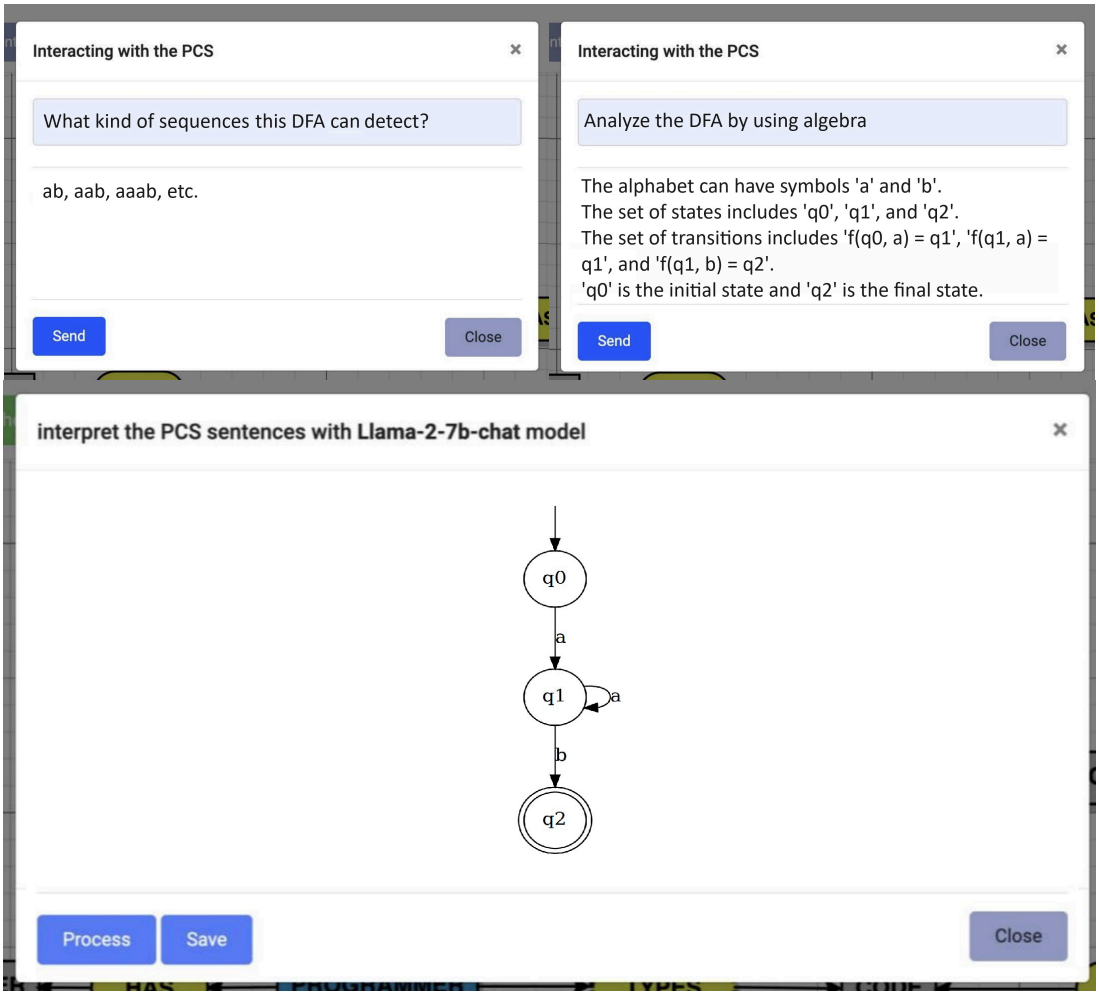


Figure 4: Some Interactions With the Pre-conceptual Schema and the Automatically Generated DFA

The functionality rating of the PCS-AI v1.0 tool, as presented in the bar chart of Figure 5, exhibits a consistently high performance among the fifteen students surveyed. Most ratings are clustered around 4 and 5, with the majority achieving a perfect score of 5. This suggests that the students found the tool highly functional for their educational purposes. The statistical summary supports this observation, with a mean of 4.87, a median of 5.0, and a mode of five. These measures indicate a robust central tendency towards the highest rating, signifying that the tool's functionality met or exceeded expectations for all participants.

The quality of the generated responses by PCS-AI v1.0 also received positive feedback, as evidenced by the bar chart. Like the functionality rating, most students rated the quality of responses as five, with a few giving it a four. The statistical summary reports a mean of 4.8, a median of 5.0, and a mode of five, reflecting a consensus on the high quality of the responses produced by the tool. This high satisfaction level underscores the tool's effectiveness in generating relevant and accurate responses for educational purposes in the Formal Languages & Automata course.

Another crucial metric evaluated is the likelihood of recommending PCS-AI v1.0 to others. The bar chart indicates that most students rated this aspect highly, with ratings of 4 and 5. The statistical summary reveals a mean of 4.73, a median of 5.0, and a mode of five. These statistics suggest that most students were likely to recommend the tool, highlighting their overall satisfaction and perceived value in their educational experience.

From a quantitative perspective, the survey results indicate that PCS-AI v1.0 performed exceptionally well in all three evaluated categories. The high ratings in functionality, quality of generated responses, and the likelihood to recommend the tool reflect the tool's significant impact and effectiveness in an educational setting, particularly for the Formal Languages & Automata course. The consistency of high scores across all three metrics suggests a well-rounded and reliable tool that meets the educational needs of students, supporting its continued use and recommendation in similar educational scenarios.

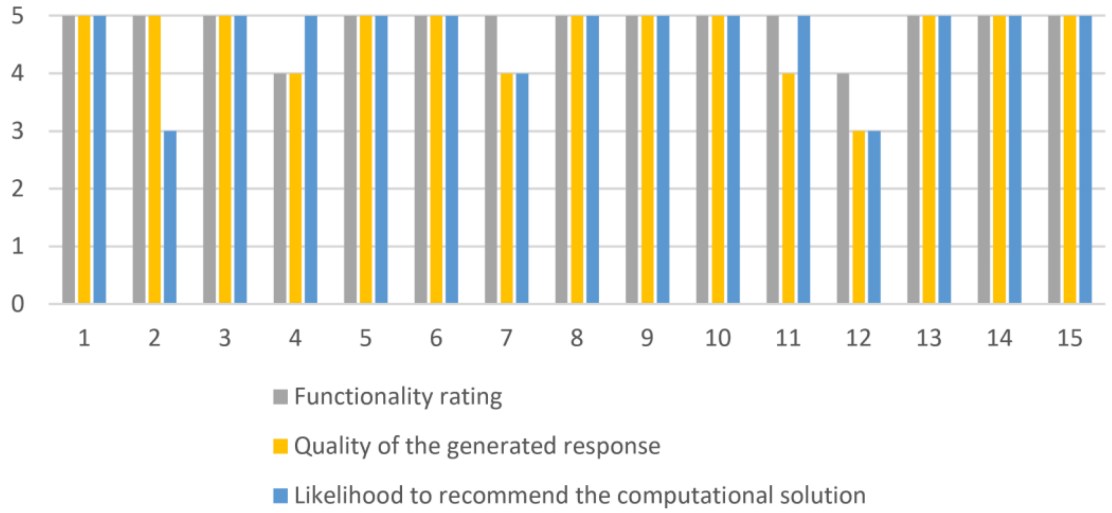


Figure 5: Quantitative Results of the Experience

The provided 3D bar chart in Figure 6 visualises the sentiment analysis of open-ended questions from the survey regarding the usage of PCS-AI v1.0 in the Formal Languages and Automata course. This qualitative analysis is categorised based on the sentiment polarity: very negative, moderately negative, moderately positive, and very positive.

The responses regarding the contextual problems students would like to address in the classroom reveal a mixed range of sentiments. Most responses fall into the positive and moderately positive categories, indicating that students feel optimistic about addressing these problems. However, there are also notable instances of moderately negative sentiments, suggesting that some students have concerns or reservations about the challenges they face in the classroom context. The very negative responses are minimal, indicating that while there are some significant issues, they are not widespread.

Students' opinions on using PCS-AI in the Formal Languages and Automata course are overwhelmingly positive. Most of the sentiment is concentrated in the moderately positive and very positive categories, demonstrating that students appreciate integrating AI tools into their learning process. This positive sentiment underscores the perceived benefits of PCS-AI, such as enhanced learning experiences and improved understanding of complex concepts. A few moderately negative sentiments suggest that while most students are satisfied, a few might have encountered issues or believe there is room for improvement.

Students expressed positive sentiments when asked about their confidence in teaching Formal Languages and Automata to another classmate using PCS-AI. The responses are heavily skewed towards the moderately positive and very positive categories, indicating that students feel confident using the AI tool effectively in a peer-teaching scenario. This confidence stems from their positive experiences and perceived tool mastery. However, a few moderately negative sentiments were also recorded, which may reflect individual variations in confidence levels or differing experiences with the tool.

The sentiment analysis of the qualitative responses indicates a positive reception of PCS-AI v1.0 among students in the Formal Languages and Automata course. Most sentiments are positive across all three queried aspects: contextual problems, opinions on PCS-AI, and confidence in teaching with PCS-AI. This positivity highlights the tool's effectiveness and the students' overall satisfaction. However, the presence of some moderately negative sentiments suggests that while the tool is well-received, there are areas where improvements could be made to enhance the user experience further and address any underlying concerns.

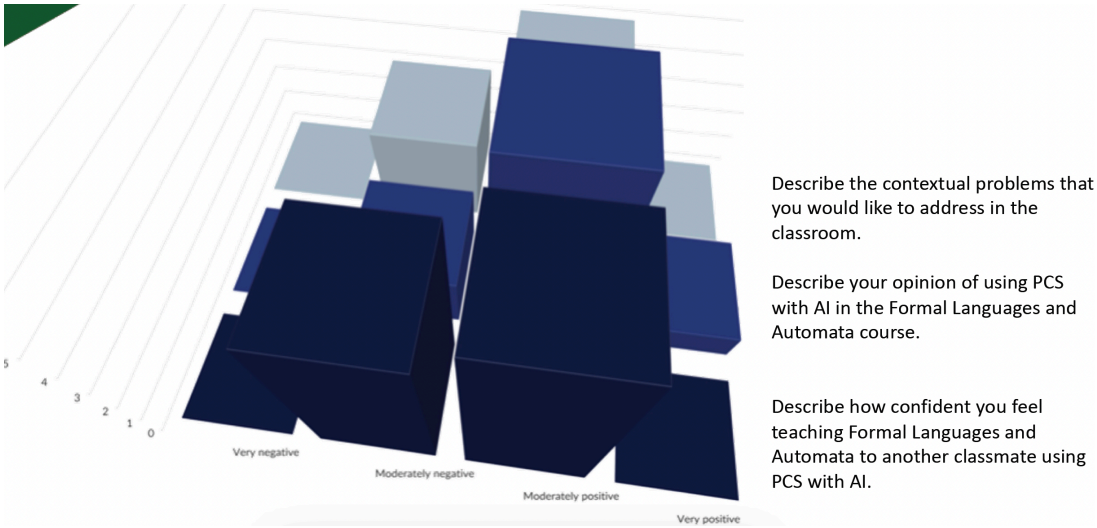


Figure 6: Qualitative Results of the Experience

The evaluation of PCS-AI v1.0 in the Formal Languages and Automata course encompasses quantitative and qualitative perspectives, offering a comprehensive understanding of its impact on student learning and satisfaction.

The quantitative analysis reveals high satisfaction levels among students regarding the tool's functionality, quality of generated responses, and likelihood of recommending PCS-AI. The functionality rating achieved an impressive mean of 4.87, with most students rating it a perfect five. Similarly, the quality of the generated responses and the likelihood of recommending the tool garnered high ratings, with means of 4.8 and 4.73, respectively. These metrics underscore the tool's robustness and efficacy in meeting educational needs. The consistently high ratings across these categories indicate that PCS-AI v1.0 is well-received and highly effective in enhancing students' learning experiences in the Formal Languages and Automata course.

Complementing the quantitative data, the qualitative analysis provides deeper insights into students' perceptions and experiences. Sentiment analysis of open-ended responses highlights a positive outlook towards PCS-AI. Students exhibited mostly positive sentiments when describing the contextual problems they wished to address, suggesting an optimistic view on

tackling these challenges with the tool. Opinions on using PCS-AI in the course were overwhelmingly positive, reflecting the tool's perceived benefits in improving understanding and engagement with the course material. Confidence levels in teaching peers using PCS-AI were also high, indicating that students feel well-equipped to leverage the tool in a collaborative learning environment.

Integrating the quantitative and qualitative findings provides a holistic view of PCS-AI's impact. The high functionality rating and quality of generated responses align with the positive sentiments expressed in the qualitative analysis, reinforcing the tool's effectiveness. The likelihood of recommending PCS-AI, supported by qualitative feedback, underscores a strong endorsement from students, suggesting they find significant value in its use.

Despite the positive feedback, the qualitative analysis does reveal some areas for improvement, as indicated by occasional moderately negative sentiments. These insights are crucial for refining PCS-AI, ensuring it addresses all student concerns and enhances the user experience.

The integrated analysis demonstrates that PCS-AI v1.0 is a highly effective tool significantly enhancing learning in the Formal Languages and Automata course. The overwhelmingly positive quantitative ratings, supported by qualitative feedback, indicate that students appreciate the tool's functionality, quality, and utility. This positive reception highlights PCS-AI's potential as an asset in educational settings, fostering better understanding and engagement with complex course materials. Continuous improvements based on student feedback will further solidify its role as a pivotal educational tool.

Conclusion

The evaluation of PCS-AI v1.0 in the Formal Languages and Automata course has demonstrated significant positive outcomes, highlighting the awareness and importance of Pre-conceptual Schemas in knowledge representation. PCS-AI v1.0 has highlighted how effectively these schemas can facilitate students' understanding of complex concepts, promoting a structured and comprehensive approach to learning. The high functionality ratings and positive qualitative feedback underline the pivotal role of Pre-conceptual Schemas in enhancing educational experiences.

The benefits of pre-conceptual schemas for students are particularly evident in using PCS-AI v1.0. The tool's ability to generate high-quality responses and support the learning process has been well-received, as indicated by students' overwhelmingly positive quantitative ratings and sentiments. By integrating AI with Pre-conceptual schemas, PCS-AI v1.0 offers a robust framework that aids in the assimilation of abstract concepts, making the study of Formal Languages and Automata more accessible and engaging for students.

Moreover, PCS-AI v1.0's wide range of application possibilities extends beyond the immediate scope of the Formal Languages and Automata course. The tool's versatility and adaptability suggest its potential utility across various educational settings and disciplines. This flexibility opens new avenues for implementing AI-supported tools in diverse academic contexts, enriching the educational landscape.

However, to fully harness the benefits of AI-supported tools like PCS-AI v1.0, addressing and overcoming any existing fears or reservations about their use is crucial. The qualitative

analysis revealed some moderately negative sentiments, indicating that while most students are enthusiastic about the tool, concerns still need to be addressed. Promoting a better understanding of AI's capabilities and limitations and providing adequate support and training can help mitigate these fears and encourage more widespread adoption of such tools.

In conclusion, PCS-AI v1.0 has proven to be an asset in the Formal Languages and Automata course, significantly enhancing students' learning experiences using Pre-conceptual Schemas. The positive feedback and high ratings underscore its effectiveness and potential for broader application. Addressing the challenges and fears associated with AI-supported tools will be essential in maximising their benefits and ensuring they become an integral part of modern education.

Acknowledgements

We want to thank the Systems Engineering Department at the University of Nariño for providing us with the space to develop this research. Additionally, we would like to express our immense gratitude to the fifteen students from the University of Nariño in the Tumaco undergraduate Systems Engineering program who attended the Formal Languages and Automata course in the first semester of 2023.

References

Aruleba, K. D. (2020). Extracting finite automata from hand-drawn images (Doctoral dissertation, Faculty of Science, University of the Witwatersrand, Johannesburg).

Asgari, S., & Baptista, J. M. B. (2011). Experimental and quasi-experimental research in information systems. In: IADIS International Workshop Information Systems Research Trends: Approaches and methodologies (ISRTAM 2011), 20–26 July, Italy.

Askarpour, M. (2021). Observations on Transitioning to Teaching Computer Science Online. arXiv preprint arXiv:2112.11186.

Cleaveland, R. (2022). Better Automata Through Process Algebra. In A Journey from Process Algebra via Timed Automata to Model Learning: Essays Dedicated to Frits Vaandrager on the Occasion of His 60th Birthday, 116–136. Cham: Springer Nature Switzerland.

Daly, J., MacDonald. I., & Willis, E. (1992). Why don't you ask them? A qualitative research framework for investigating the diagnosis of cardiac normality. In: Daly J, MacDonald I, Willis E, editors. Researching Health Care: Designs, Dilemmas, Disciplines. London: Tavistock/Routledge; 189–206.

Fugard, A. J., & Potts, H. W. (2015). Supporting thinking on sample sizes for thematic analyses: A quantitative tool. *International Journal of Social Research Methodology*, 18(6), 669–684.

Goyal, M., & Sachdeva, S. (2009). Enhancing Theory of Computation Teaching Through Integration with other Courses. *International Journal of Recent Trends in Engineering* 1(2).

Hopcroft, J. E., Motwani, R., & Ullman, J. D. (2006). Introduction to Automata Theory, Languages, and Computation (3rd ed.). Pearson.

Jordaan, S., Timm, N., & Marshall, L. (2023, December). AutomaTutor: An Educational Mobile App for Teaching Automata Theory. In Brazilian Symposium on Formal Methods, 131–140. Cham: Springer Nature Switzerland.

Lewis, H. R., & Papadimitriou, C. H. (1998). Elements of the Theory of Computation (2nd ed.). Prentice Hall.

Noreña, P. (2020). An extension to Pre-conceptual schemas for refining event representation and mathematical notation. Ph.D. Thesis. Universidad Nacional de Colombia, sede Medellín.

Ramos, B. (2022). Usability Evaluation of OFLAT Platform. https://run.unl.pt/bitstream/10362/155514/1/Ramos_2022.pdf

Sipser, M. (2013). Introduction to the Theory of Computation. *ACM Sigact News*, 27(1), 27–29.

Tecson, C. A., & Rodrigo, M. M. T. (2021). A Self-paced Tutoring System, ILSA: Which System Utilization aligned with Learners' Goal Orientations? In 2021 9th International Conference on Information and Education Technology (ICIET), 14–20. IEEE.

Vayadande, K. B., Sheth, P., Shelke, A., Patil, V., Shevate, S., & Sawakare, C. (2022). Simulation and testing of deterministic finite automata machine. *International Journal of Computer Sciences and Engineering*, 10(1), 13–17.

Zapata, C. (2007). Definición de un esquema preconceptual para la obtención automática de esquemas conceptuales de UML. Ph.D. Thesis. Universidad Nacional de Colombia, sede Medellín.

Contact email: insuasti@udenar.edu.co

The Use of Interactive Videos in Undergraduate Courses: Lecturers' Acceptance Level

Chin Sook Fui, Quest International University, Malaysia
Tina Lim Swee Kim, Quest International University, Malaysia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The use of technology is not new in education and it has been growing and evolving rapidly to support both teaching and learning. Video is one of the most famous educational technology tools. In recent years, interactive features have been added to engage the students rather than watching the videos passively. These videos are known as interactive videos. Interactive videos optimize active learning and improve students' performance. This study involved lecturers from the six faculties of a private university in Malaysia, who participated voluntarily. Their task was to create interactive videos within the university's Learning Management System (LMS). The research employed an instrument adapted from the Technology Acceptance Model (TAM) survey, originally developed by Davis (1989) and later refined for a study on interactive video technology by Pauli (2019). The instrument's reliability for internal consistency was determined using Cronbach's alpha, indicating high reliability for all four constructs and overall high internal consistency. The findings demonstrate a positive acceptance level for the use of interactive videos in teaching, irrespective of gender differences in cognitive processing. Among the four constructs, Attitudes toward Using Interactive Video had the highest mean. This study provides empirical evidence that lecturers are willing to adopt and utilize interactive videos in their teaching practices. Despite the novelty of interactive videos for many lecturers, the positive acceptance level persists, indicating that interactive videos can be widely introduced in higher education contexts to enhance engagement and interaction in teaching and learning.

Keywords: Educational Technology, Interactive Video, Technology Acceptance, Technology Acceptance Model (TAM)

iafor
The International Academic Forum
www.iafor.org

Introduction

The use of technology is not new in education and it has been growing and evolving rapidly to support both teaching and learning. It has now become an integral part of higher education worldwide, including in Malaysia (Azmuddin, Mohd Nor & Hamat, 2020). With technology tools, students can have better access to information, as well as enhanced learning from opportunities to deepen their knowledge.

Video is one of the most famous educational technology tools. The usage of video has been evolving like other technology tools. Earlier, videos were presented by projectors in the classroom and today it is common to search for a video on the internet, at any time and anywhere. In recent years, interactive features were added to engage the students rather than only expecting them to watch the videos passively (Wachtler et al., 2016). These videos are known as interactive videos.

Gedera and Zalipour (2018, p. 363) defined interactive videos as "*videos that embed interactive learning moments in which deep learning can occur for students*." The incorporation of interactive learning moments into videos gives students a sense of control and puts them in charge of their learning. This echoes the view of Zhang, Zhou, Briggs, and Nunamaker (2006), who opined that "*interactive video technology increases learner-content interactivity, thus potentially motivating students and improving learning effectiveness*" (p. 17). The results of their research indicated that students in the e-learning environment that provided interactive video achieved significantly better learning performance and a higher level of learning satisfaction, as compared to those who were provided non-interactive video.

Interactive videos have a positive impact on students' learning. By adding interactivity, students are more engaged, challenged and committed to the learning process. Geri, Winer, and Zaks (2017) showed that interactive videos significantly improved the completion percentage and expanded the attention span of students. It is a crucial element to create self-regulating learning environments for students (Delen, 2014). In the research carried out by Papadopoulou and Palaigeorgiou (2016), lecturers recognized the value and benefits of interactive videos in teaching and learning. They pointed out that through interactive videos, they can stimulate students' thinking and discussion and engage students actively.

To ensure that interactive videos for teaching and learning are used effectively, it is extremely important to study the factors that potentially facilitate/affect the use of interactive videos by both lecturers and students. For instance, the integration of technology has the potential to be very stressful for those who possess limited knowledge of the use of computers and technology (Merrill, 2015).

Research conducted by Spotts, Bowman and Mertz (1997) on the use of instructional technologies among university faculty found that the frequency of use among female lecturers was slightly higher than that among males. On the other hand, a study conducted among school teachers in India by Islahi and Nasrin (2019) indicated that there was no significant difference between the attitudes of male and female teachers towards the use of information technology for teaching and learning. This finding echoes the findings obtained by Gebhardt, Thomson, Ainley and Hillman (2019). Meanwhile, a study on the adoption of technology amongst academic staff in a Canadian university that was conducted by Zhou and Xu (2007) found that males reported having more experience in using technology for teaching and a higher level of comfort using technology.

By understanding the potential factors, it can guide the processes of utilizing interactive videos in teaching and learning. Charness and Boot (2016) highlighted that *technology acceptance* is significant in influencing one's determination in using it. Therefore, this study aimed to investigate the lecturers' acceptance level of using interactive videos for teaching.

Literature Review

Interactive Video

Interactive video is a form of digital video that supports user interaction. It is also called "hypervideo" - a video that embeds interactive learning moments in which deep learning can occur for students (Palaigeorgiou et al., 2018). Instead of watching videos passively, users are able to click within the video for an action to occur. These clickable areas, or "hotspots" require students to perform an interactive action when clicked, such as answering questions and quizzes, showing prompts, and reflective pauses. These create moments where the students have to pause and think critically about the video content and learning activities (Schoeffmann et al., 2015).

Interactive videos have many educational benefits. Through interactive videos, students are allowed to learn independently and follow their path and pace (Schoeffmann et al., 2015). In return, this makes differentiation can be done more easily and fosters personalized learning. As supported by Delen (2014) interactive videos can become a platform for self-regulating learning environments and reduced levels of embarrassment or anxiety allow learners to be comfortable enough to learn new content.

In addition, Dimou et al. (2009) highlighted that interactive videos use a non-linear structure with several calls for action that motivate students to pay full attention to the learning material. They are able to have a quick review of any part of the video as many times as it is necessary. In general, interactive video learning environments use a variety of interaction types, such as embedded questions, annotations, shared user notes and comments, captions, user traces, hyperlinks, summarization and classroom video analytics (Kazanidis et al., 2018).

Technology Acceptance

Technology acceptance can be defined as "a user's willingness to employ technology for the tasks it is designed to support" (Teo, 2011, p.1). It is considered a prerequisite for learners to adopt information technology to promote learning (Hsieh et al., 2017). Understanding how personal attitude contributes to behavioural intention on technology use is important to gain a deeper understanding of what influences an individual in adopting technology. For example, identifying and understanding the forces that shape users' acceptance, resistance or rejection when users interact with technology can be avoided or minimized. Substantial studies were carried out to investigate the users' acceptance of different types of technology such as mobile technology, social media, and MOOCs (Taherdoost, 2018).

To explain the associations between technology acceptance and behavioural intention, several models and frameworks have been developed to examine users' technology acceptance. One of the most influential models is the Technology Acceptance Model (TAM), first proposed by Davis (1989) based on the Theory of Reasoned Action (TRA) by Fishbein and Ajzen in 1975.

According to TAM, there are two primary factors influencing an individual's intention to use new technology (Charness & Boot, 2016):

(a) **Perceived Usefulness** - the degree to which a person believes that using a particular technology would enhance the performance.
(b) **Perceived Ease of Use** - the degree to which a person believes that using a particular technology would be free from effort.

TAM has been recognized as a powerful predictive model that can be used in several contexts and is widely used to explain users' intention to use technology. For instance, Yuen and Ma (2008) explored teachers' acceptance of e-learning by using TAM. Nevertheless, some researchers criticized that TAM is too simple and leaves out other variables (Alomary & Woollard, 2015). In the study carried out by Pauli (2019), TAM was adapted and validated, particularly on interactive videos.

Research Framework, Questions and Hypotheses

Conceptual Framework

The conceptual framework of this study is based on the Technology Acceptance Model (TAM) by Davis (1989). This model suggests that the acceptability of an information system is determined by two main factors: (a) perceived usefulness and (b) perceived ease of use. TAM postulates that the use of an information system is determined by the behavioural intention, but on the other hand, the behavioural intention is determined by the person's attitude towards the use of the system and also by his perception of its utility.

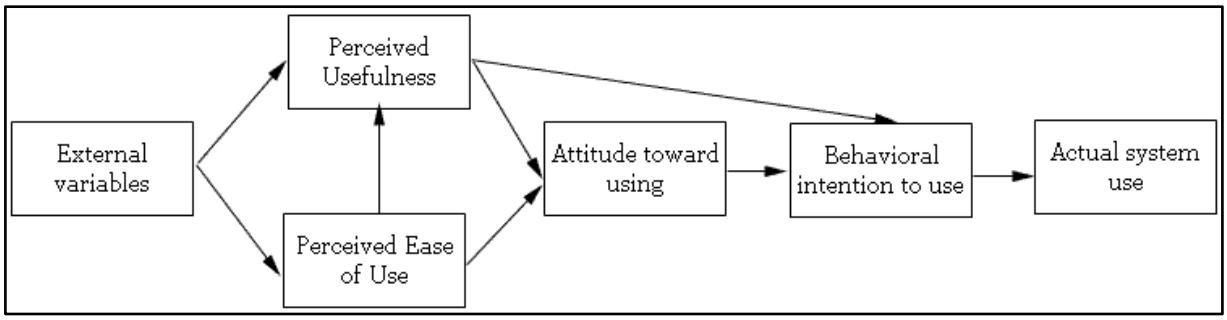


Figure 1. TAM by Davis (1989)

This study investigated the acceptance level of lecturers in using interactive videos for teaching. Figure 2 outlines the conceptual framework of this study. Lecturers are important stakeholders in teaching and learning. The success of interactive video implementation depends on the lecturers' acceptance level which influences the use of interactive videos in their teaching process.

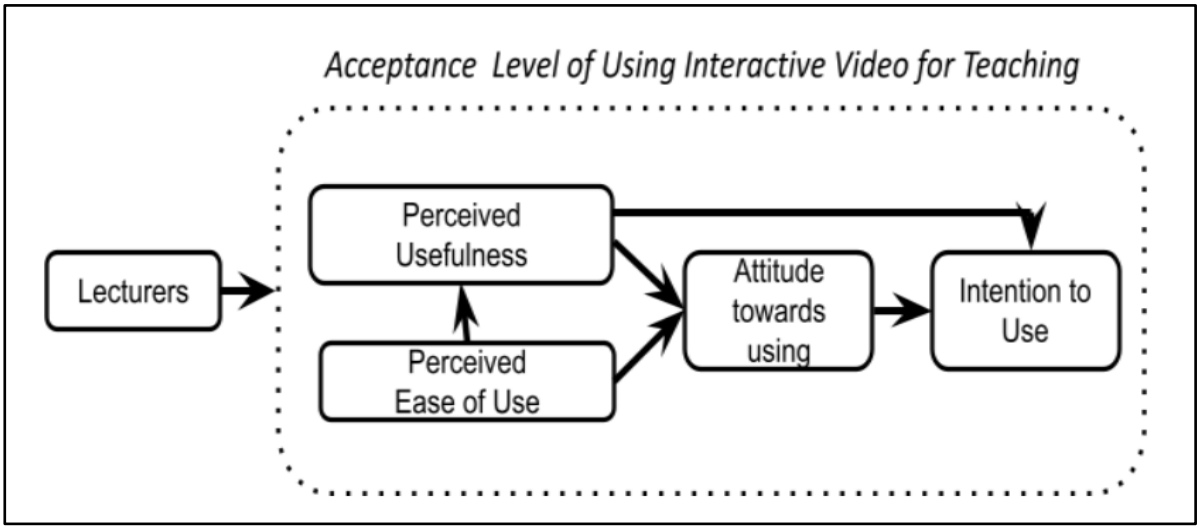


Figure 2. Conceptual Framework

Research Questions and Research Hypotheses

(a) What is the lecturers' level of acceptance of using interactive videos for teaching?

(b) What is the relationship between lecturers' Perceived Ease of Use (PEOU) and their Perceived Usefulness (PU) and Attitude towards Using (ATU) interactive videos?

H_1: Lecturers' Perceived Ease of Use (PEOU) positively affects their Perceived Usefulness (PU) of interactive videos.

H_2: Lecturers' Perceived Ease of Use (PEOU) positively affects their Attitude towards Using (ATU) of interactive videos.

(c) What is the relationship between the lecturers' Perceived Usefulness (PU) and their Attitude towards Using (ATU) and the Intention to Use (ITU) of interactive videos?

H_3: Lecturers' Perceived Usefulness (PU) positively affects their Attitude towards Using (ATU) of interactive videos.

H_4: Lecturers' Perceived Usefulness (PU) positively affects their Intention to Use (ITU) of interactive videos.

(d) What is the relationship between the lecturers' Attitude towards Using (ATU) and their Intention to Use (ITU) of interactive videos?

H_5: Lecturers' Attitude towards Using (ATU) positively affects their Intention to Use (ITU) of interactive videos.

Methodology

Participants

In this study, lecturers from the six faculties in one private university were invited to create interactive videos in the university's Learning Management System (LMS). Participation was voluntary. In total, 97 lecturers participated in two hands-on training workshops (four hours per workshop). Out of 97 participants, 73 responded to the questionnaire (Response rate = 75%).

Table 1. Demographic Profile of Respondents (n = 73)

Variables		Number (n)	Percentage
Gender	Male	22	30%
	Female	51	70%
Used **videos** for teaching before this	Yes	69	94.5%
	No	4	5.5%
Used **interactive videos** for teaching before this	Yes	18	24.7%
	No	55	75.5%
Used **H5P** to develop interactive videos for teaching before this	Yes	0	0%
	No	73	100%

Interactive Video

HTML-5-Package (H5P) was used to create interactive videos. H5P is a free open-source software for the development of interactive HTML5 content and can be embedded on any website that is compatible with an H5P plugin (Moodle, 2021).

By using H5P, these are the interactive features that can be embedded in a video:

(a) Quiz interaction (Questions)
(b) Simple interaction (Text, Image, Table)
(c) Adaptivity (Go To) interaction

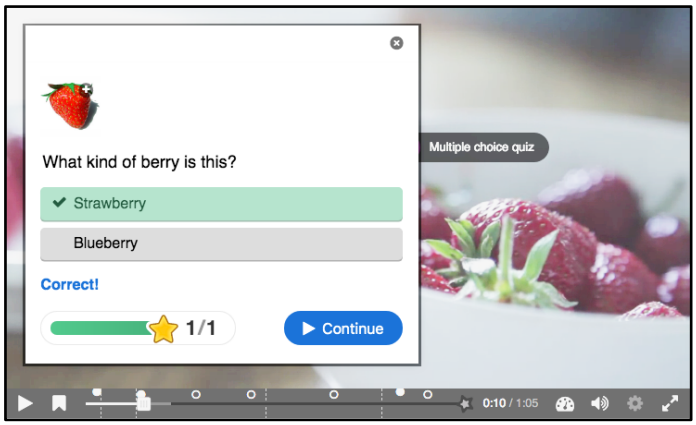


Figure 3. An Example of Quiz Interaction in an Interactive Video Created by Using H5P

Research Instrument: Modified Technology Acceptance Model Tool

In this study, the Modified Technology Acceptance Model Tool (Modified TAM Tool) was used for data collection. This instrument was adapted from the Technology Acceptance Model (TAM) survey, originally developed by Davis (1989) and further edited for a study on interactive video technology by Pauli (2019). For this study, the items of the questionnaire were administered using Google Form, an online Google Workspace app.

The Modified TAM questionnaire consists of 22 items on a five-point Likert scale; 1 for Strongly Disagree, 2 for Disagree, 3 for Neutral, 4 for Agree and 5 for Strongly Agree. The overall reliability of the instrument was reported to be excellent with a Cronbach's alpha coefficient of 0.95. Altogether there are four constructs, namely, Perceived Usefulness (six items), Perceived Ease of Use (six items), Attitude towards Using (five items) and Intention

to Use (five items). The Cronbach's alpha for the constructs were reported as 0.89, 0.90, 0.87 and 0.89 respectively.

In this study, the Modified TAM questionnaire was further adapted. Its reliability for internal consistency was determined by using Cronbach's alpha. All constructs were reported highly reliable and a high level of internal consistency was obtained for the overall instrument (α = 0.865), as shown in Table 2.

Table 2. Reliability Analysis: The Modified TAM Questionnaire

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Perceived Usefulness (PU)	.946	.950	6
Perceived Ease of Use (PEOU)	.916	.919	6
Attitude towards Using (ATU) Interactive Video	.931	.934	5
Intention to Use (ITU) Interactive Video	.955	.956	5
Overall (All four constructs)	.865	.868	22

Data Collection and Analysis

All of the participants were informed of the objectives of the study and what they were expected to do, through an online consent form. This information included the purpose of the study, a brief description, assurance of anonymity and how the data would be used. Upon completion of the training workshop, the online Modified TAM questionnaire was administered. Data were then analysed using IBM SPSS Statistics 26 software.

Findings

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - Overall

The descriptive analysis shown in Table 3 revealed that the mean of ATU Interactive Video is the highest among the other variables (mean = 4.4111), followed by PU (mean = 4.393), ITU Interactive Video (mean = 4.359) and PEOU (mean = 4.095), as shown in Table 3. Overall, the lecturers' acceptance level of the use of interactive video for teaching is high (mean = 4.329).

Table 3. Descriptive Statistics: The Lecturers' Level of Acceptance of Using Interactive Videos for Teaching

Constructs	Acceptance Level (n = 73)	
	Mean	SD
Perceived Usefulness (PU)	4.393	.6717
Perceived Ease of Use (PEOU)	4.095	.6278
Attitude towards Using (ATU) Interactive Video	4.411	.6027
Intention to Use (ITU) Interactive Video	4.359	.6625
Overall (All four constructs)	4.329	.5687

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Gender

Both male and females show high acceptance level for all four constructs. Among the four constructs, the highest mean was obtained by males for PU (4.464), followed by ITU (4.436) and ATU (4.427). The lowest mean was obtained for PEOU (4.123).

In comparison, the highest mean was obtained by females for ATU (4.404), followed by PU (4.363) and ITU (4.310). The lowest mean obtained by females was the same as that for males, that is for PEOU, at 4.082.

Table 4. Descriptive Statistics: by Gender

Gender	Male (n=22)		Female (n=51)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.464	.5645	4.363	.7161
Perceived Ease of Use (PEOU)	4.123	.5740	4.082	.6547
Attitude towards Using (ATU) Interactive Video	4.427	.5496	4.404	.6293
Intention to Use (ITU) Interactive Video	4.436	.6666	4.325	.6645
Overall (All four constructs)	4.373	.5709	4.310	.5725

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Video Usage Experience

In terms of experience in using videos for teaching and learning, results shown in Table 5 indicate that lecturers who have used videos for teaching before reported a higher level of acceptance as compared to those who have not.

Table 5. Descriptive Statistics: by Video Usage Experience

Video Usage Experience	Have used videos for teaching before			
	Yes (n=69)		No (n=4)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.365	.6786	4.875	.2500
Perceived Ease of Use (PEOU)	4.107	.6374	3.875	.4272
Attitude towards Using (ATU) Interactive Video	4.377	.6025	5.000	.0000
Intention to Use (ITU) Interactive Video	4.330	.6694	4.850	.1915
Overall (All four constructs)	4.336	.5377	4.075	.7632

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Interactive Video Usage Experience

Analyses of data by experience in using interactive videos as shown in Table 6 indicate that lecturers who have used interactive videos for teaching before reported higher means for the overall level of acceptance, as compared to lecturers who have not.

Table 6. Descriptive Statistics: by Interactive Video Usage Experience

Interactive Video Usage Experience	Have used interactive videos for teaching before			
	Yes (n=18)		No (n=55)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.367	.7364	4.402	.6562
Perceived Ease of Use (PEOU)	4.078	.6975	4.100	.6101
Attitude towards Using (ATU) Interactive Video	4.444	.5338	4.400	.6278
Intention to Use (ITU) Interactive Video	4.489	.6480	4.316	.6674
Overall (All four constructs)	4.528	.3893	4.255	.5786

Hypotheses Testing

Using Spearman's Rho correlation, the relationship between constructs within this study based on the TAM were presented in Table 7 and the hypotheses testing were summarised in Table 8.

The correlation coefficient between all constructs was positive, showing that there is an association between the constructs, which was consistent with the original TAM and published research (Pauli, 2019). Among the associations, the highest correlation was found between ATU Interactive Video and ITU Interactive Video (r = .877).

Table 7. Spearman's Rho Correlation Statistics

Spearman's rho		Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)	Attitude towards Using (ATU) Interactive Video	Intention to Use (ITU) Interactive Video
Perceived Usefulness (PU)	Correlation Coefficient	1.000	.565**	.721**	.786**
	Sig. (1-tailed)	.	.000	.000	.000
	N	73	73	73	73
Perceived Ease of Use (PEOU)	Correlation Coefficient	.565**	1.000	.488**	.493*
	Sig. (1-tailed)	.000	.	.000	.000
	N	73	73	73	73
Attitude towards Using (ATU) Interactive Video	Correlation Coefficient	.721**	.488*	1.000	.877**
	Sig. (1-tailed)	.000	.000	.	.000
	N	73	73	73	73
Intention to Use (ITU) Interactive Video	Correlation Coefficient	.786*	.493**	.877**	1.000
	Sig. (1-tailed)	.000	.000	.000	.
	N	73	73	73	73

***Correlation is significant at the 0.01 level (1-tailed)*

Table 8. Summary of Hypotheses Testing

Hypotheses	*r*	p	Relationship	Hypothesis Accepted
H_1: Lecturers' PEOU positively affects their PU of interactive videos.	.565**	.000	Strong positive	Yes
H_2: Lecturers' PEOU positively affects their ATU of interactive videos.	.488**	.000	Strong positive	Yes
H_3: Lecturers' PU positively affects their ATU of interactive videos.	.721**	.000	Very strong positive	Yes
H_4: Lecturers' PU positively affects their ITU of interactive videos.	.786**	.000	Very strong positive	Yes
H_5: Lecturers' Attitude towards Using (ATU) positively affects their Intention to Use (ITU) of interactive videos.	.877**	.000	Very strong positive	Yes

***Correlation is significant at the 0.01 level (1-tailed)*

Discussion

Educational technologies have been integrated into teaching and learning practices and interactive video is one of the famous educational technology tools. To reach the full potential of interactive videos in teaching and learning, it must be recognised and accepted by the key stakeholders, especially the instructors.

From the findings, it shows the acceptance level of the use of interactive videos for teaching is highly positive for both male and female lecturers, despite males and females using cognitively different schematic processing (He and Freema, 2019). This is aligned with the study conducted by Baturay et al. (2017) that gender is not a factor that will positively affect the attitude towards the use of technology. On top of that, this provides a piece of empirical evidence that lecturers are willing to accept and use interactive videos in their teaching. Alharbi and Drew (2014), pointed out that instructors play an important role in implementing technology innovation in the classroom. With this positive indicator, it suggests that interactive videos could be introduced and used widely in higher education contexts as they could transform learning by enhancing engagement and interaction in teaching and learning (Tuma, 2021).

An interesting point to be highlighted is that interactive video is new to the majority of the lecturers whereby more than 75% of them have not used interactive video for teaching before. Nevertheless, the acceptance level of the use of interactive videos for teaching is highly positive regardless of their interactive video usage experience. Training workshops were given to all participants to create interactive videos could be the possible reason for this as Njuguna (2020) stated that training factors have a role in boosting learners' belief in their capacity. It enhances the learners' knowledge, skills and attitudes (Rodriguez & Walter, 2017). In return, they have a positive attitude towards using the interactive video and show a high tendency to use it.

On the other, all five hypotheses were proven to have statistically significant positive correlations. These findings are similar to the findings obtained by Pauli (2019) that all variables showed statistically significant positive correlations. Overall, the findings from this

study are consistent with the original TAM and published research. This has confirmed that the TAM is applicable for the use of interactive videos in a local higher education context.

Conclusion and Recommendation

Interactive video offers many educational benefits and can be easily developed using software such as H5P and can then be embedded in the LMS without additional installation from the user's end. Nevertheless, it has yet to be applied widely in higher educational institutions. Barriers must be recognised to integrate interactive video into teaching. According to TAM, for users to use a technology, they must first perceive it as useful and ease of use, which in turn will impact their attitude towards using it.

This study reveals that lecturers exhibit a high level of acceptance towards the use of interactive videos in teaching, regardless of gender or prior experience with interactive video usage. This finding provides valuable insights for higher education providers, emphasizing the importance of implementing interactive videos to enhance educational experiences. There is an urgent need to incorporate interactive technology into higher education, as it is currently underutilized in educational activities (Tuma, 2021). Furthermore, this study confirms the applicability of TAM in the context of using interactive videos in higher education.

For future research, an experimental approach could be employed to examine external factors that influence the acceptance level, such as the training provided and the tools used to create interactive videos. Additionally, this research can be extended to include another key stakeholder: the students. Understanding students' perspectives on interactive videos will further inform strategies to enhance engagement and interaction in higher education.

Acknowledgements

The H5P training workshops are supported by the Commonwealth of Learning (COL).

References

Alharbi S., & Drew, S. (2014). Using the technology acceptance model in understanding academics' behavioural intention to use learning management systems. *International Journal of Advanced Computer Science and Applications*, 5(1), 143–155.

Alomary, A., & Woollard, J. (2015, November 21). How is Technology Accepted by Users? A Review of Technology Acceptance Models and Theories. *Proceedings of The IRES 17th International Conference*, London, United Kingdom.

Azmuddin, R. A., Mohd Nor, N. F., & Hamat, A. (2020). Facilitating Online Reading Comprehension in Enhanced Learning Environment Using Digital Annotation Tools. *IAFOR Journal of Education: Technology in Education*, *8*(2). https://doi.org/10.22492/ije.8.2.01

Charness, N., & Boot, W. R. (2016). Technology, gaming, and social networking. In K. W. Schaie & S. L. Willis (Eds.), *Handbook of the psychology of aging* (8th ed., pp. 389-407). Elsevier.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, *13*(3), 319–340.

Delen, E., Liew, J., & Willson, V. (2014). Effects of interactivity and instructional scaffolding on learning: Self-regulation in online video-based environments. *Computers & Education, 78*, 312-320.

Dimou, A., Tsoumakas, G., Mezaris, V., Kompatsiaris, I., & Vlahavas, L. (2009). An empirical study of multi-label learning methods for video annotation. In Content-Based Multimedia Indexing, 2009. CBMI'09. Seventh International Workshop on (pp. 19-24). IEEE.

Edgar, S., Carr, S. E., Connaughton, J. & Celenza, A. (2019). Student motivation to learn: is self-belief the key to transition and first-year performance in an undergraduate health professions program? *BMC Med Educ, 19*, 111.

Gebhardt, E., Thomson, S., Ainley, J., & Hillman, K. (2019). Teacher gender and ICT. *Gender Differences in Computer and Information Literacy* (pp.53-68). DOI:10.1007/978-3-030-26203-7_5

Gedera, D. S. P., & Zalipour, A. (2018). Use of interactive video for teaching and learning. In *ASCILITE 2018 Conference Proceedings* (pp. 362–367). Australasian Society for Computers in Learning in Tertiary Education.

Geri, N, Winer, A, & Zaks, B. (2017). Challenging the six-minute myth of online video lectures: Can interactivity expand the attention span of learners?, *Online Journal of Applied Knowledge Management,_5*(1), http://www.iiakm.org/ojakm/articles/2017/volume5_1/OJAKM_Volume5_1pp101-111.pdf

He, J. & Freeman, L. A. (2019). Are Men More Technology-Oriented Than Women? The Role of Gender on the Development of General Computer Self-Efficacy of College Students. *Journal of Information Systems Education*, *21*(2), 203-212.

Hsieh, J. S. C., Huang, Y. M., & Wu, W. C. V. (2017). Technological acceptance of LINE in flipped EFL oral training. *Computers in Human Behavior*, *70*, 178 –190.

Islahi, F., & Nasrin. (2019). Exploring teacher attitude towards information technology with a gender perspective, *Contemporary Educational Technology, 10*(1), 37-54.

Kazanidis, I., Palaigeorgiou, G., Papadopoulou, A. & Tsinakos, A. (2018). Augmented Interactive Video: Enhancing Video Interactivity for School Classroom. *Journal of Engineering Science and Technology Review*, *11*(2), 174-181.

Merrill, E.B. (2015). Integrating Technology into Nursing Education. *The ABNF Journal, 26*(4), 72-83.

Moodle (2021, August 21). *H5P: About H5P*. https://docs.moodle.org/311/en/H5P

Njuguna, J. (2020). Training Factors as Predictors of Students' Self-Efficacy Beliefs for Online Journalism Practice. *IAFOR Journal of Education: Technology in Education*, *8*(2). https://doi.org/10.22492/ije.8.2.08

Palaigeorgiou, G., Papadopoulou, A., & Kazanidis, I. (2018). Interactive Video for Learning: A Review of Interaction Types, Commercial Platforms, and Design Guidelines. In International Conference on Technology and Innovation in Learning, Teaching and Education (pp. 503-518). Springer, Cham.

Papadopoulou, A. & Palaigeorgiou, G. (2016, Oct 28-30). Interactive video, tablets and self-paced learning in the classroom: Preservice teachers perceptions. *The International Association for Development of the Information Society (IADIS) International Conference on Cognition and Exploratory Learning in the Digital Age (CELDA).*

Pauli, V. (2019). Usefulness and ease of interactive video technology integration among faculty members in online nursing courses. *Transactions on the International Conference on Health Information Technology Advancement, 60*. https://scholarworks.wmich.edu/ichita_transactions/60

Rodriguez, J., & Walters, K. (2017). The importance of training and development in employee performance and evaluation. *Journal of Multidisciplinary Research and Development*, 206-211.

Schoeffmann, K., Hudelist, M. A., & Huber, J. (2015). Video interaction tools: A survey of recent work. *ACM Computing Surveys (CSUR), 48*(1), 1-34.

Spotts, T. H., Bowman, M. A., & Mertz, C. (1997). Gender and use of instructional technologies: A study of university faculty. *Higher Education, 54,* 421 – 436.

Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, *22,* 960-967.

Teo, T. (2011). Technology Acceptance Research in Education. In: Teo T. (eds) Technology Acceptance in Education. SensePublishers.

Tuma, F. (2021). The use of educational technology for interactive teaching in lectures. *Annals of Medicine and Surgery*, 62, 231-235.

Wachtler, J., Hubmann, M., Zöhrer, H. & Ebner, M. (2016). An analysis of the use and effect of questions in interactive learning-videos. *Smart Learning Environments, 3*(13), DOI:10.1186/s40561-016-0033-3

Yuen, A. H. K. & Ma, W. W. K. (2008). Exploring teacher acceptance of e-learning. *Asia Pacific Journal of Teacher Education*, *36*(3), 229-243.

Zhang, D., Zhou, L., Briggs, R. O., & Nunamaker Jr, J. F. (2006). Instructional video in e-learning: Assessing the impact of interactive video on learning effectiveness. *Information & Management, 43*, 15-27.

Zhou, G., & Xu, J. (2007). Adoption of Educational Technology: How Does Gender Matter? *International Journal of Teaching and Learning in Higher Education, 19*(2), 140-153.

Representing Curriculum Design Practices in ESSENTIA CURRICULUM: A Case Study at the University of Nariño, Colombia

Jesus Insuasti, University of Nariño, Colombia
Carlos Mario Zapata-Jaramillo, Universidad Nacional de Colombia at Medellín, Colombia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In examining curriculum design theory over the past century, we analysed how design methods are defined. Despite established theoretical methods, a global survey of 226 professors revealed a reliance on subjective crieria for designing curricula. Professors expressed a need for better documentation, leading to limited information on their design processes for others to learn from. Furthermore, varied terminology and graphical forms make curriculum designs complex to communicate and understand. To address this, we proposed *ESSENTIA CURRICULUM*, a representation of curriculum design practices. This system is based on a common language developed by integrating a century of curriculum theory with the experiences of 226 professors worldwide. *ESSENTIA CURRICULUM* is a simple, flexible language applicable in various contexts. It has been successfully implemented in representing design practices in the Systems Engineering Programme, yielding satisfactory results. This approach provides a foundation for future artificial intelligence developments in curriculum design.

Keywords: Curriculum, Design, Practice, Language

iafor
The International Academic Forum
www.iafor.org

Introduction

A literature review was conducted to compile a century's data, explicitly focusing on curriculum design theory. Literature exploration sheds light on the evolution and transformation of various curriculum design methods. Most notably, the definitions and concepts associated with these methods have witnessed significant shifts aligned with historical moments in each context, reflecting the changing dynamics of educational landscapes and the ever-evolving needs of learners.

However, despite the academic world being equipped with some theory-based curriculum design methods, practical implementation often tells a different story. A survey involving 226 professors worldwide highlighted a striking deviation from these theoretical frameworks, revealing that many educators rely heavily on subjective criteria when crafting curriculum designs. While reflecting individual expertise and experiences, such personal biases and inclinations may not always align with widely accepted methods. This disparity highlights the need to bridge the theoretical knowledge gap and its real-world implementation.

The insights gleaned from the professors' survey describe a concerning picture of the current state of curriculum design documentation. A recurring sentiment expressed by these educators is the palpable absence of documentation detailing curriculum design processes, which not only hampers the preservation of pivotal steps and decisions but also deprives future educators of potential reference material. Further compounding the issue is the proliferation of diverse terminologies and myriad representations in curriculum designs. While reflecting the richness of individual approaches, this diversity inadvertently introduces significant heterogeneity, resulting in a marked impediment to clear communication and understanding within academic circles, posing challenges in adopting and adapting these curriculum designs.

In response to the challenges presented by the diverse and often fragmented approaches to curriculum design, we introduce *ESSENTIA CURRICULUM*. This language emerged from linguistic analysis, grounded in a linguistic corpus created from a century's worth of curriculum design theory. By integrating the collective experiences and insights of 226 professors worldwide, *ESSENTIA CURRICULUM* captures the essence of shared practices and commonalities in curriculum design. Beyond its foundational strengths, what sets it apart is its user-friendly nature, making it understandable and versatile. Its adaptability is focused on fitting into diverse educational landscapes, serving as a common language that bridges gaps and facilitates coherent communication in curriculum design endeavours.

To substantiate the functionality of *ESSENTIA CURRICULUM*, we conducted a practical validation within a real-world academic setting. The chosen scenario for this exercise was the Systems Engineering Programme at the University of Nariño in southern Colombia. Throughout the course, the language was actively employed as a curriculum design and representation tool, receiving a primarily positive response, with participants expressing their appreciation for the clarity and adaptability of *ESSENTIA CURRICULUM*. Beyond the immediate benefits observed, this validation paves the way for further exploration and potential advancements, positioning *ESSENTIA CURRICULUM* as a promising asset in educational design if it can be supported by generative artificial intelligence in future iterations.

This article is divided into six sections. The second section presents a literature review of a century's worth of curriculum design theory and describes some preliminary findings in experiences related to curriculum design. The third section describes the methodology used in the research. The fourth section depicts the proposed solution by constructing a linguistic corpus based on the theory and the responses from a worldwide survey. These serve as the foundation for the *ESSENTIA CURRICULUM* language. The fifth section describes the validation of *ESSENTIA CURRICULUM* in an academic scenario, providing an overview of the results. The sixth section presents a discussion on validating the proposal. Finally, the last section presents the research conclusion and mentions the scope for future studies.

Literature Review

In the early 20th century, curriculum design saw significant shifts influenced by progressive educational movements. Kilpatrick's project method 1918 introduced experiential learning, emphasising the role of students' interests and activities in education. Contributions from Bobbitt in 1924 and Charters in 1929 focused on systematic curriculum construction, aligning educational objectives with societal needs. Rugg, in 1930, further examined the curriculum's role in reflecting and shaping social dynamics, while Caswell and Campbell 1935 emphasised the potential for social transformation by introducing a curriculum design focused on actual needs.

Post-World War II, curriculum theory witnessed diverse developments. Tyler's Basic Principles of Curriculum and Instruction (1949) provided a foundational structure for curriculum development, emphasising clear objectives and systematic evaluation. Hilda Taba (1962) is globally recognised for her contribution to establishing a clear relationship between theory and practice in curriculum design. Smith *et al.* (1957) linked the nature of the curriculum to prevailing thoughts within specific contexts. Kerr (1968) focused on strategies to overcome challenges in designing curricula for contexts. Nicholls and Nicholls (1972) proposed a practical guide for curriculum design with defined steps and concrete actions. Bruner's The Process of Education (1977) advocated for discovery learning and the spiral curriculum, while Stenhouse (1975) introduced a research-oriented approach emphasising teacher autonomy and iterative refinement. Grayson (1978) suggested a curriculum design method involving problem definition, curriculum structure, and evaluation.

The latter part of the 20th and early 21st centuries witnessed the integration of technical and global perspectives in curriculum design. Isman *et al.* (2005) proposed a new instructional design model reflecting technology's growing influence on education. Walters's PhD thesis (1978) and Perkins's Smart Schools (1998) contributed to the discourse on curriculum design in specific disciplines and the role of intelligence in learning, respectively. Van Den Akker *et al*. (2006) integrated research perspectives into the curriculum design.

In the 21st century, the focus shifted to internationalisation and rapid design models. Clarke *et al.* (2016) and Young and Perovic (2016) discussed transnational curriculum frameworks and fast course design, reflecting the need for adaptable and globally relevant curricula. IBE-UNESCO's work in 2017 emphasised the global need for inclusive and sustainable educational practices.

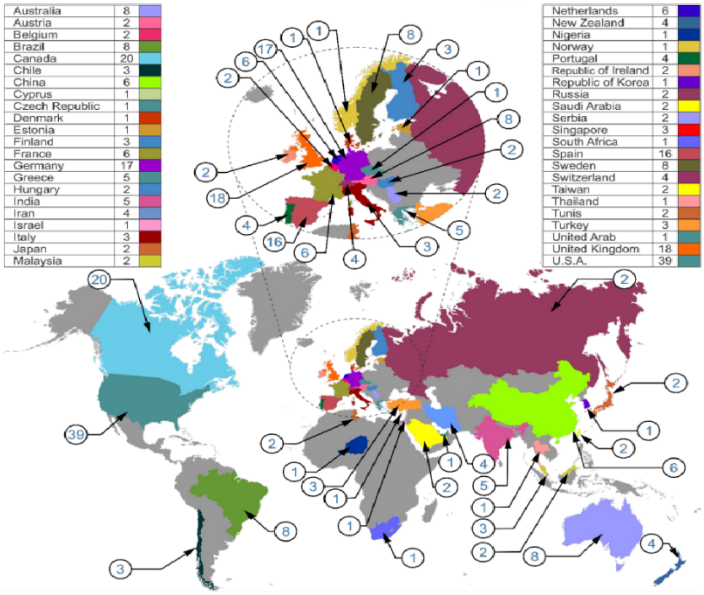
Curriculum design theories have continued to evolve in recent years, emphasising understanding and design. Wiggins and McTighe's Understanding by Design (1999) introduced a backward design model, prioritising learning outcomes. Ornstein and Hunkins

(2018) offered a comprehensive overview of foundational principles and contemporary issues in curriculum, highlighting the dynamic and evolving nature of the field.

Problem Statement and Research Methodology

Surveys are a pivotal research method employed in various academic and professional fields, offering a systematic approach to collecting data from a specific population. They can be conducted via questionnaires or interviews and are highly valued for their versatility, efficiency, and ability to gather large volumes of data. According to Babbie (2016), surveys are particularly effective in descriptive, explanatory, and exploratory research. Additionally, as highlighted by Creswell and Creswell (2017), they can be tailored to qualitative and quantitative research paradigms, making them adaptable to diverse research questions. However, as Dillman *et al.* (2014) cautioned, the validity and reliability of survey data hinge on well-crafted questions and representative sampling, underscoring the importance of meticulous survey design, as Fowler (2013) emphasised, to ensure accurate and generalisable findings.

In an ambitious effort to gather insights from leading academic minds in curriculum design, we utilised the 2019 Academic Ranking of World Universities (ARWU) by Shanghai Jiao Tong University as a starting point, meticulously sifting through this prestigious list, focusing on the top one thousand universities globally (ARWU, 2019). Our extensive research identified a pool of professors renowned for their expertise in curriculum design. We issued a 'Call for Action,' inviting them to contribute their valuable perspectives through a survey. This was met with a response, underscoring the selectivity and commitment required for such a task. Two hundred twenty-six professors worldwide agreed to participate. Figure 1 details the demographic data of these participants, providing a snapshot of the professors that shaped our survey's findings.



Continent	Countries	Universities	Professors
Africa	3	3	4
America	4	52	70
Asia	14	28	35
Europe	21	79	105
Oceania	2	8	12
	44	**170**	**226**

Figure 1: Professors worldwide participation.

Creating a linguistic corpus from the responses of 226 professors, in conjunction with a comprehensive literature review spanning a century in curriculum design, constitutes a crucial step in this research. Such a linguistic corpus, derived from theoretical foundations and survey data, provides a rich dataset for analysing trends, patterns, and evolving

perspectives in curriculum design from theoretical and practical viewpoints. McEnery and Hardie (2012) highlighted that a linguistic corpus offers an invaluable resource for empirical research, allowing for detailed linguistic analysis across diverse contexts. The global scope of the responses ensures a wide-ranging perspective, aligning with the principles outlined by Baker (2006) for corpus representativeness. Additionally, by integrating insights from seminal works in curriculum design, such as those by Pinar (2013) and Tyler (1949), this corpus not only reflects current academic thought but also traces the historical evolution of the field. This dual approach of synthesising contemporary survey data with historical literature offers a unique lens through which to examine the trajectory of curriculum design, as advocated by Cohen *et al.* (2018) in their work on research methods in education.

As part of the intricate process of analysing the qualitative data from our comprehensive literature review on curriculum design theory spanning a century, coupled with the insightful responses from 226 professors worldwide, we employed NVivo Software. NVivo, renowned for its robust qualitative data analysis capabilities, was instrumental in constructing our linguistic corpus, facilitating the systematic categorisation and thematic analysis of the vast textual data. It enabled us to identify key themes, patterns, and nuances in curriculum design perspectives, both from historical literature and the contemporary viewpoints of experienced professors. Using NVivo ensured a methodologically sound and nuanced analysis, allowing us to draw meaningful and contextually rich insights into global curriculum design practices' evolution and current state.

Using 3D representations to visualise the concepts within our linguistic corpus marked a significant methodological advancement in our study. These 3D visualisations revealed the semantic relationships between keywords, offering insights into the intricate interconnections and hierarchical structures within the field of curriculum design. By transforming abstract textual data into tangible, spatial models, these representations facilitated a more intuitive understanding of complex conceptual relationships, as depicted in Figure 2.

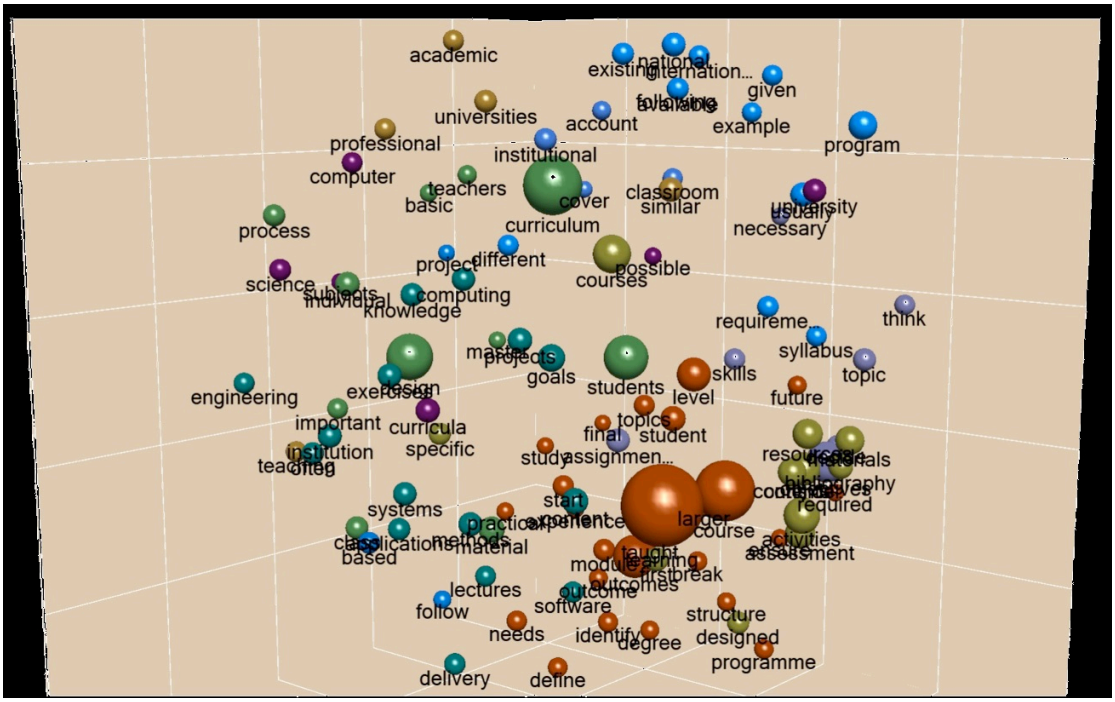


Figure 2: Conceptual relationships on the linguistic corpus.

Complementing this approach, we conducted a cluster analysis using NVivo Software. This analysis was crucial in identifying standard codes and themes from the vast corpus, effectively categorising the data into coherent, analysable segments. The constructive collaboration between the 3D conceptual mapping and NVivo's cluster analysis provided a dual lens: one that offered a macroscopic view of overarching themes and another that delved into the microscopic intricacies of semantic linkages. This enriched our understanding of the data and enhanced the clarity and depth of our findings, revealing the nuanced dynamics of curriculum design theory and practice.

Conducting a cluster analysis to examine a linguistic corpus is a pivotal step in computational linguistics, offering profound insights into the semantic structures and commonalities within a body of text. Cluster analysis allows researchers to identify natural groupings of related words and concepts within the corpus based on their usage and context, revealing underlying patterns that may not be apparent through simple observation. This method is essential to discern thematic concentrations and variations in language use across different texts or within a single comprehensive document. According to Manning and Schütze (1999), cluster analysis is a powerful tool for understanding the relationships and hierarchies among words, enabling the construction of more sophisticated language understanding models. Similarly, as Jockers (2014) notes, the technique is invaluable for tracing thematic trends over time in digital humanities. In educational research, cluster analysis can pinpoint prevailing pedagogical themes within curricular documents or academic discourse, as Rehurek and Sojka (2010) highlighted by demonstrating the utility of software such as Gensim. Thus, this analytical approach is integral to advancing our comprehension of linguistic phenomena and enhancing the robustness of curriculum design and other language-sensitive analyses.

Our study's exploration of curriculum design practices included syntax analysis and collocations within computational linguistics, using our comprehensive linguistic corpus as the foundation. Syntax analysis allowed us to meticulously examine the grammatical structures within the corpus, illustrating how language constructs in curriculum design are typically framed and developed. This syntactic scrutiny revealed underlying patterns in articulating curriculum design concepts, offering insights into common practices and prevailing pedagogical philosophies, as discussed in Manning and Schütze's Foundations of Statistical Natural Language Processing (1999). Investigating collocations – frequently co-occurring words or phrases – provided a deeper understanding of the contextual usage of key terminologies in curriculum design.

Collocation analysis is a cornerstone of corpus linguistics, providing significant insights into how words combine in natural language use. By analysing the habitual juxtapositions of words, it unveils the inherent syntactic and semantic patterns that define language structure and meaning. This analytical tool is crucial to understanding language idiosyncrasies, often overlooked by traditional linguistic analysis. McEnery and Hardie (2012) emphasise that collocations are not merely frequent word combinations but are fundamental to constructing meaning in discourse. Sinclair's (1991) pioneering study of collocations revealed their role in shaping the texture and cohesiveness of language. In language teaching, Hill (2000) highlights the importance of collocation analysis in developing learners' proficiency and fluency, allowing them to use natural language that is contextually appropriate. Collocation analysis is also instrumental in computational linguistics for tasks such as machine translation and natural language processing, as it helps capture the subtleties of meaning and the complexity of language use (Manning & Schütze, 1999). The results of such analysis can

significantly inform curriculum design, particularly in language education, by integrating authentic language patterns into learning materials.

By identifying these collocations, as outlined in Sinclair's 'Collocation: A Progress Report' (2004), we discerned the prevalent terms, conceptual associations, and thematic linkages. This combined approach of syntax analysis and collocation examination, facilitated by advanced computational tools, enabled us to decode the linguistic nuances of curriculum design discourse. In doing so, we uncovered common practices and emerging trends in the field; a concept echoed in Jurafsky and Martin's Speech and Language Processing (2009). This methodological fusion enriched our analysis, providing a more elaborate perspective on how curriculum design theories and practices are linguistically constructed and interconnected.

We thus identified 153 practices distributed across 22 curriculum design methods. Additionally, we noted the existence of the following ten items that are universally included in curriculum designs and are considered common in curriculum design theory: Body of Knowledge, Expert/Peer Experience, Prior Knowledge/Interests of Students, Context/Industry/Marketing Needs, Aims/Objectives/Learning Outcomes, Structure/Content, Teaching Strategies/Learning Experiences, Assessment, Resources, and Feedback, as depicted in Figure 3.

		Common items in curriculum design theory									
		Background-based approach				Component-based approach					
Authors of the method	**Method structures**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
#1, Kilpatrick (1918)	1. Purposing			X							
	2. Planning			X			X				
	3. Executing			X	X			X			
	4. Interpreting and Judging										X
#2, Bobbitt (1924)	1. Identifying a domain	X			X	X					
	1.1. Finding the experts		X		X						
	1.2. Analyzing the expert behavior		X								
	1.3. Characterizing the student profile and their role			X							
	2. Identifying the activities for such a domain		X		X						
	3. Proposing educational objectives for each activity					X					
	3.1. Objective-based steps					X					
	3.2. Preparing the material									X	
...											
#21, OIE-UNESCO (2017)	1. Evidence-gathering				X						
	2. Preparation					X	X				
	3. Development							X			
	4. Implementation							X		X	
	5. Monitoring and evaluation								X		X
#22, Ornstein & Hunkins (2018)	1. Theoretical foundation	X									
	2. Design					X	X				
	3. Development							X			
	4. Implementation									X	
	5. Evaluation								X		X

Figure 3: Excerpt of the 153 practices found in the analysis.

All these 153 practices are closely related and aim to conceptualise ten major concepts – the everyday items presented above – around which any effort in curriculum design revolves.

These 153 practices distributed among 22 curriculum design methods highlight the need to organise this knowledge to develop a terminological unification to synthesise various

curriculum design considerations. This realisation was the starting point for designing a new proposal called *ESSENTIA CURRICULUM*, which have the symbology depicted in Figure 4 to 7.

ESSENTIA CURRICULUM has three areas of concern. The concept of ALPHA is related to the elements must be present in a curriculum effort; they can be measured, and they have states to be checked. Activity spaces are the concepts to encapsulate any activity related to curriculum design. Competences are the needed skills to develop the activities. Finally work products are the physical documents that are produced in a curriculum design project.

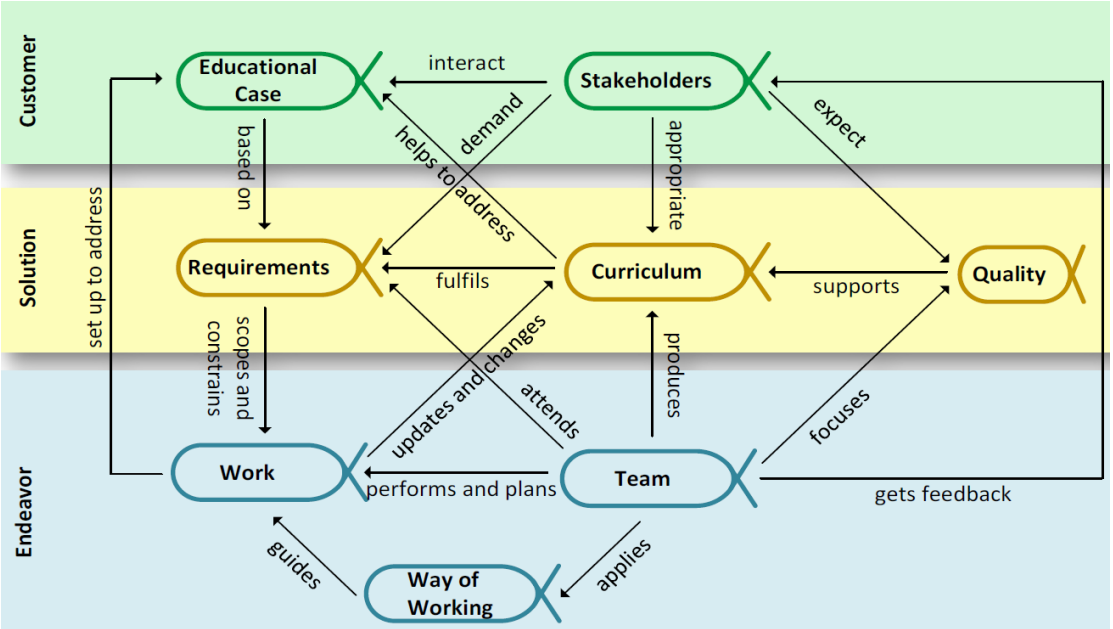


Figure 4: ALPHAs in ESSENTIA CURRICULUM

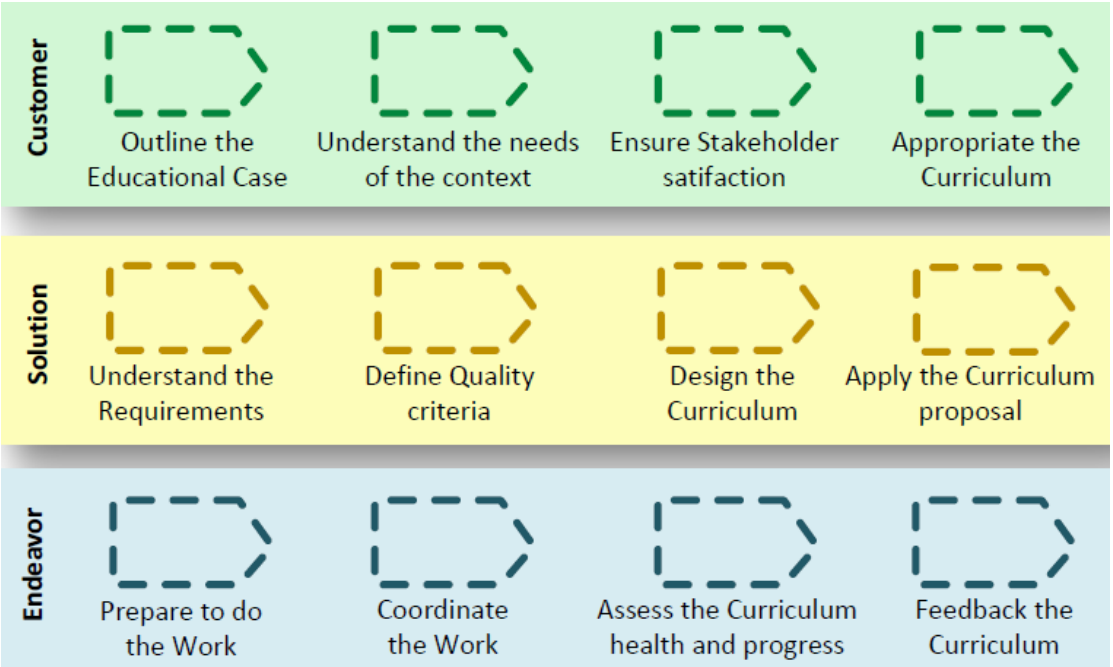


Figure 5: Activity Spaces in ESSENTIA CURRICULUM

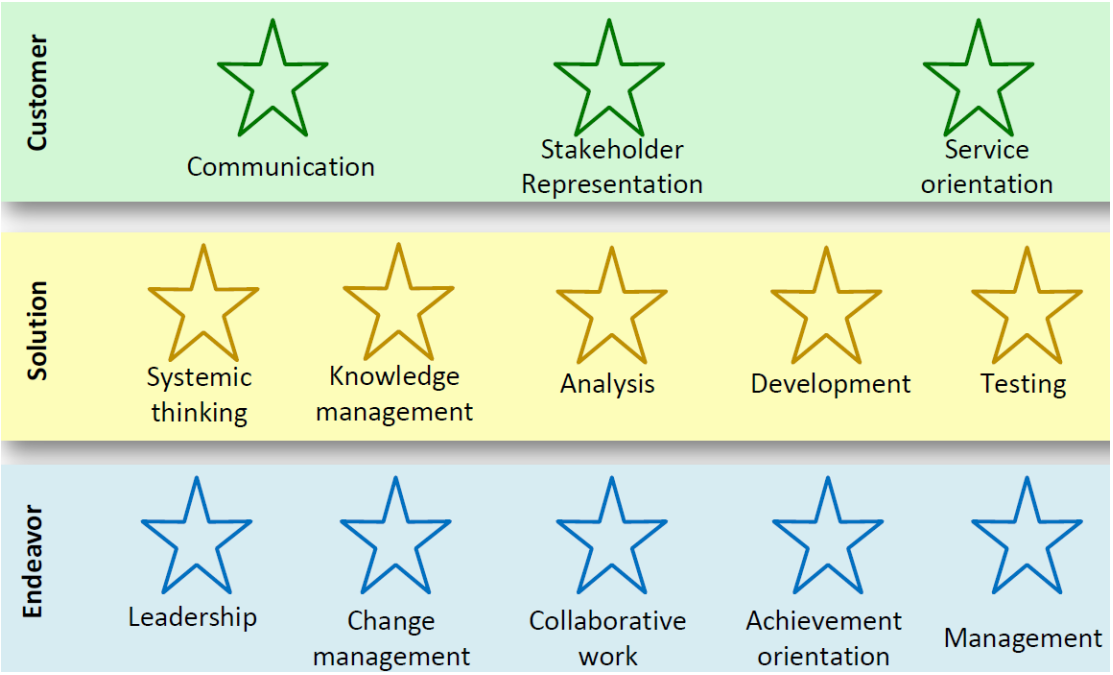


Figure 6: Competences in ESSENTIA CURRICULUM

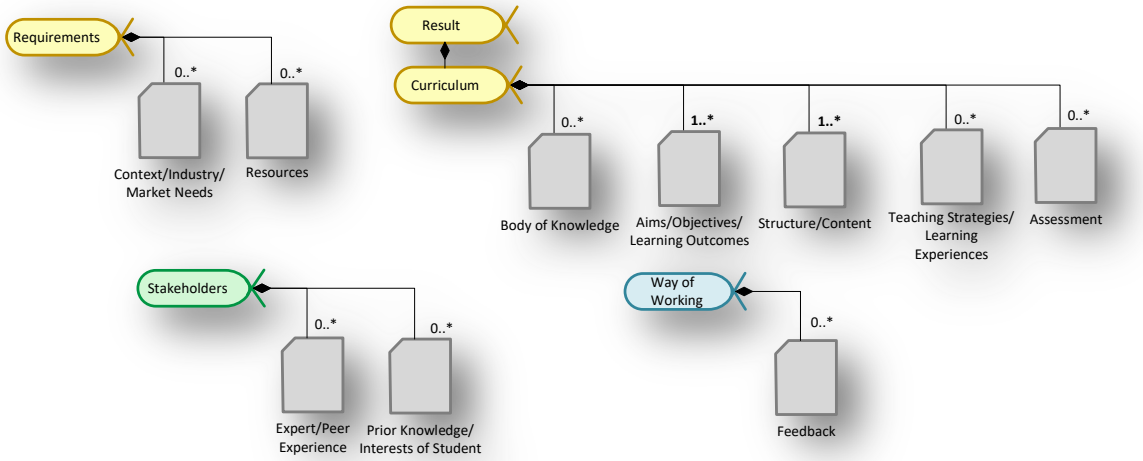


Figure 7: Work Products in ESSENTIA CURRICULUM

Findings and Discussion

In the first semester of 2023, 10 participants of the self-assessment process in the Systems Engineering Programme developed a workshop with *ESSENTIA CURRICULUM*, the participants performed the validation of *ESSENTIA CURRICULUM* based on an institutional document. "Curriculum Processes," in a textbook by Góyes and Uscátegui (2000), has guided curriculum design for over two decades at the University of Nariño. The University, which holds high-quality institutional accreditation, has 11 faculties, 107 academic programmes with qualified registration, and 35 academic programmes with high-quality accreditation. All accredited programmes at the University have followed this textbook's guidelines, which describe how to design a curriculum for the local context. This textbook is an excellent reference and authority on curriculum design with proven results.

Considering the terminological unification developed as an initial step in constructing *ESSENTIA CURRICULUM*, all practices represented in this approach must be well-named and well-formed, as proposed by Barón (2019). Every practice represented in *ESSENTIA CURRICULUM* must be named with an adjective, a nominalised verb, and a noun from the unified glossary. Following the specified order, this practice is called the collaborative construction of the curriculum process. Coloured words have a special meaning based on the *ESSENTIA CURRICULUM* rules. This practice encompasses all the aspects in the textbook that have been an institutional reference for the curricular designs of the high-quality accredited academic programmes of the University of Nariño.

The workshop included the representation of curriculum processes based on *ESSENTIA CURRICULUM* in its content. Some elements were initially identified in the text and reinterpreted. With these essential elements and following the syntax of *ESSENTIA CURRICULUM* as a graphic language, it was possible to represent a practice related to curriculum processes based on the textbook within the development of a collective workshop with the ten participants. At the end of the workshop, the following representations were made, as depicted in Figure 8 and 9.

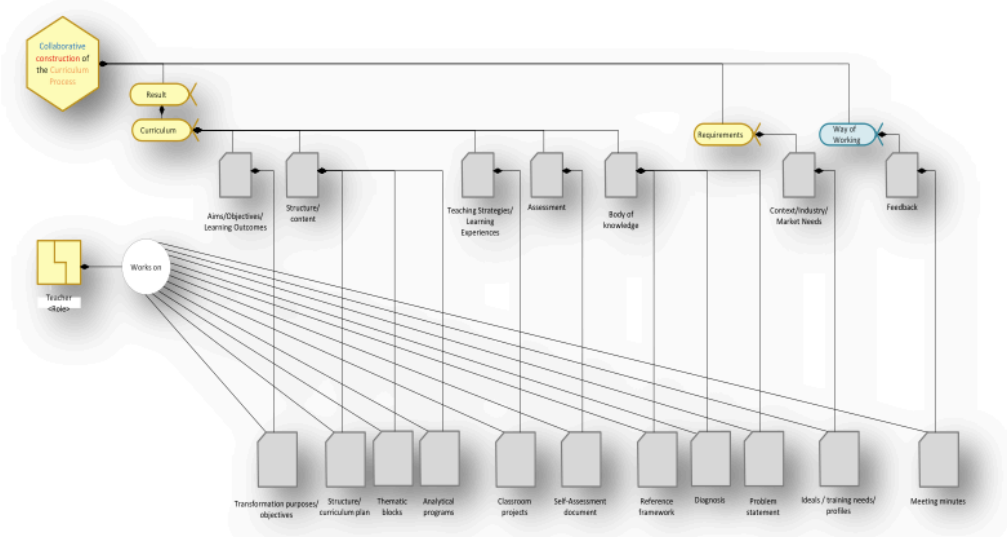


Figure 8: Practice representation in ESSENTIA CURRICULUM (part 1)

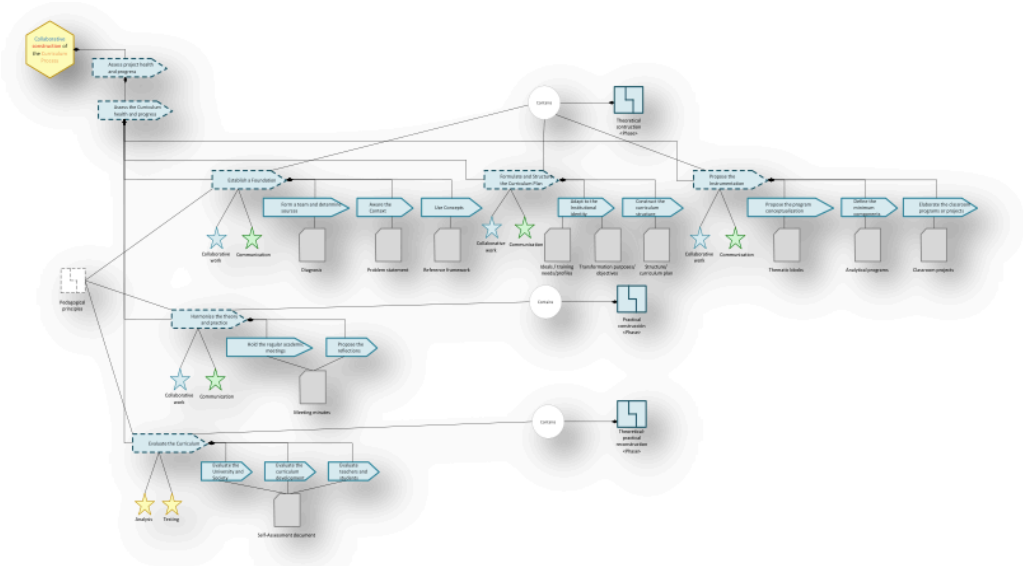


Figure 9: Practice representation in ESSENTIA CURRICULUM (part 2)

As a complement to the experience of *ESSENTIA CURRICULUM* in the academic setting, the participants completed a survey with quantitative and qualitative items, the results of which are depicted in Figures 10 and 11. The experience began with an introductory session on this innovative approach, setting the stage for an in-depth examination of the 'curriculum process' method proposed by Góyes and Uscátegui (2000). This foundational understanding paved the way for an immersive workshop where participants, collaborating in pairs, examined the representation of practices for the method under study.

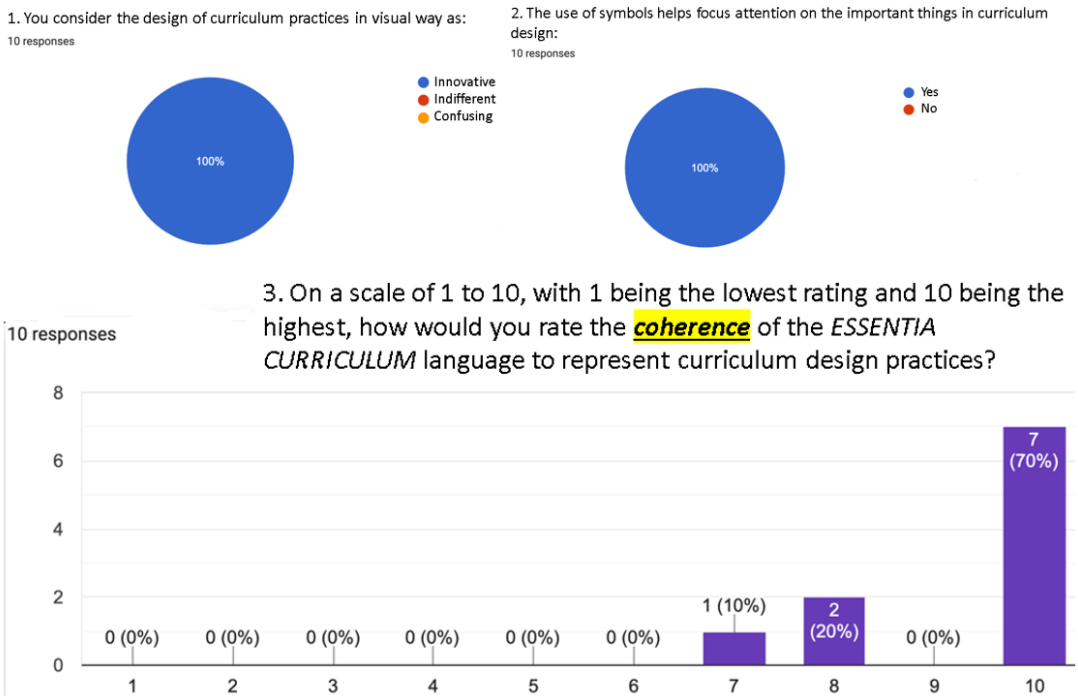


Figure 10: Quantitative results of the experience.

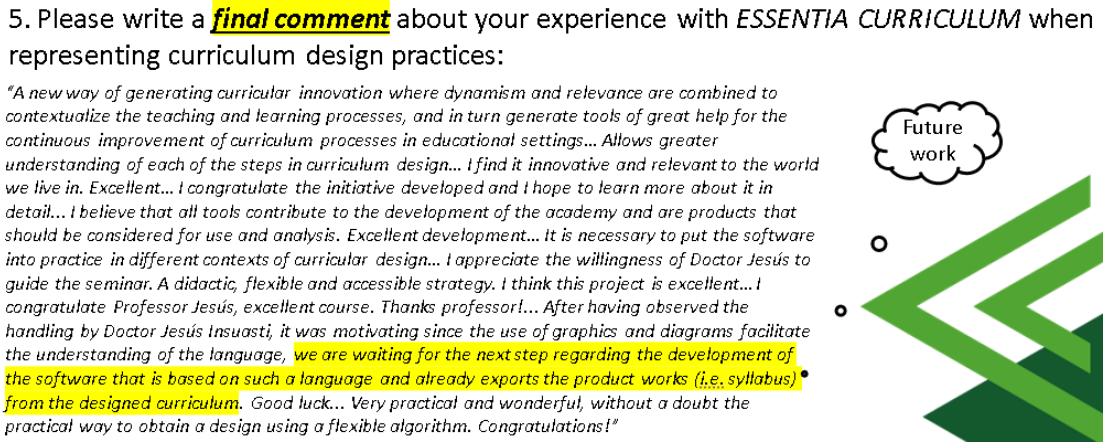


Figure 11: Qualitative results of the experience.

This hands-on workshop was an academic exercise and a collaborative venture that harnessed the cohort's collective intelligence. As the pairs collaborated, they shared insights and feedback, employing the principles of *ESSENTIA CURRICULUM* to navigate the intricacies of the curriculum process method. This culminated in a series of presentations, where each pair contributed to a unified representation of practice. The collaborative, iterative process ensured that the final representation was comprehensive and enriched with the diverse perspectives of all participants.

The benefits of such collaborative activities extend beyond the academic outcomes of any single project, fostering a sense of community and shared purpose among people while encouraging the exchange of ideas, promoting critical thinking, and enabling them to appreciate the value of diverse viewpoints. All these features were achieved using just one graphic language called *ESSENTIA CURRICULUM.* Through collective problem-solving and negotiation, students develop communication and consensus-building skills vital for academic and professional success. Additionally, the group construction of knowledge, facilitated by activities like the *ESSENTIA CURRICULUM* workshop, exemplifies the social constructivist paradigm, where learning is seen as a socially situated activity and knowledge is built through interaction with others.

Finally, incorporating collaborative methodologies in curriculum design enhances the learning experience and mirrors real-world scenarios requiring interdisciplinary teamwork and cooperation. As demonstrated in the Systems Engineering Programme, this approach leads to developing a more robust and versatile curriculum representation and equips students with the interpersonal and cognitive skills necessary for leadership in educational innovation.

Conclusions and Future Directions

Drawing upon a century of curriculum design theories and a global survey of 226 professors, our research underscores a critical gap in the systematic documentation of curriculum design processes. It highlights the challenges posed by diverse terminologies and representation methods. The findings reveal a tendency among educators to rely on subjective criteria, leading to a significant loss of valuable knowledge that could otherwise enrich academia's collective understanding of curriculum development.

The introduction of *ESSENTIA CURRICULUM* represents a transformative step in addressing these challenges. By uncovering a common ground through the synthesis of extensive theoretical insights and the practical experiences of professors worldwide, *ESSENTIA CURRICULUM* emerges as a unifying language that simplifies and enhances the discourse of curriculum design. Its adaptability across various contexts marks a significant advancement in curriculum design practices.

Its validation within the workshop at the University of Nariño, as part of its self-assessment process of the Systems Engineering Programme, is a testament to its utility and effectiveness. The positive outcomes observed therein validate the practical application of *ESSENTIA CURRICULUM* and open avenues for its future enhancement and adaptation. Its potential to facilitate more transparent communication, more efficient design processes, and enhanced pedagogical outcomes is substantial.

As the field of curriculum design continues to evolve, *ESSENTIA CURRICULUM* emerges as a guiding force for future research and development. It is poised to bridge the divide between theory and practice, offering a robust framework that can be tailored to the unique needs of diverse educational landscapes. The implications for academia are profound, promising a new era of streamlined curriculum design processes characterised by greater coherence, improved knowledge sharing, and enriched educational experiences.

ESSENTIA CURRICULUM is more than a tool; it catalyses change. It embodies the collective wisdom of a century's curriculum design expertise while embracing the nuances of contemporary educational challenges. Our research invites educators and curriculum

designers to embrace this new language, fostering a collaborative environment where knowledge is preserved, shared, and used to its fullest potential.

Finally, *ESSENTIA CURRICULUM* is supported by syntax rules and semantic coupling, highlighting its potential use in future developments of some computational tools that allow integrating elements of artificial intelligence for deployment. In this sense, there is the potential to leverage natural language processing to automatically create each work product, such as syllabus, teaching and learning strategies, and learning outcomes.

Acknowledgements

We thank the Systems Engineering Programme at the University of Nariño for providing the space to develop this research. Additionally, we would like to express our immense gratitude to the ten participants at the University of Nariño who engaged in the self-assessment process of such a Programme in the first semester of 2023.

References

ARWU. (2019). Shanghai Ranking Consultancy. Academic Ranking of World Universities in Engineering/Technology and Computer Sciences – 2019. http://www.shanghairanking.com/FieldENG2019.html

Babbie, E. (2016). The practice of social research. Wadsworth Cengage Learning.

Baker, P. (2006). Using corpora in discourse analysis. Continuum. https://doi.org/10.5040/9781350933996

Barón, A. (2019). Modelo para la definición unificada de la práctica como constructo Teórico en ingeniería de software. [Ph.D. Thesis. Universidad Nacional de Colombia, sede Medellín].

Bobbitt, J. (1924). How to make a curriculum. Houghton Mifflin.

Bowker, L., & Pearson, J. (2002). Working with specialized language: A practical guide to using corpora. Routledge. https://doi.org/10.4324/9780203469255

Bruner, J. (1977). The process of education – A landmark in educational theory. Harvard University Press.

Caswell, H., & Campbell, D. (1935). Curriculum development. American Book.

Charters, W. (1929). Curriculum construction. Macmillan.

Clarke, A., Johal, T., Sharp, K., & Quinn, S. (2016). Achieving equivalence: A transnational curriculum design framework. International Journal for Academic Development, 21(4), 364–376. https://doi.org/10.1080/1360144X.2015.1092444

Cohen, L., Manion, L., & Morrison, K. (2018). Research methods in education. Routledge. https://doi.org/10.4324/9781315456539

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative, and mixed methods approaches. SAGE Publications.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). Internet, phone, mail, and mixed-mode surveys: The tailored design method. Wiley.

Durango, C. E., Zapata-Rueda, C. M., & Zapata-Jaramillo, C. M. (2019). Representación en el Núcleo de la Esencia de Semat de las Competencias de un Equipo de Desarrollo de Software. Información Tecnológica, 30(4), 217–226. https://doi.org/10.4067/S0718-07642019000400217

Fowler, F. J. (2013). Survey research methods. SAGE Publications.

Góyes, I., & Uscátegui, M. (2000). Teoría curricular y universidad. Editorial Universidad de Nariño.

Grayson, L. (1978). On a methodology for curriculum design. Engineering Education, 1(1), 285–295.

Hill, J. (2000). Revising priorities: From grammatical failure to collocational success. In M. Lewis (Ed.), Teaching collocation: Further developments in the lexical approach (pp. 47–69). Language Teaching Publications.

IBE-UNESCO. (2013). Brochure: UNESCO International Bureau of Education. IBE-UNESCO Press.

IBE-UNESCO. (2017). Developing and implementing curriculum frameworks. IBE-UNESCO Press.

Isman, A., Caglar, M., Dabaj, F., & Ersozlu, H. (2005). A new model for the world of instructional design: A new model. The Turkish Journal of Educational Technology, 4(3), 33–39.

Jacobson, I., Meyer, B., & Soley, R. (2012). SEMAT Essence: A guide to the kernel and language of software engineering. ACM. https://doi.org/10.1145/2380656.2380670

Jockers, M. L. (2014). Text analysis with R for students of literature. Springer. https://doi.org/10.1007/978-3-319-03164-4

Jurafsky, D., & Martin, J. H. (2009). Speech and language processing. Prentice Hall.

Kerr, J. (1968). The problem of curriculum reform. In J. F. Kerr (Ed.), Changing the curriculum (pp. 13–38). University of London Press.

Kilpatrick, W. (1918). The Project Method – The use of the purposeful act in the educative process. Teacher College, Columbia University Press.

Manning, C. D., & Schütze, H. (1999). Foundations of statistical natural language processing. MIT Press.

McEnery, T., & Hardie, A. (2012). Corpus linguistics: Method, theory and practice. Cambridge University Press. https://doi.org/10.1017/CBO9780511981395

Meyer, I., & Mackintosh, K. (2000). When terms move into our everyday lives: An overview of de-terminologization. Terminology, 6(1), 111–138. https://doi.org/10.1075/term.6.1.07mey

Nicholls, A., & Nicholls, H. (1972). Developing a curriculum – A practical guide. 1st Edition. Routledge. https://doi.org/10.4324/9780429454172

OMG. (2018). About the essence specification version 1.2. https://www.omg.org/spec/Essence/1.2/PDF

Ornstein, A., & Hunkins, F. (2018). Curriculum: Foundations, principles, and issues. 7th Edition. Pearson Education Limited.

Perkins, D. (1998). Smart schools. The Free Press.

Pinar, W. F. (2013). Curriculum studies in the United States: Present circumstances, intellectual histories. Palgrave Macmillan. https://doi.org/10.1057/9781137303424_2

Rehurek, R., & Sojka, P. (2010). Software framework for topic modelling with large corpora. In Proceedings of the LREC 2010 Workshop on New Challenges for NLP Frameworks [ELRA].

Rugg, H. (1930). American life and the school curriculum. Ginn.

Sager, J. C. (1990). A practical course in terminology processing. John Benjamins Publishing. https://doi.org/10.1075/z.44

Sinclair, J. (1991). Corpus, concordance, collocation. Oxford University Press.

Sinclair, J. (2004). Collocation: A progress report. In R. B. Rutherfold (Ed.), Language and linguistics: Emerging trends. Nova Science Pub In.

Smith, B., Stanley, W., & Shores, J. (1957). Fundamentals of curriculum development. World Book Company.

Stenhouse, L. (1975). An introduction to curriculum research and development. Heinemann Education.

Taba, H. (1962). Curriculum development theory and practice. Harcourt, Brace & World.

Tyler, R. W. (1949). Basic principles of curriculum and instruction. University of Chicago Press.

Van Den Akker, J., Gravemeijer, K., McKenney, S., & Nieveen, N. (2006). Introducing educational design research. In T. Plomp & N. Nieveen (Eds.), Educational design research (pp. 3–7). [SLO].

Walters, S. (1978). The design of a theoretical model and criteria for the construction of a curriculum for physical science. [PhD Thesis. University of Cape Town].

Wiggins, G., & McTighe, J. (1999). Understanding by design. Association for Supervision and Curriculum Development.

Young, C., & Perovic, N. (2016). Rapid and creative course design: As easy as ABC? Procedia – Social and Behavioral Sciences, 228, 390–395. https://doi.org/10.1016/j.sbspro.2016.07.058

Contact email: insuasti@udenar.edu.co

Transformative Pathways: Rethinking Gender-Inclusive Educational Structures for Innovation and Adaptability in Contemporary Learning Environments

Adelfa C. Silor, Mindanao State University-Iligan Institute of Technology, Philippines
Faith Stephanny C. Silor, Mindanao State University-Iligan Institute of Technology, Philippines
Miguelito B. Emfimo, Mindanao State University-Iligan Institute of Technology, Philippines

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The awareness of gender disparities in education has increased, but current literature lacks a thorough exploration of reimagining educational structures for diverse gender needs. This research focuses on transformative pathways, addressing gaps, and contributing to the discourse on equitable learning environments. The imperative prompts this research to address persistent gender disparities in educational structures. Despite advancements in recognizing and advocating for gender equality, a significant gap exists in understanding how educational systems can be inclusively and adaptively transformed to cater to students' diverse experiences across the gender spectrum. Recognizing the transformative potential of rethinking educational structures, this study aims to provide actionable insights informing policy, practice, and institutional change. Employing a robust mixed-methods approach focusing on 100 participants, the research systematically gathers quantitative data on prevailing educational frameworks and their impact on learning outcomes. Simultaneously, qualitative methods delve into the nuanced experiences of students, educators, and policymakers. In-depth case studies of institutions with successful gender-inclusive structures offer practical insights into effective strategies and challenges. The findings illuminate the complex interplay between gender dynamics and educational structures, contributing a nuanced understanding and actionable insights for creating equitable and adaptable learning environments. In conclusion, the study emphasizes the significance of transformative pathways in reimagining education for inclusivity, innovation, and adaptability in contemporary settings.

Keywords: Actional Insights, Institutional Change, Nuanced Understanding, Reimagining Education

iafor
The International Academic Forum
www.iafor.org

Introduction

The dynamic terrain of worldwide education necessitates novel strategies that tackle the interlocking problems of gender inclusivity, flexibility, and creativity in modern educational settings. Gender-transformative approaches have led to the emergence of a new paradigm for gender and development, characterized by a renewed emphasis on core feminist concepts. This change has occurred in tandem with the growth of transformational research and the field of international development's greater emphasis on social transformations (MacArthur et al., 2022). Feminist thoughts and ideas, which have been developing over several decades, serve as the foundation for gender-transformative techniques. To enable both men and women to pursue new ways of being and doing, they want to radically transform the systems and structures that support gender inequality, rather than just incorporating gendered thought into development programming (MacArthur et al., 2022).

Transformative learning theory provides a conceptual framework for comprehending how educational environments can be reformed to stimulate innovation and adaptability. It promotes a radical reconstruction and questioning of one's thinking and behaviors. This theory, which has its roots in the American women's movement, emphasizes the significance of understanding how cultural expectations and norms—particularly those about gender roles—have influenced an individual's identity (Eschenbacher & Weber, 2023).

Within the realm of education, this entails establishing learning spaces that foster critical thinking and provide people the confidence to question societal norms and defend their rights. This strategy has demonstrated potential in several areas, including the fight against period poverty, where transformative learning has given communities the tools and information they need to support gender equality (Kassama & Eschenbacher, 2023). Despite being widely used in talks about education, concepts like "inclusion" are typically ill-defined and challenging to put into effect. The remaining major problem is achieving inclusive education in school settings, especially in methods that simultaneously support gender equity. According to research, instructors' views regarding inclusive education are frequently ambiguous or undifferentiated, and their support is crucial for the effective execution of inclusive policies (Lindner, Schwab, Emara, & Avramidis, 2023; Avramidis & Norwich, 2002; Freeman-Green, Williamson, & Cornelius, 2023). Furthermore, it is still a global struggle to bring these principles to reality despite international commitments to provide high-quality education. Though transformative learning theories and gender-transformative approaches are receiving more attention, there is still a great deal of confusion about how these ideas may be successfully implemented in modern educational systems. The majority of previous research has concentrated on the theoretical underpinnings of transformational learning and gender inclusion, with little attention paid to the practical difficulties involved in applying these strategies in actual educational settings. Furthermore, although inclusive education has received a lot of attention, not enough attention has been given to how gender intersects with inclusion to create creative and flexible learning settings for everyone, including children with disabilities (Taneja-Johansson & Singal, 2021).

To close this gap, this study critically assessed the current status of gender-inclusive educational structures and investigated transformative approaches for reimagining them in a way that encourages creativity and adaptation. This research gave a thorough examination of the opportunities and problems involved with applying gender-transformative approaches in modern learning environments by drawing on case studies from varied educational contexts, academic and gray literature, and more. By providing useful information and guiding principles

for educators, legislators, and academics who are dedicated to promoting gender equity in education, the study's findings added to the continuing conversation on gender and education.

Related Literature

A new paradigm for gender and development has emerged in international development, with a renewed emphasis on fundamental feminist ideas thanks to the rise of gender-transformative approaches. This increase has coincided with the expansion of transformative research and the field of international development practice's increased focus on social transformations (MacArthur et al., 2022). This article examines the history of gender-transformative techniques and the present scope of applications, as shown by academic and gray literature. Five guiding principles have been proposed to help guide future study and practice in this area. The reality of putting gender-transformative strategies into practice is still changing, even if it has been established that they are not new and are instead grounded on feminist concepts and ideas from many decades ago. This study has, for example, emphasized the decolonization of research and development practices and the ongoing evolution of feminist development practice to acknowledge gender identity variation (MacArthur et al., 2022).

The resurrected language of gender transformation provides an opportunity to critically analyze broader trajectories and purposes of change within the context of international development work, given the shortcomings in the "empowerment as development" models that have been identified. While a gender-mainstreaming strategy seeks to incorporate gendered thinking into development programming as a means of achieving better development results, a gender-transformative approach maintains that equality is the goal of development programming as well as its road. By using this terminology, we hope to introduce a fresh batch of scholars and professionals to the feminist foundations of gender and development. Its goal is to modify the systems and structures so that both men and women can be freed to pursue new ways of being and doing, rather than trying to fix the women or change the men (MacArthur et al., 2022).

A fundamental reorganization and radical questioning of one's thoughts and behavior are encouraged by the theory of transformative learning and its concept of freedom—that is, the idea that we are not limited by one way of seeing the world or being in it. The women's movement in the US gave rise to this idea of adult learning, which echoes what it means to become a transformational learner—realizing how one's way of being has been defined and limited by societal norms and expectations resulting from gender roles (Eschenbacher & Weber, 2023). By encouraging critical thinking and action among individuals and communities to examine and modify the structural origins of this problem, transformative learning offers a viable remedy to period poverty. By giving people and communities the knowledge, abilities, and resources they need to fight for their rights, question gender stereotypes, and challenge social norms, transformative learning can be extremely helpful in ending period poverty. Period poverty may be eliminated and gender equality can be advanced by individuals and groups by establishing a learning environment that encourages critical thinking, discussion, and cooperation (Kassama & Eschenbacher, 2023).

A fundamental reorganization and radical questioning of one's thoughts and behavior are encouraged by the theory of transformative learning and its concept of freedom—that is, the idea that we are not limited by one way of seeing the world or being in it. The women's movement in the US gave rise to this idea of adult learning, which echoes what it means to become a transformational learner—realizing how one's way of being has been defined and limited by societal norms and expectations resulting from gender roles (Eschenbacher &

Weber, 2023). Words like "inclusion" are rarely defined and are frequently taken for granted. The normative nature of empirical research on inclusive education stems from its foundation in concepts like "democracy" and "justice." The meanings of such concepts rely on a subjective assessment of the location and time where inclusion is intended to occur, making it difficult to convert them into actual practice. Therefore, achieving inclusive education in school settings and doing research on the topic is difficult (Rapp & Corral-Granados, 2021). According to the findings, primary school teachers' opinions toward inclusive education are typically ambiguous or indifferent. Consistent with earlier study findings, inclusion appears to be contingent on the sort of handicap a student has. Consequently, when it comes to the idea of inclusion for all pupils, typical primary school instructors are not in favor of it. Studies conducted in the past few years have largely failed to guide how to improve instructors' attitudes (Lindner, Schwab, Emara, & Avramidis, 2023).

A great deal of research has attempted to examine teachers' attitudes toward the integration and, more recently, the inclusion of children with special educational needs in mainstream school, based on the premise that the successful implementation of any inclusive policy is largely dependent on educators supporting it (Avramidis & Norwich, 2002). A great deal of research has attempted to examine teachers' attitudes toward the integration and, more recently, the inclusion of children with special educational needs in mainstream school, based on the premise that the successful implementation of any inclusive policy is largely dependent on educators supporting it (Freeman-Green, Williamson, & Cornelius, 2023). International pledges to provide high-quality education for everyone, including children with disabilities, are still centered on the importance and promise of doing so; nevertheless, it is still unclear how best to carry out these intentions in reality. Research unequivocally demonstrates that regardless of how well-funded educational institutions are or how long they have been addressing inclusive education concerns, turning ideology into reality continues to be a global struggle. In this study, we conduct a critical analysis of how education systems around the world need to improve their efforts to integrate inclusive education (Taneja-Johansson, S. & Singal, N., 2021).

Methodology

The study employed a qualitative research approach, utilizing input from a group of participants who were purposefully selected and had a range of backgrounds and experiences in educational environments. About the issues of gender dynamics and educational systems, in particular, this sampling technique ensured a wide range of opinions. Open-ended questionnaires and interviews were used to collect data, allowing participants to fully express their opinions. After that, the data underwent a methodical coding and analysis process to find reoccurring themes. These topics were then classified and quantified according to the frequency of mentions. A comprehensive grasp of the participant insights was obtained through this thematic analysis, which also identified important topics for educational advancement and the creation of inventive, equitable, and flexible learning settings.

Results and Discussions

Table 1 presents the key themes and participant feedback about the study's objectives, which are to examine the complex relationship between gender dynamics and educational structures, enhance understanding of these systems, and offer practical strategies for creating equitable and adaptable learning environments.

Theme	Participant Feedback
Gender Dynamics	"The study effectively highlights the complex interactions between gender dynamics and educational structures."
Nuanced Understanding	"It offers a deep and nuanced understanding of how educational structures operate and can be improved."
Actionable Insights	"The insights provided are practical and can be implemented to create more equitable and adaptable learning environments."
Transformative Pathways	"Emphasizing transformative pathways is crucial for reimagining education in a meaningful way."
Inclusivity	"The focus on inclusivity is essential for contemporary educational settings."
Innovation	"Stressing innovation is necessary for the future of education."
Adaptability	"Highlighting adaptability ensures that educational environments can evolve with changing needs and contexts."

Table 1: The Key Themes and Participant Feedback

Theme	Number of Participants Mentioning Theme	Example Feedback
Gender Dynamics	30	"The study effectively highlights the complex interactions between gender dynamics and educational structures."
Nuanced Understanding	25	"It offers a deep and nuanced understanding of how educational structures operate and can be improved."
Actionable Insights	35	"The insights provided are practical and can be implemented to create more equitable and adaptable learning environments."
Transformative Pathways	20	"Emphasizing transformative pathways is crucial for reimagining education in a meaningful way."
Inclusivity	40	"The focus on inclusivity is essential for contemporary educational settings."
Innovation	25	"Stressing innovation is

Table 2: The Quantitative Analysis Based on Participant Feedback

Table 2 above shows the quantitative analysis, based on participant feedback elicited various marked themes and their frequencies that would give valuable insight into the perceived changes in gender dynamics, educational structures, and further-reaching goals of educational innovation and inclusivity. Gender dynamics had come up as a marked theme, spoken out loud by 30 participants who accepted the effectiveness of the study in expressing the complex dexterity of gender dynamics and educational settings. Such findings indicate that participants have accepted the fact that gender can shape educational experiences and outcomes. The nuanced understanding theme was also elicited in the responses of 25 participants who reported the depth of the study has enlightened the themes concerning how the educational systems

work and what can be done to enhance them. Broader calls for better insights into schooling and policy can agree on it. Moreover, the actionable insights notice has gathered plenty; 35 suggests the feasibility of recommendations from this study in designing equitable and flexible learning environments. In less elaborate words, interest was so high on the part of the participants in how findings could be translated into strategies and feasible actions one could take on real problems in education. At the end of the transformational pathways, 20 participants began to realize that the perception of the new vision about education needs new creative ways. All participants agreed on the matter that educational reforms can't rust only old methods but have to be flexible in the needs of a new developing society with technological development.

To posit that these three considerations differ among such a huge array in the ideas count, we got the highest consensus concerning inclusivity from 40 respondents. It, therefore, underlines consensus on the relevance of inclusivity to the creation of rich and supportive learning environments. Finally, 25 participants debated innovation because it is considered that innovative practices and technologies are considered a need for quality and relevance in the learning process. It was concluded that challenges in gender dynamics, changing wisdom and actionable insights, transformative pathways, inclusiveness, and innovation are some of the key constituents representing the future of education. All these were highlighted as findings held jointly at the moment of exigency in policies and growing educational practice—a momentum that will include innovation but also one that has a place for being responsive to the changes that modern learning environments need and call for.

Table 3 emphasizes the significance of transformative pathways in reimagining education, highlights the importance of inclusivity in contemporary educational settings, stresses the need for innovation, and underlines the importance of adaptability in education.

Theme	Participant Feedback
Transformative Pathways	"Emphasizing transformative pathways is crucial for reimagining education in a meaningful way."
Inclusivity	"The focus on inclusivity is essential for contemporary educational settings."
Innovation	"Stressing innovation is necessary for the future of education."
Adaptability	"Highlighting adaptability ensures that educational environments can evolve with changing needs and contexts."

Table 3: The Qualitative Analysis of the Feedback

Table 3 shows the qualitative analysis of the feedback provided by the respondents establishes that it identifies four themes to be fundamental for future education: Transformative Pathways, Inclusivity, Innovation, and Adaptability. Out of the 69 respondents, 30 identified innovative ways to tremendously transform ways of practice and education outcomes. This consequently prompts an educational change not only at the levels adopted by the traditional method but also at the advanced and effective stages. One dominant theme here is that of inclusivity. Forty participants contributed comments about critical issues associated with the building of learning environments for the fostering of just and responsive learning for all. It reflects a collective recognition of the need to make sure that education is accessible and supportive to people from all walks of life. At the same time, 25 of them highlighted the innovation aspect as a tool for making education relevant to the world that is changing through the use of new ideas, technologies, and methodologies. Finally, 35 mentioned that Adaptability will allow

educational systems to be adaptable to societal, technological, and economic changes. It means that the themes, as an ensemble, underline powerful consensus to the view that truly educational environments must be dynamic, inclusive, innovative, and adaptive to be effective in meeting changed learner and societal needs.

Conclusion

Convergent themes arising from the qualitative analysis of the appraisal of the feedback obtained from the participants underline the need, more urgently, vis-à-vis the future of education and how gender dynamics relate to educational innovation. It is for this reason that they have been able to realize how gender dynamics interact with educational structures in ways that call for increasing awareness of the ways and means such structures could be improved. On the other hand, while actionable insight—a strong will—is said to be necessary, it argues the findings are translated to ensure equity strategies are useful and adaptable learning environments. As transformative pathways, inclusivity, innovation, and adaptability, manifest as people who believe in responsive, forward-looking educational reforms. However, from the ensemble of such themes, one could gather that this better working and inclusive future of schools and students shall require serious work to mend gender dynamics, policy and innovation, and practice adaptation in education.

Recommendations

Ensure gender equity in education. The schools and other learning institutions shall ensure that their policies and practices are sensitized to gender and take cognizance of the interplay of gender dynamics in learning outcomes, including sensitization in teacher training and reflection in the nondiscriminatory and inclusive curriculum accounting for diversified views on gender. Enabling transformative pathways: Develop, promote, and implement novel ways of mainstreaming and restructuring techniques for teaching and learning, which can be in the form of inter-disciplinary studies, project-based learning, and technology-enabled education for the fostering of creativity and critical thinking among students. The best quality, at the same time as inclusion and equity, can only be ensured if an educational environment accommodating the changing students' needs is developed. Otherwise, it may also be arrived at through the provision of policies that provide for educational opportunities in such a way that is indifferent across the various minority groups.

Incentivize Innovation: Allow for research and development investments; through this is the way institutions will come up with new ideas, technologies, and methodologies capable of imparting quality education with greater relevance. Another support is for educators to share innovative educational practices and, similarly, infuse into the classroom new technologies. Bring more adaptive changes in the system of education and its practices: Systems and practices of education have to be fluid and adaptive to the changes responding to the needs of society and technology by being responsive to dynamism in economic conditions. It would be committed to professional development at any time of practice, updating the curriculum parallel to current developments, and ensuring that the designed policies would maintain amenability to new challenges and opportunities. It is, therefore, possible that educational institutions would be able to develop environments that are equal, integral, even innovative, adaptable, secure relevant, and effective changes by putting the recommendations into practice.

References

Avramidis, E., & Norwich, B. (2002). Teachers' attitudes towards integration/inclusion: A review of the literature. European Journal of Special Needs Education, 17(2), 129–147. https://doi.org/10.1080/08856250210129056

Eschenbacher, S., & Weber, N. (2023). Deconstructing gender identity through transformative learning. Studies in the Education of Adults, 55(2), 427–440. https://doi.org/10.1080/02660830.2023.2243660

Freeman-Green, S., Williamson, P., & Cornelius, K. E. (2023). Promoting inclusive practices in education: Bridging gaps and fostering independence. TEACHING Exceptional Children, 56(2), 68-69. https://doi.org/10.1177/00400599231223785

Kassama, F. L., & Eschenbacher, S. (2023). Period poverty – Fostering gender equality through transformative learning. Studies in the Education of Adults, 55(2), 413–426. https://doi.org/10.1080/02660830.2023.2256517

Lindner, K. T., Schwab, S., Emara, M., & Avramidis, E. (2023). Do teachers favor the inclusion of all students? A systematic review of primary schoolteachers' attitudes towards inclusive education. European Journal of Special Needs Education, 38(6), 766–787. https://doi.org/10.1080/08856257.2023.2172894

MacArthur, J., Carrard, N., Davila, F., Grant, M., Megaw, T., Willetts, J., & Winterford, K. (2022). Gender-transformative approaches in international development: A brief history and five uniting principles. Women's Studies International Forum, 95, 102635. https://doi.org/10.1016/j.wsif.2022.102635

Rapp, A. C., & Corral-Granados, A. (2021). Understanding inclusive education – A theoretical contribution from system theory and the constructionist perspective. International Journal of Inclusive Education, 28(4), 423–439. https://doi.org/10.1080/13603116.2021.1946725

Taneja-Johansson, S., & Singal, N. (2021). Pathways to inclusive and equitable quality education for people with disabilities: Cross-context conversations and mutual learning. International Journal of Inclusive Education, 1–16. https://doi.org/10.1080/13603116.2021.1965799

The Role of the School Manager in the Implementation of Active Methodologies in a Vocational Education Institution

Fabia Maria Silva Lins dos Santos, Serviço Nacional de Aprendizagem Comercial, Brazil
Marcos Canto Machado, University of São Paulo, Brazil

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The present study shows the role of the school manager in the implementation of active learning methodologies in an educational institution of vocational education in the State of São Paulo, Brazil. Through an online survey with open and closed questions, 33 school managers of this institution answered their actions and orientations related to the topic. It was possible to identify that 73% understand that their priority is to influence people so that they are motivated and mediate the administrative processes to reach the pedagogical ends; 99% of them agree that the manager exerts influence on the motivations and competences of the teachers. Of all, 85% state that the teacher proposes activities that allow solving problems, investigations and simulations, but 36% follow the projects of the students through the report of their team. Of the total, 97% understand that research is the methodological resource used in most classes, but 54% is not clear if teachers present knowledge in situations other than traditional ones. From all, 64% report being present at various moments in the educational discussions but, in relation to an unjustified reprobation, 33% understand that the student should retake the test and do not identify other evaluation instruments. Based on the results, it was observed that these managers acquired a repertoire for the identification and discussion of active methodologies, but still have conceptual doubts and most are not very close to the classroom, to identify, in fact, what methodology chosen by the teachers under their management.

Keywords: School Director, School Principal, School Leadership, School Manager, Active Methodologies, Mediation, Research, Real Projects

iafor
The International Academic Forum
www.iafor.org

Introduction

The role of school managers has been decisive as a direct influencer of the results of the teaching-learning process (Lück, 2000). United Nations Educational, Scientific and Cultural Organization [UNESCO] (2014) pointed out that there are no formal parameters for their role in Brazil compared to other Latin American countries.

In the literature, the school leader is described as capable of influencing people to achieve objectives voluntarily and with motivation (Lück, 2000 and 2012). It would be up to each manager to mobilize participants in the school community so that administrative mediation is carried out for pedagogical purposes to leverage ongoing and in-service training processes for their professionals (Almeida and Rubim, 2004; Paro, 2015). Research indicates that this coordination would determine the relationships in the pedagogical process (Leithwood et al, 2010; Paro 2010). Confident teachers take responsibility for their students' learning and seek active methodologies and student-centered learning (Leithwood et al, 2010).

This study focused on the school manager who works at a private, non-profit professional education institution, which defined in its school bylaws that he is responsible for school and administrative management, with the commitment to monitor and evaluate educational indicators, to improve the teaching and learning process. The principal or manager in this case, is also responsible to implement the institution's Pedagogical Proposal. This proposal states that methodologies should be more participatory, based on real work situations, through case studies, research, problem-solving, projects, and other strategies. According to this proposal, the student should be actively involved.

The principles of active teaching methodologies concern: the student as the central point of the teaching and learning process, their autonomy and reflection, the problematization of reality, teamwork, and, to support the process, a teacher as a mediator, facilitator and activator (Diesel et al, 2017). Active methodologies require the teacher’s autonomy to create activities with the potential to promote the experience and students’ learning (Bacich and Moran, 2018; Moran, 2013). Active methodology encompasses research as a pedagogical principle present by stimulating critical analysis, reflection, investigation, and the proposition of professional and social solutions or alternatives (Institution Pedagogical Proposal).

The research sought to determine whether this manager aims to implement the active methodologies referenced in the Institution's Pedagogical Proposal and attempted to understand how close they are to the teachers, to identify the influence of this manager on their methodological choices.

Material and Methods

A survey was conducted with school managers who work at a private Professional Education Institution, which offers Secondary Level Technical Professional Education. This institution consisted of 53 school units distributed throughout the State of São Paulo.

Bryman (2004) states that combining quantitative and qualitative data is useful for ensuring overlapping results. An online questionnaire was used, prepared using Google Docs, which was sent to them via a link in an invitation email. The managers were not asked to identify themselves. The questionnaire was sent to 53 managers in August 2018.

Results and Discussion

There were 33 respondents. The analyses of the responses obtained are presented below.

Training

Out of the 33 respondents, 67% stated that they had completed or were currently completing a postgraduate degree in education, 21% were currently completing or were completing a master's degree in education, 9% had a degree in pedagogy, and 3% chose other courses.

Motivation and Administrative Mediation for Pedagogical Purposes

Based on what Paro (2015) and Lück (2012) listed, managers chose the priority items in their management (Table 1).

Response Possibilities	Number of respondents
1st - Coordinate the collective effort and influence people so that they are motivated; 2nd - Mediate the administrative process to achieve pedagogical goals; 3rd - Achieve the proposed numbers.	24
1st - Coordinate the collective effort and influence people so that they are motivated; 2nd - Achieve the proposed numbers; 3rd - Mediate the administrative to achieve pedagogical goals.	8
1st - Achieve the proposed numbers; 2nd - Coordinate the collective effort and influence people so that they are motivated; 3rd - Mediate the administrative process to achieve pedagogical goals.	1

Table 1. Responses to question 2 of the questionnaire
(In order of importance, which sequence of actions is most similar to their priorities as school managers - from most important to least important)
Source: Original research results

The majority, (73%), chose the option in which their priority is Coordinating collective efforts and influencing people so that they are motivated. Significantly, 97% of managers chose answers in which the first option was coordinating collective efforts and influencing people so that they are motivated. As Lück (2012) describes, one of the great challenges of school management is mobilizing talent, inspire people and efforts in the search for continuous improvement.

When asked whether they agreed with the statement: School managers play a key role in improving school results by influencing teachers' emotions, motivations, skills and the school environment (Question 3), 97% of respondents said yes. These responses confirm the research by Leithwood et al (2010), Pont et al (2008), and the notes by Lück (2012).

In this sense, managers' attitudes can influence the level of engagement and contribute to higher-than-expected participation by employees or lead to high levels of demotivation (Sciotti, 2016).

Articulate In-Service Training

Next, the manager was asked about his team's in-service training (Table 2).

Response Possibilities	Number of respondents
Gather your team to attend a lecture or discuss texts and guidelines, encouraging the search for solutions regarding administrative and educational processes	15
Other	9
Discusses administrative processes as a means to improve the unit's educational indicators	5
Requests that the course coordinators hold meetings with teachers and establishes administrative alignment with sector leaders	4

Table 2. Responses to question 4 of the questionnaire
(To carry out in-service training for your team, you...)
Source: Original research results

The presentation or lecture format is still preferred by managers to achieve some in-service training (45%). Only 15% chose the option in which administrative discussion is a means to improve educational indicators. And when they chose the "other" alternative, they said that the actions developed should consider a little of each item mentioned. A minority of managers, 12%, outsource educational discussions to course coordinators.

Monitoring and Evaluation of the Teaching-Learning Process

When asked whether they monitor and evaluate indicators of the teaching-learning process (Question 5), the majority (85%) stated that they monitor periodically.

Summary of indicators	Quantidade
Dropout/Remaining	17
Failure/Failure in the same Curricular Unit	9
Pass/Approved by recovery	7
Student projects	7
Teaching activity	6
Administrative and Financial	5
Indicator Imprecise or unclear in its definition	5
Student attendance	4
Courses offered	3
Valuing or pedagogical practices	3
Educational records	3
Student evaluation	2
Course evaluation	2
Cancellation	2
Conversations with teams	2
Recovery action	2

Table 3. Grouping of keywords resulting from question 5 of the questionnaire
(If yes, which teaching-learning indicators do you assess and monitor?)
Source: Original research results

One manager pointed out that the institution did not define learning indicators (3%). And 12% responded that they do not monitor directly, as the course coordinators and the secretariat carry out the monitoring. Of the majority who confirmed this, the analysis of the keywords resulting from their responses resulted in Table 3, where the repetition of indicators mentioned was counted.

Principles of Active Methodologies

Still on the teaching and learning process, managers answered question 6, as shown in Table 4.

Response Possibilities	Number of respondents
Classes are based on course plans, seeking to solve problems, research and formative assessment	30
The educational process is defined by the course coordinator and his teaching team according to the needs of each course	2
Classes follow course plans, requiring specific assessments of how much the student understood these concepts	1

Table 4. Grouping of responses to question 6 of the questionnaire
(Regarding the teaching-learning process, which guideline below is closest to your practice?)
Source: Original research results

The vast majority (91%) chose the item: Classes are based on course plans, to seek solutions to problems, research, and formative assessment. This choice is in line with the description of the Institution's Pedagogical Proposal. One manager (3%) chose the item: Classes follow course plans, requiring specific assessments of how much the student understood these concepts - a choice that demonstrates that there are doubts about the formative assessment process, which is not specific but rather throughout the process. Two managers (6%) chose the alternative where guidance on the teaching-learning process is delegated to course coordinators.

Similarly, in the following question, when asked: Teachers are hired, guided and developed so that..., (Question 7), 3% chose the option in which hiring teachers is the responsibility of the course coordination team, which hires professionals with technical knowledge (as shown in Table 5). This alternative also exempts the manager from methodological guidance. Most managers (85%) chose the alternative in which the teacher, based on the course plan, proposes activities that allow for problem-solving, investigations, and simulations - also confirming what the Institution's Pedagogical Proposal says and what Diesel et al (2017) described.

Response Possibilities	Number of respondents
Based on the course plan, propose activities that allow problem-solving, investigations and simulations	28
Other	3
The hiring and training of teachers is the responsibility of the course coordinators, which hires professionals with technical knowledge recognized by the market	1
Present the content in the curricular units and guide students in preparing a final course project, through theoretical and practical classes	1

Table 5. Responses to question 7 of the questionnaire
(Teachers are hired, guided and developed so that...)
Source: Original research results

Regarding monitoring and discussing students' projects (Question 8), a large part of the respondents follow them remotely: 12% watch the final project when they can and 36% learn about them through reports from course coordinators. The majority (52%) chose the option: I participate in some collective planning meetings and discussions of generating themes, as shown in Table 6.

Response Possibilities	Number of respondents
I participate in some collective planning meetings and discussions on the themes generated by some classes	17
In pedagogical meetings, course coordinators and teachers share ongoing projects	12
At the end of the course, students present their final projects and, when possible, I attend to them	4

Table 6. Responses to question 8 of the questionnaire
(How do you monitor and discuss the progress of students' projects?)
Source: Original research results

When asked: You have identified that, in a certain area, teachers only give presentations and carry out specific assessment activities. Do you believe that some review of this teaching-learning process is necessary? (Question 9), almost all responded that the process should be reassessed.

Another manager responded that he understands the need to review the process and that this is part of his job: to discuss specific cases as well as the development of teaching teams with the coordination team. Because it is a complex issue, there was one response that disagreed in part, saying that it depends on how it happens: if these presentations are part of a process that is shared with the students and these specific assessments are strategies to learn about what cannot be perceived in the day-to-day classroom, there is no need to intervene in the process.

Innovative proposals – which break established standards and institutional rules (Question 10) – are treated as opportunities to carry out administrative mediation to achieve pedagogical goals in 82% of responses (Table 7).

Response Possibilities	Number of respondents
They are welcomed and in my role as manager, I provide administrative mediation to achieve the pedagogical purpose	27
They are welcomed, but must be adapted to institutional guidelines	6

Table 7. Responses to question 10 of the questionnaire
(How are innovative proposals - student projects or teacher suggestions - that break established standards and institutional rules treated?)
Source: Original research results

This response is consistent with the principles of active methodologies that Diesel et al (2017) point out and as Paro (2015). On the other hand, 18% understand that innovation must be adapted to institutional rules - an action that can hamper initiatives related to real projects, for example.

In question 11, most managers (64%) can identify how teachers mediate students (Table 8):

Response Possibilities	Number of respondents
How teachers mediate students, as I am present at various moments of educational discussions	21
The methodologies used by teachers, as I discuss with course coordinators about the teaching-learning process	11
How the teaching-learning process happen because I attend classes randomly throughout the year	1

Table 8. Responses to question 11 of the questionnaire (I can identify...)
Source: Original research results

When using active methodologies, teachers must create activities that promote student experience and learning in such a way that they can systematize knowledge (Moran, 2013; Prado, 2003). Thus, in educational discussions, teachers tend to verbalize and express which initiatives are close to active methodologies or not (Conselho Nacional de Educação, 2012; Tébar, 2011).

By this verbalization, 33% of the managers understand that this monitoring can happen based on the reports of course coordinators, which may already demonstrate a certain distance from the teachers' actual practices. Only one manager (3%) indicated that he attended classes randomly throughout the year. These responses reinforce the distance observed when asked about how they follow up on students' projects.

Role of Research

In this question, 97% state that research is the resource used in most classes, by groups of students and encouraged by teachers (Table 9).

Response Possibilities	Number of respondents
Research is a resource used in most classes, by groups of students and encouraged by teachers	32
Research is used in the integrative project curricular unit, when students need to have arguments and theoretical references for their final course work	1

Table 9. Responses to question 12 of the questionnaire
(How is research used in the courses of this school unit?)
Source: Original research results

Another manager (3%) chose the option: Research is used in the curricular unit of the integrative project when students need to have arguments and theoretical references for the course completion work. Perhaps it was not clear that this option refers to the course completion work, which is not consistent with the proposition defined in the Pedagogical Proposal. The alternative presented in the questionnaire was: The contents are defined by the teachers in the collective planning, so no additional research is requested from the students during the classes. No manager chose it.

How the Teacher Presents Knowledge

Table 10 shows that 91% reinforced the project as a strategy that is usually chosen by their team to achieve the skills described in the curricular units of technical courses. In the item others, one of the managers (6%) emphasizes that the strategy must look at the uniqueness of the group, which influences the choice of path.

Response Possibilities	Number of respondents
Students are invited to discuss and propose projects in response to problems arising from the generating themes	30
Other	2
Teachers present the content during the curricular units, which will be used later in the integrative project, to create a course completion paper	1

Table 10. Responses to question 13 of the questionnaire
(To achieve the skills described in the curricular units of technical courses,
which strategy is usually chosen by your team)
Source: Original research results

Only one manager chose the item: teachers present the content during the curricular units, which will be used later in the integrative project, to create a final coursework. We are still talking about a structure where theory precedes practice.

When managers were asked to relate the projects developed by students with the products they generate (Question 14), 52% stated that the projects present solutions for their communities. These responses corroborate what is listed in the Pedagogical Proposal by encouraging critical analysis, reflection, investigation, and the proposition of professional and social solutions or alternatives. When choosing the item: they relate to the concepts of the course plans and the students are ready to look for a job (45%), perhaps it demonstrates that, despite the project, it does not work with real cases or with the students' communities. In this item, only one manager did not want to give an opinion on the students' projects, delegating them to the course coordinators. The data are presented in Table 11:

Response Possibilities	Number of respondents
They present solutions to problems in the communities where these students live	17
They relate to the concepts in the course plans and students are ready to look for jobs when the course ends	15
Course coordinators guide teachers directly on the projects that students develop	1

Table 11. Responses to question 14 of the questionnaire
(In your assessment, the projects developed by the students…)
Source: Original research results

When asked about the objective of pedagogical meetings (Table 12), 82% of them chose the alternative where the intention is to promote discussion between teachers and coordinators about the teaching and learning process.

Response Possibilities	Number of respondents
Promote discussion among teachers and course coordinators about the teaching-learning process and exchange between those involved, about pedagogical experiences	27
Another possibility	5
Provide the presentation of educational concepts or institutional projects	1

Table 12. Responses to question 15 of the questionnaire (Pedagogical meetings are held to...)
Source: Original research results

To find out whether students have the opportunity to understand concepts in diverse contexts (Libâneo, 2011), they were asked whether the manager would be able to say whether teachers present knowledge in new or different situations. As shown in Table 13, the majority of responses are concentrated on yes (45%) and sometimes (30% of responses). Only 9% responded in some cases. And 6% chose the option not sure and 6% opted for other. This data may show that they look at teaching processes from a certain distance: the teacher who only attempts to transmit content by lecturing does not enable the student to understand the concepts in other ways. Also, this teacher does not identify what representations the student has about the concepts in order to act on them by introducing the necessary variation between the materials and the project, so that a new representation can be developed (Meirieu, 1998; Libâneo, 2011).

Response Possibilities	Number of respondents
Yes	15
Sometimes	10
In some cases	3
Other	2
Not sure	2
In some courses	1

Table 13. Responses to question 16 of the questionnaire (Do teachers present knowledge in new or different situations, inside or outside the classroom?)
Source: Original survey results

Role of Error

The managers chose the option that best represented the role of error in the school under their administration (Table 14).

Response possibilities	Number of respondents
They provide information for teachers to review their classes	14
They are part of the project development process and the course completion work	12
They are identified at specific moments during the formative and individual assessment process and in the course completion work	7

Table 14. Responses to question 17 of the questionnaire (In this school, students' mistakes…)
Source: Original research results

As the option chosen by the majority (43%), the error shows teachers which strategies should be reviewed. Once again, when exposed to the term course completion work, managers understood that completion work is part of the ongoing assessment process. Thus, 36% chose the second item, even though it contradicts the process of developing a project. The third item, also chosen by 21% of respondents, brings other divergences, as it mentions specific moments - which is contrary to ongoing education.

Assessment

The next question asked managers to write down how they would resolve the following issue: You received an email with a complaint from a student who reported that she was absent on the day of the test and had failed. What would you orient to responding to this complaint?

In most of the responses, the managers want to understand whether the student failed the test because of only one assessment and understand that it is important to review the entire process. Some of these respondents, in addition also want to understand whether the student was already having problems developing the skills required by the course – which appears in their speech as giving a new chance if there is one. For another five managers, the solution is to forward the student to request a new assessment, justifying the reason for her absence. Or even that the student should request a review or recovery of learning. In these two statements and three others that treat the student's question as part of an administrative process, the manager does not seek to talk to the coordinators and teachers. And so, he advises the student

to request a new test. Thus, the chance of the student having her failure maintained seems to be high. Table 15 below summarizes:

Action suggested by the manager	Number of respondents
Review the process	14
Check how the process happened and give her another chance, if necessary	6
The student should request a new test	5
I ask the course coordinator to review the process together with the teachers	4
The student should have another chance	1
Listen to the teachers	1
Review the process and give the student another chance	1
Review the process, even if the reason for the absence is trivial	1

Table 15. Summary of the managers' speech when a student reports that she was absent on the day of the test and had failed.
Source: Original research results

In four other responses, the manager forwards the matter to the coordination department to resolve with the teachers. One of the managers believes that a review of the evaluation process is necessary, even if the reason for the absence is trivial.

Although the discussion revolves around the review of the process, no comment mentioned any other type of evaluation.

Application Formats for Active Methodologies

As a final question, the manager was asked whether training the team in active methodologies would favor application according to the modality, as shown in Table 16. The majority (88%) chose that it is possible to apply it in short-term (free) courses, technical courses, and at events.

Three managers, or 9%, chose the option in which it is only possible to apply it in integrative projects and one manager (3%) chose the option in which there was no possibility of evaluation because he is developing teachers for this practice.

Response possibilities	Number of respondents
Application in all courses: free, technical and even in events	29
The application of these methodologies in integrative projects	3
I can't evaluate it yet, because we are developing teachers for this practice	1

Table 16. Responses to question 19 of the questionnaire
(Team training in active methodologies and student-centered learning strategies favors)
Source: Original research results

Conclusions

The study conducted with 33 managers of a vocational education institution in the state of São Paulo, Brazil, shows that they are concerned with motivating their team, mediating the administrative work for pedagogical purposes, and identifying, in the alternatives presented

in the questionnaire, actions that are significant for the implementation of active methodologies in the classroom. Although their choices in the questionnaire options indicated that they seek to implement active methodologies, when questioned openly about this action and monitoring, it was noted that some of them are not too close to the classroom and do not know in detail how the pedagogical practice of the teacher takes place. In approximately one-third of the cases, the work of these teachers is not guided by the manager directly, but by the coordination team of these school units and some managers understand that it is not their role to guide the teacher.

As a suggestion for the Institution to advance in the implementation of these methodologies, it could describe what is expected of this manager to highlight which activities are related to their role; organize indicators of the learning process and carry out periodic evaluations of these indicators for discussion among managers to seek improvements. It is also recommended to assess whether the hierarchical organization of these school units - in which the manager is responsible for both pedagogical and administrative tasks - facilitates this closeness with teachers. And whether this dual role causes an overload in their priorities. There are other school models where there is a division of labor between the administrative principal and the pedagogical principal. As a further study, it would be interesting to compare whether principals who work under this division can be closer to the educational process and the methodological choices of teachers.

Acknowledgements

I would like to thank my parents, my husband and my son for their full support in my student life. Senac São Paulo, where I work for 24 years and the managers that answer the research. Also, for University of São Paulo/ESALQ and Professor Marco Canto for providing the orientation for this research.

References

Almeida, M. E. B.; Rubim, L. C. B. (2004). *O papel do gestor escolar na incorporação das TIC na escola: experiências em construção e redes colaborativas de aprendizagem.* PUC-SP. São Paulo, SP, Brazil. Available in <http://www.eadconsultoria.com.br/matapoio/biblioteca/textos_pdf/texto04.pdf>. Accessed on April 15, 2018.

Bacich, L.; Moran, J. (2018). Metodologias ativas para uma aprendizagem mais profunda. In: Moran, J. *Metodologias ativas para uma educação inovadora: uma abordagem teórico prática.* Porto Alegre: Penso Editora.

Bryman, A. (2004). *Social research methods.* (2nd ed). New York: Oxford University Press.

Conselho Nacional de Educação. (2012). C. de E. B. Resolução nº 6, de 20 de Setembro de 2012. *Diretrizes Curriculares Nacionais para a Educação Profissional Técnica de Nível Médio.* Brasília: Diário Oficial da União, 21 de setembro de 2012, Seção 1, p. 22.

Diesel, A.; Baldez, A.; Martins, S. (2017). Os princípios das metodologias ativas de ensino: uma abordagem teórica. *Revista Thema*, 14(1): 268–288. Available in <http://revistathema.ifsul.edu.br/index.php/thema/article/view/404>. Accessed on May 08, 2018.

Leithwood, K.; Patten, S.; Jantzi, D. (2010). Testing a conception of how school leadership influences student learning. *Educational Administration Quarterly.* 46(5): 671–706. Available in <http://eaq.sagepub.com/content/46/5/671>. Accessed on April 15 2018.

Libâneo, J. C. (2011). Didática e trabalho docente: a mediação didática do professor nas aulas. p. 84–99. In: J. C. Libanêo, M. V. R. Suanno, & S. V. Limonta. *Concepções e Práticas de Ensino num Mundo em Mudança.* Goiás: CEPED/Editora PUC Goiás. Available in <http://professor.pucgoias.edu.br/SiteDocente/admin/arquivosUpload/5146/material/DIDÁTICA E TRABALHO DOCENTE 2011.doc>. Accessed on May 8, 2018.

Lück, H. (2000). Perspectivas da gestão escolar e implicações quanto à formação de seus gestores. *Em Aberto* 17(72): 11–33. Available in <http://lms.ead1.com.br/upload/biblioteca/curso_4392/fron00lbi6.pdf>. Accessed on April 15, 2018.

Lück, H. (2012). *Liderança em Gestão Escolar*. Petrópolis: Editora Vozes Limitada. Available in <https://books.google.com.br/books?id=1NYbBAAAQBAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false>. Accessed on September 06, 2018.

Meirieu, P. (1998). *Aprender...Sim, mas como?* (7th ed). Porto Alegre: Artes Médicas.

Moran, J. (2013). *Metodologias ativas para uma aprendizagem mais profunda*. São Paulo: USP. Available in <http://www2.eca.usp.br/moran/wp-content/uploads/2013/12/metodologias_moran1.pdf>. Accessed on May 05, 2018.

OREALC/UNESCO Santiago. [UNESCO]. (2014). *El Liderazgo en América Latina y El Caribe: Un Estado del Arte con Base en Ocho Sistemas Escolares de la Región*. Available in <http://unesdoc.unesco.org/images/0023/002327/232799s.pdf>. Accessed on April 15, 2018.

Paro, V. H. (2010). A educação, a política e a administração: reflexões sobre a prática do diretor de escola. *Educação e Pesquisa*. 36(3): 763–778. Available in <http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1517-97022010000300008&lang=pt>. Accessed on April 08, 2018.

Paro, V. H. (2015). *Diretor escolar: educador ou gerente*. (56thed.). São Paulo: Cortez Editora.

Pont, B.; Nusche, D.; Moorman, H. (2008). *Improving School Leadership, Volume 1 Policy and Practice*. Paris: OECD Publishing. Available in <https://read.oecd-ilibrary.org/education/improving-school-leadership_9789264044715-en#page1>. Accessed on April 15, 2018.

Sciotti, L. M. S. (2016). *Horizontes para a liderança: para onde nos levam nossos modelos, crenças e ações*. São Paulo: Senac São Paulo.

Tébar, L. (2011). *O perfil do professor mediador*. São Paulo: Senac São Paulo.

Contact email: fabia.santos@sp.senac.br

A Systematic Review of Teachers' Beliefs and Practices of Overt Translanguaging in English-Medium-Instruction Classrooms

You Wu, University of Malaya, Malaysia
Juliana Othman, University of Malaya, Malaysia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This systematic review investigates the relationship between English-medium instruction (EMI) teachers' translanguaging beliefs and their classroom practices. Translanguaging, the dynamic utilisation of multiple languages by multilingual learners, holds significant promise for EMI settings. However, a critical gap exists in understanding how teachers' beliefs translate into classroom action. A comprehensive search across education databases identified ten relevant studies published between 2015 and 2023. Thematic analysis revealed three key themes: teacher beliefs, classroom practices, and mediating factors. The review underscores the considerable variation in teachers' translanguaging stances, the diverse practices employed in their classrooms, and the multifaceted contextual factors influencing the translation of beliefs into practice, even within prescribed institutional language policies. These findings highlight the need for further research on translanguaging in primary and secondary education, where current scholarship is limited. Additionally, the review emphasises the importance of targeted professional development that confronts entrenched monolingual ideologies and unlocks the full potential of translanguaging in EMI contexts.

Keywords: Translanguaging, English Medium Instruction, Teacher Beliefs, Classroom Practices, Mediating Factors

iafor
The International Academic Forum
www.iafor.org

1. Introduction

For decades, extensive debates have occurred regarding language's role in English-medium-instruction (EMI) classrooms (Macaro, 2019; Macaro et al., 2018; Kuteeva, 2019). With multilingualism, applied linguists gradually shift their attention from socially constructed languages to the observable daily behaviours of bilinguals. In response to this transition, translanguaging has been suggested as a theory of how individuals creatively and critically deploy features from a full range of semiotic and linguistic resources as a unitary repertoire (Li, 2018). In this regard, translanguaging is the process by which an individual understands and interacts with complicated social realities by using linguistic (i.e., all linguistic varieties, such as registers, dialects, styles, and accents) and multimodal resources (e.g., gestures, symbols, diagrams, and photographs) (Yuan & Yang, 2020).

As a pedagogical practice, translanguaging was first coined by Willams (1994) in the context of bilingual classroom settings in Wales to alternate between languages for both input and output intentionally. In this sense, it is a planned teacher-initiated strategy to leverage linguistic diversity among educators and students, considering it as a readily accessible pedagogical resource rather than a constraint to scaffold the weaker language skills and enhance knowledge construction (Williams, 2002). Furthermore, translanguaging is an effective teaching practice for negotiating with students to form an organic whole of content and language-integrated learning (Coleman et al., 2018). Most importantly, this purposeful employment of multiple linguistic and other meaning-making cues shows respect to students' prior knowledge brought about their home languages (L1s), thereby has the potential to challenge the linguistic hierarchy between named languages and power distance between teacher and students, ultimately promoting an inclusive learning environment and academic success among all students in multilingual classrooms (Lin, 2018).

From the view of translanguaging, the entire linguistic system benefits students' academic and affective development in multilingual classrooms. However, it has been rarely recognised as a legitimate teaching strategy (García & Li, 2014). It implies the need to synthesise the use of translanguaging pedagogy to justify its value in multilingual settings. This is especially important in EMI scenarios due to the widely-reported breakdown between the ideal monolingual scenario expected by policymakers and administrators and its multilingual reality at the practical level since translanguaging has been demonstrated to effectively bridge this gap by liberating teachers and students from the narrow constraints of monolithic norms. Based on Spolsky's (2004) tripartite framework of language policy theory, which includes language management, language belief (ideology), and language practice, it can be observed that the written regulations may not always align with the actual language choices made in practice. This discrepancy highlights the need for more effective language policy implementation. Therefore, the central focus of the current review will essentially shift to language belief and practice.

This review focuses on the role of teachers due to their transformative agency in making language decisions despite the prescribed institutional language policy (Phyak et al., 2022). Besides, regardless of the well-acknowledged interactive relationship between teachers' pedagogical thinking and doing (Yuan, 2017), Borg (2003) and Stainton Rogers (2011) point out a potential gap between teachers' beliefs and practices, which might bring about the sense of frustration and depression. Therefore, the review also sets out in response to Borg's (2017) call to investigate the nature of the disparities and consistencies between them and to augment our knowledge of how teachers perceive and enact translanguaging as a potentially

practical teaching approach in EMI classrooms. We hope this review establishes what is already known about the teacher beliefs and practices regarding translanguaging in the EMI context, offers valuable insights to classroom practitioners, and provides an authoritative foundation for researchers intending to expand in this field through new primary research.

2. Method

This systematic review is based on PRISMA (Preferred Reporting Items for Systematic Review and Meta-Analysis) reporting guidelines (Page et al., 2021), following procedures of (i) a systematic database search, (ii) preliminary title/abstract screening, (iii) thorough examination of full-text articles, and (iv) coding of full-text articles in NVivo 12. Overall, this review employs the qualitative approach to data analysis.

2.1. Review Questions

This systematic review will investigate the following questions:

1. What were teacher beliefs towards translanguaging pedagogy in EMI classrooms?
2. What were classroom practices from the translanguaging lens in EMI classrooms?
3. What factors enabled and constrained the transition from teacher beliefs to classroom application of translanguaging pedagogy?

2.2. Inclusion Criteria

The studies were included according to the following:

- Publication date—Studies were published from 2015 to December 2023, as research beyond the past decade was considered outdated and did not accurately represent current situations and trends.
- Study type—Qualitative or mixed-methods studies with in-depth qualitative part that report empirical data on teacher beliefs and classroom practices of translanguaging.
- Context—Studies were eligible if they were described/entitled/designated as EMI, English medium instruction or English as a medium of instruction.
- Participants—At least part of the participants were teachers.

2.3. Searching Strategy

The following databases were searched: Resources Information Centre (ERIC), Scopus, Web of Science and Google Scholar. “Translanguaging”, “EMI”, “teacher beliefs”, “classroom practices”, and various combinations, were utilised to conduct a database search to identify literature published from 2015 onwards.

2.4. Selection Process

We initially reviewed the titles and abstracts of all records retrieved through the search process after automatic duplicate removal. Those records that could not be definitively excluded based on the information presented in the preliminary screening of the title and abstract were further assessed through a comprehensive evaluation of the full texts. Studies that met all the pre-established inclusion criteria were kept for subsequent data extraction and synthesis phases.

Two independent reviewers screened titles and abstracts for eligibility, followed by a full-text analysis. Furthermore, comprehensive scrutiny was also conducted on the full texts of all potentially relevant articles identified through snowballing. This included articles that discussed terms associated with translanguaging (e.g., translingual, trans-sanitising, and code-switching) to ensure that all pertinent empirical studies were included before and after the analysis.

2.5. Data Extraction and Data Items

Data extraction involves three categories: (1) general information, comprising reference details, source, publication type, and funding source; (2) descriptive data, including context, participants, and methods; and (3) analytical data, covering teachers' translanguaging beliefs, practices, influential factors, conclusions, and limitations.

2.6. Quality Assessment

The review uses the Joanna Briggs Institute Critical Appraisal Checklist for critical and interpretive research (Lockwood et al., 2015). It serves as a recommended quality appraisal tool designed explicitly for primary qualitative research to assess the trustworthiness of each study by scrutinising the potential bias in its design, conduct, and analysis. Even though some included studies employed mixed-methods design, findings related to the research questions of this review were yielded from the qualitative part. Each study was assigned a quality rating from 10 (indicating the study has provided the most trustworthy evidence) to 0 (suggesting the study has not adequately addressed sources of bias, if at all). Additional specifics regarding the assessment methodology for these criteria and the rationale behind the ratings were elaborated in the Supplementary Materials (Lockwood et al., 2015).

2.7. Synthesis

Given our prior knowledge of the literature and the nature of our review questions, we anticipated that eligible studies would focus on teacher beliefs and classroom practices. Therefore, we opted for a thematic synthesis (Thomas & Harden, 2008), as it has been specifically developed and applied to address research questions concerning people's perspectives and experiences. Specifically, it consists of three stages: a "line-by-line" coding of text, the development of "descriptive themes" based on shared patterns among the primary studies, and the generation of "analytical themes", which move beyond the primary studies, forming new interpretive constructs and explanations (Thomas & Harden, 2008, p.7). Data was primarily analysed inductively to identify emergent themes. In contrast, the analysis also involved constructing a preliminary coding manual, which was informed by Borg's (2003) teacher cognition theory and research questions, focusing on teacher belief, classroom practice, and contextual factors. To address RQ1 and RQ2, we extracted all the participants' quotations and text under the results and discussion sections of each included study into the NVivo Software. By doing so, we kept close to the original findings and categorised them into multiple descriptive themes across eligible literature. To address RQ3, we inferred barriers and facilitators for transitioning teacher beliefs into classroom application on translanguaging pedagogy by comparing and contrasting the views expressed by teachers and practices observed by researchers across studies, thus developing an analytical thematic schema.

3. Results

Four databases were searched to obtain a dataset from 2015 to December 2023, yielding over 3,000 publications (see PRISMA flow diagram in Figure 1).

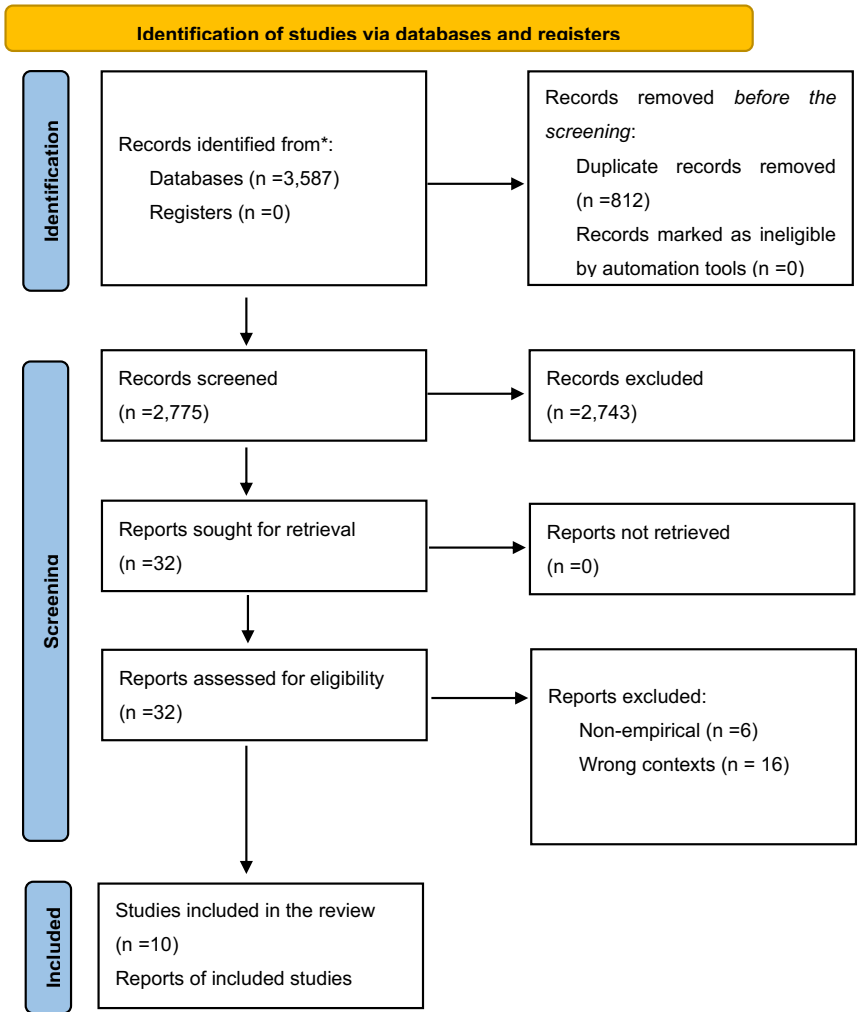


Figure 1. PRISMA flow diagram (Page et al., 2021)

3.1. Teacher Beliefs

The first theme that emerged from the data pertains to the findings of all included studies, specifically focusing on how teachers perceive and recognise the value of translanguaging pedagogy in their classrooms. In other words, the data was coded to understand to what extent teachers realise the benefits of students' prior linguistic resources for knowledge construction and other pedagogical purposes. As a result, the following subthemes emerged: *translanguaging as a valuable and inevitable strategy* and *translanguaging as a detrimental practice*. We will expound upon these two themes with illustrative quotes from participants in the included studies.

3.1.1. Translanguaging as a Valuable and Inevitable Strategy

Integrating translanguaging into pedagogy is a multifaceted concept, with teachers recognising its dual nature as both a valuable tool and an inevitable strategy in the

educational landscape. This dual perspective presents translanguaging as two sides of the same coin, embodying its potential benefits and acknowledging its inherent presence as a survival strategy.

On the one hand, translanguaging is viewed as a valuable tool, supported by empirical evidence highlighting its positive impact in bridging knowledge gaps and facilitating meaning-making (Doiz & Lasagabaster, 2017; Jia et al., 2023; Gu et al., 2022; Chang, 2019; Tri & Moskovsky, 2021). Scholars emphasise its effectiveness in bridging students' cultural and historical background knowledge with abstract disciplinary content, transmitting content knowledge, and aiding meaning-making processes. For example, one of three teachers observed and interviewed by Jia et al. (2023) positively recognises the integration of multilingual resources for teaching in EMI classrooms. From his perspective, prior linguistic cues were an intrinsic advantage that should be exploited whenever he needed to address difficulties that students encountered in understanding his instruction, especially when tackling cognitively demanding concepts. Tri and Moskovsky (2021) also acknowledged the affordances of translanguaging practice not only for knowledge construction within school settings but also for post-graduation preparation in local labour markets. They argued that translanguaging plays a crucial role in helping students navigate the demands of the local workforce by improving students' conceptual competence in the mother tongue.

On the other hand, translanguaging is recognised as an inevitable strategy, acknowledging its pervasive nature within classrooms despite efforts to maintain an English-only environment (Serna-Bermejo & Lasagabaster, 2022; Doiz & Lasagabaster; Fang et al., 2023). For instance, in Doiz and Lasagabaster's (2017) research, an EMI teacher expressed that while maintaining English as the primary language is desirable, the occasional use of the students' L1 was inevitable in certain circumstances and contexts. Similarly, the findings of Fang et al. (2023) and Tri and Moskovsky (2021) indicated the impracticality of adhering strictly to English usage at all times, as it may lead to communication breakdowns. Hence, it was acknowledged that languages other than English should be judiciously and selectively employed to complement comprehension whenever necessary as a survival strategy. This recognition emphasised the pragmatic nature of translanguaging as a pedagogical approach, acknowledging its inevitability and advocating for its strategic and context-appropriate application.

Essentially, these two perspectives on translanguaging coexist as essential aspects of the same pedagogical coin. Teachers recognise the value of translanguaging as a powerful tool for practical instruction and knowledge construction while acknowledging its inevitability and advocating for its strategic and judicious use to enhance learning experiences.

3.2. Translanguaging as a Detrimental Practice

A prevalent theme in the literature also highlighted teachers' resistance to translanguaging pedagogy within their classrooms, with several studies underscoring concerns about its potentially detrimental effects on students' language and content development (Serna-Bermejo & Lasagabaster, 2022; Tri & Moskovsky, 2021; Doiz & Lasagabaster, 2017; Jia et al., 2023; Fang et al., 2023). Teachers expressed worries, as noted in Serna-Bermejo and Lasagabaster's (2022) study, regarding the potential negative impact of translanguaging, particularly its role in fostering students' overreliance on and excessive use of languages other than English. Similar concerns were echoed in studies by Doiz and Lasagabaster (2017), Jia et al. (2023), and Fang et al. (2023). Participants in these studies exhibited

negative views on translanguaging, instead advocating for the exclusive use of English during instructions to create an immersive environment to enhance target language competencies (Tri & Moskovsky, 2021). Fang et al. (2023) and Jia et al. (2023) further argued that maintaining an English-only practice could reinforce teachers' power and authority, contributing to their professionalism in EMI courses. However, this approach contradicts the goal of translanguaging pedagogy, which aims to create an inclusive classroom and establish educational equity. Despite this resistance, it is noteworthy that researchers (Serna-Bermejo & Lasagabaster, 2022; Doiz & Lasagabaster, 2017; Fang et al., 2023) still observed instances of languages other than English being used in classrooms. This observation showcased a discrepancy between teachers' translanguaging beliefs and their actual classroom practices, adding a layer of complexity to the ongoing debate surrounding the effectiveness and appropriateness of translanguaging in educational settings. Regardless of educators' varying beliefs about translanguaging, the subsequent section will shed light on using translanguaging practices in the classroom.

3.3. Classroom Practices

The second central theme was developed based on the findings of all included studies concerning the frequency with which teachers tend to use translanguaging pedagogy in their classrooms. The following four subthemes were identified: targeted L1 use, English-dominant, integrative, and flexible.

3.3.1. English-Dominant

The theme revolves around monolingual classrooms where English is the sole medium for all instruction and interaction. Only a few studies have delved into how teachers in such settings strictly adhere to using English exclusively (e.g., Drljača Margić & Molino, 2022; Fang et al., 2023; Yuan & Yang, 2020). The primary rationale behind this practice was often tied to the teachers' distinct L1s compared to their students, coupled with the prevailing monolithic ideology behind EMI language policies (Yuan & Yang, 2020).

For instance, Yuan and Yang (2020) observed teacher educator courses without planned pedagogical translanguaging practices. In these settings, only two spontaneous instances were observed. Interestingly, these instances occurred without prior preparations, leading to a lack of deliberate effort to create a welcoming atmosphere or establish associations between students' background knowledge and the main messages the teacher intended to convey. This highlights a prevailing trend in monolingual classrooms where the exclusive use of English is maintained, often influenced by the unique linguistic backgrounds of teachers and the overarching EMI language policy.

3.3.2. Targeted L1 Use

Many studies have consistently reported that the use of the L1 is typically limited to occasional instances aimed at clarification or providing support to struggling students (e.g., Drljača Margić & Molino, 2022; Serna-Bermejo & Lasagabaster, 2022). Drljača Margić and Molino's (2022) findings indicated that non-English words or strings were present in 80% of observed lectures, albeit with low frequency. Interestingly, these instances were often pragmatic strategies employed not necessarily for direct pedagogical purposes but to build rapport and enhance overall communication. Pedagogically driven translanguaging was also identified in some instances to clarify complex terminologies and improve students'

comprehension of content knowledge, although these instances were infrequent (Fang et al., 2023). Similarly, Serna-Bermejo and Lasagabaster (2022) reported a low presence of translanguaging in observed EMI classrooms, with most occurrences related to subject matters. The infrequent use of translanguaging is ascribed to the hesitancy of both teachers and students regarding linguistic flexibility, coupled with apprehensions about exceeding the prescribed medium of instruction. Expanding beyond classroom instructional activities, Doiz and Lasagabaster (2017) noted even less frequent translanguaging practices in learning materials and assessment tasks. This phenomenon could be attributed to the additional efforts required by teachers for translation. In addition to the functions above of minimal translanguaging, certain studies (Doiz & Lasagabaster, 2017; Chang, 2019; Jia et al., 2023) highlighted the occasional use of translanguaging for classroom management.

3.3.3. Integrative

Among the included articles, only two studies, namely Alhasnawi (2021) and Jia et al. (2023), actively reported the incorporation of L1 for purposes such as vocabulary building, collaborative learning, and content scaffolding. Alhasnawi's (2021) investigation in both on-campus and online classrooms showed substantial use of students' L1 during teaching processes. Notably, English was primarily reserved for explaining subject-specific concepts and terminologies. This approach stemmed from teachers' emphasis on fostering content understanding, problem-solving, and logical thinking, recognising that achieving these goals might be challenging if English were used exclusively throughout the instruction. Similarly, Jia et al. (2023) attributed the extensive use of shared L1 between teachers and students to minimal EMI teaching experience, perceived inadequacies in students' English proficiency, and unfamiliarity with disciplinary-specific vocabularies.

This integrative approach views translanguaging as a pragmatic response and a pedagogical strategy to enhance content understanding and promote effective communication. In this sense, it aligns with the sociocultural theory that language functions as an integral part of the knowledge construction and meaning-making processes (Vygotsky, 1978).

3.3.4. Flexible

A few studies have explored instances where teachers demonstrate flexible language shifting between English and L1s based on the learning task and student needs (Gu et al., 2022; Fang et al., 2023). In one such study conducted at a Chinese university, Gu et al. (2022) observed nine teachers who adeptly coordinated various linguistic, spatial, and semiotic resources to enhance the co-construction of knowledge and meaning with their students. These teachers deliberately employed a flexible approach, organically integrating content and language teaching to fulfil better the diverse requirements of the learning tasks and students' needs. This finding highlights a nuanced and adaptive teaching practice that responds to the dynamic nature of language learning and instructional demands. The flexible use of translanguaging is due to the participants viewing themselves more as content teachers who considered teaching subject matter the primary objective, thus focusing more on the efficiency and effect in meaning-making instead of language teaching.

3.4. Contextual Influences

To address the RQ3, a thematic analysis was employed to investigate the factors influencing the transition from teacher beliefs to classroom practices of translanguaging. While some

papers did not explicitly discuss these factors, valuable insights were inferred from sections detailing findings or research implications. The ensuing discussion is organised into four key subsections: political factors, pedagogical factors, interactional factors, and ideological factors. Throughout the discussion, quotes from selected papers are incorporated to exemplify and support these identified themes.

3.4.1. Political Factors

Political factors in this review were informed by Shohamy's (2006) findings regarding language policies, which might not "exist in the form of clear-cut labelled statements" (Spolsky, 2004, p.11). Instead, they are determined and implemented through various mechanisms that cannot be directly deducible from laws and policy papers but from "rules and regulations, language educational policies, language tests, language in public space as well as ideologies, myths, propaganda, and coercion" (Shohamy, 2006, p. 56).

Most studies examining the transition from teacher beliefs in translanguaging to classroom practices underscored the substantial impact of monolingual policy mechanisms. Teachers interviewed by Chang (2019), Tri and Moskovsky (2021), Yuan and Yang (2021), and Fang et al. (2023) explicitly stated that the university's language policy, mandating 100% English use, was the primary reason for adhering to an English-only practice during lectures. Despite recognising the potential benefits of using students' L1s for a more natural and meaning-making experience, these teachers felt discouraged due to the institutional policy.

Beyond explicit institutional management of language use, implicit political mechanisms were also identified, including monolingual-based assessments, teaching materials, and hegemonic language ideologies embedded in school syllabi and curricula. For instance, in Drljača Margić and Molino's (2022) study of EMI classrooms across five European countries, 73% of participants acknowledged both explicit and implicit English-only institutional policies. Participants expressed that they "have to write their exam in English", "all the materials we use are in English", and "in the curriculum and for this specific course, it says it has to be in English" (p.33). These findings highlight the pervasive influence of political factors on language practices within educational settings.

3.4.2. Pedagogical Factors

Nearly half of the studies identified the mediating role of pedagogical factors in the relationship between teachers' translanguaging beliefs and practices (Gu et al., 2022; Fang et al., 2023; Alhasnawi, 2021; Chang, 2019). For example, Gu et al.'s (2022) research highlighted a teacher explicitly stating, "We need to clarify why we use English… It depends on the subject's nature. In customer relations management, Chinese is better, and there is no strong reason to use English" (p.15). This indicates that translanguaging to the local language could enhance students' contextualised understanding of content knowledge. Similar findings were observed in Fang et al.'s (2023) research, where translanguaging practices were more prevalent in humanities than sciences due to the higher linguistic density in the former.

Alhasnawi's (2021) and Chang's (2019) studies also reached similar conclusions, suggesting that, compared with symbol-based discourse in the sciences, humanities exhibit more translanguaging practices owing to their higher linguistic density. These findings highlighted the nuanced role of pedagogical factors, particularly disciplinary differences, in shaping teachers' decisions regarding using translanguaging practices in the classroom.

3.4.3. Interactional Factors

Many studies proposed that translanguaging acts as a pragmatic strategy to tackle inadequate English proficiency among both lecturers and students, refrained from the strict enforcement of an English-only environment (e.g., Drljača Margić & Molino, 2022; Gu et al., 2022; Fang et al., 2023; Tri & Moskovsky, 2021). Gu et al. (2022) interviewed teachers who expressed their worries about students' difficulties understanding subject matters if the courses were delivered exclusively in English. By contrast, translanguaging was less commonly deployed when teachers believed that their students possessed sufficient competencies to understand the lessons fully in English, as they said, "I think in general their level is sufficient to follow the lessons." (Drljača et al. 2022, p.42). The acknowledgement that teachers use languages other than English in response to their inadequate language proficiencies was less common; in Drljača Margić and Molino's (2022) research, only one participant mentioned translanguaging practices being used to compensate for their English language insufficiency.

Teachers also employ translanguaging to build rapport with students. In Drljača Margić and Molino's (2022) research, teachers reported instances such as "when students answered in Catalan, I would switch to Catalan" (p.33). However, some studies highlight a discrepancy in linguistic backgrounds among students, preventing teachers from fully engaging in translanguaging practices. For example, several teachers in Drljača Margić and Molino's (2022) study noted that, despite the potential naturalness of using the L1, English as a lingua franca was employed to allow international students to participate. This highlighted the multifaceted nature of translanguaging as a strategic tool influenced by considerations of proficiency, inclusivity, and building connections within the learning environment.

3.4.4. Ideological Factors

Ideological factors that influence the alignment between teacher beliefs and classroom practices have been documented in several articles (e.g., Drljača Margić & Molino, 2022; Doiz & Lasagabaster, 2017; Gu et al., 2022; Alhasnawi, 2021). In multilingual classrooms observed by Drljača Margić and Molino (2022), students were encouraged to occasionally switch to languages other than English, even in exams, to express themselves more precisely. This approach reflects teachers positioning themselves more as subject lecturers than language specialists. This finding aligns with the results of studies by Doiz & Lasagabaster (2017), Alhasnawi (2021), Jia et al. (2023), and Gu et al. (2022), where translanguaging was consistently deployed as participants prioritised students' acquisition of content knowledge.

Furthermore, Doiz and Lasagabaster (2017) attributed the discrepancy between teacher beliefs and self-reported practices regarding students' L1 use to deeply rooted monolingual ideologies and the general trend of language separation in that context. This underscored the need for more professional training focusing on the benefits of translanguaging to help teachers overcome prejudices and align their practices more closely with their beliefs. The ideological underpinnings play a crucial role in shaping teachers' thinking and doing regarding integrating students' L1s in the learning environment.

4. Conclusion

Overall, we identified only ten eligible studies. Taken together, our systematic review found (1) a substantial variation in how lecturers value and use learners' prior linguistic resources, (2) inconsistencies between teachers' beliefs and practices regarding translanguaging in EMI

classrooms and (3) a variety of contextual factors behind the teachers' integration of translanguaging praxis. As an emerging research area, further work on translanguaging is needed. We recommend that researchers collect more empirical data from primary and secondary levels of schooling. More quantitative studies are required to explore practitioners' beliefs and adoption of multiple language resources in various schools across different subjects to gain a more comprehensible and generalisable understanding of the factors that influence their relationship.

However, this review has certain limitations. Its concentration on Anglophone literature, search methodologies, inclusion/exclusion criteria selection and application, and time range brings these. Our search was limited to databases in the English language. Consequently, some non-English research may have been overlooked. Future revisions to the study should be considered to broaden the search approach. Another restriction might be our selection to incorporate research from various nations and jurisdictions. There are theoretical grounds to believe that teachers' translanguaging stances and classroom practices may vary depending on the broader social and educational contexts, widespread pedagogical trends and ideologies. Nevertheless, as we anticipated that the relevant literature would be limited, we decided to incorporate research from all over the world to present the most thorough review of the subject that the body of existing literature would permit. Future assessments should compare results from other nations with varying language and cultural backgrounds, assuming enough data supports such comparisons.

Despite potential drawbacks, the results of this systematic review of empirical studies on teachers' beliefs and behaviours related to overt translanguaging offer valuable information about the state of translanguaging research today, including how it is perceived and used in classrooms worldwide. Furthermore, it contributes to our understanding of complicated interactions of diverse factors mediating the relationship between teachers' thinking and doing. Doing so can raise the awareness of policymakers and teacher training programs about the importance of reconciling teachers' different beliefs and assumptions concerning translanguaging and fostering opportunities for teachers and students to engage in translanguaging practices. Moreover, educators should see themselves primarily as content instructors tasked with integrating disciplinary teaching with English, shedding excessive concerns about students' L1 usage. This shift in perspective can foster the flexible adoption of translanguaging practices in their classrooms, ultimately advancing educational equity and cultivating an inclusive learning environment for all students. Lastly, it may aid in laying the foundation for future studies on translanguaging in EMI situations and beyond by highlighting the future research directions required to advance the topic.

References

Alhasnawi, S. (2021). Teachers' beliefs and practices concerning translanguaging university mathematics in Iraq. *Linguistics and Education*, *63*, 100930. https://doi.org/10.1016/j.linged.2021.100930

Borg, S. (2003). Teacher cognition in language teaching: A review of research on what language teachers think, know, believe, and do. *Language Teaching*, *36*(2), 81–109. https://doi.org/10.1017/s0261444803001903

Borg, S. (2017). Teachers' beliefs and classroom practices. In P. Garrett & J. M. Cots (Eds.), *The Routledge Handbook of Language Awareness* (pp. 75–91). Routledge https://doi.org/10.4324/9781315676494-5

Cenoz, J., & Gorter, D. (2021). *Pedagogical translanguaging*. Cambridge University Press. https://doi.org/10.1017/9781009029384Chang, S.-Y. (2019). Beyond the English Box: Constructing and Communicating Knowledge Through Translingual Practices in the Higher Education Classroom. *English Teaching & Learning*, *43*(1), 23–40. https://doi.org/10.1007/s42321-018-0014-4

Cogo, A. (2020). ELF and translanguaging: Covert and overt resources in a transnational workplace. In K. Murata (Ed.). *ELF Research Methods and Approaches to Data and Analyses* (pp. 38–54). Routledge. https://doi.org/10.4324/9781003021650-5

Coleman, J., Hultgren, A. K., Wei, L., Tsui, C. C., & Shaw, P. (2018). Forum on English-Medium Instruction. *TESOL Quarterly*, *52*(3), 701–720. https://doi.org/10.1002/tesq.469

Doiz, A., & Lasagabaster, D. (2016). 9. Teachers' Beliefs about Translanguaging Practices. In C. M. Mazak & K. S. Carroll (Eds.), *Translanguaging in Higher Education* (pp. 157–176). Multilingual Matters. https://doi.org/10.21832/9781783096657-011

Drljača Margić, Branka and Alessandra Molino. (2022). Translanguaging in EMI Lecturer's perspectives and practices. RiCOGNIZIONI, Rivista di lingue, letterature e culture modern, 9(17): 29-47.

Fang, F., Jiang, L., & Yang, J. (2023). To impart knowledge or to adhere to policy: Unpacking language ideologies and practices in Chinese EMI courses through a translanguaging lens. *Language Teaching Research*, 0(0).https://doi.org/10.1177/13621688231183771

Fives, H., & Gill, M. G. (2014). *International Handbook of Research on Teachers' Beliefs*. Routledge.

García, O. (2009). Chapter 8 Education, Multilingualism and Translanguaging in the 21st Century. In T. Skutnabb-Kangas, R. Phillipson, A. K. Mohanty & M. Panda (Eds.). *Social justice through multilingual education* (pp. 140–158). Multilingual Matters. https://doi.org/10.21832/9781847691910-011

García, O., & Li, W. (2014). Language, bilingualism and education. In O. García & W. Li (Eds). *Translanguaging* (pp. 46–62). Palgrave Pivot London. https://doi.org/10.1057/9781137385765_4

Greenhalgh, T., & Peacock, R. (2005). Effectiveness and efficiency of search methods in systematic reviews of complex evidence: audit of primary sources. *Bmj*, *331*(7524), 1064-1065. https://doi.org/10.1136/bmj.38636.593461.68

Gu, M. M., Lee, C.-K. J., & Jin, T. (2023). A translanguaging and trans-sanitising perspective on subject teachers' linguistic and pedagogical practices in EMI programme. *Applied Linguistics Review*, *14*(6), 1589–1615. https://doi.org/10.1515/applirev-2022-0036

Jia, W., Fu, X., & Pun, J. (2023). How Do EMI Lecturers' Translanguaging Perceptions Translate into Their Practice? A Multi-Case Study of Three Chinese Tertiary EMI Classes. *Sustainability*, *15*(6), 4895. https://doi.org/10.3390/su15064895

Kuteeva, M. (2019). Revisiting the 'E' in EMI: students' perceptions of standard English, lingua franca and translingual practices. International Journal of Bilingual Education and Bilingualism, 23(3), 287–300. https://doi.org/10.1080/13670050.2019.1637395

Li, W. (2018). Translanguaging as a practical theory of language. *Applied Linguistics*, *39*(1), 9–30. https://doi.org/10.1093/applin/amx039

Lin, A. M. Y. (2018). Theories of trans/languaging and trans-sanitising: implications for content-based education classrooms. *International Journal of Bilingual Education and Bilingualism*, *22*(1), 5–16. https://doi.org/10.1080/13670050.2018.1515175

Lockwood, C., Munn, Z., & Porritt, K. (2015). Qualitative research synthesis. *International Journal of Evidence-based Healthcare*, *13*(3), 179–187. https://doi.org/10.1097/xeb.0000000000000062

Long, H., French, D. P., & Brooks, J. (2020). Optimising the value of the critical appraisal skills programme (CASP) tool for quality appraisal in qualitative evidence synthesis. *Research Methods in Medicine & Health Sciences*, *1*(1), 31–42. https://doi.org/10.1177/2632084320947559

Macaro, E. (2019). Exploring the role of language in English medium instruction. International Journal of Bilingual Education and Bilingualism, 23(3), 263–276. https://doi.org/10.1080/13670050.2019.1620678

Macaro, E., Tian, L., & Chu, L. (2018). First and second language use in English medium instruction contexts. Language Teaching Research, 24(3), 382–402. https://doi.org/10.1177/1362168818783231

Mazak, C. M., & Herbas-Donoso, C. (2014). Translanguaging Practices and Language Ideologies in Puerto Rican University Science Education. Critical Inquiry in Language Studies, 11(1), 27–49. https://doi.org/10.1080/15427587.2014.871622

Nguyen, H., Chik, A., Woodcock, S. (2022). Translanguaging in English-Medium Instruction: Teacher Practices at a Vietnamese University. In: Pham, M., Barnett, J. (eds) English Medium Instruction Practices in Vietnamese Universities. Education in the Asia-Pacific Region: Issues, Concerns and Prospects, vol 68. Springer, Singapore. https://doi.org/10.1007/978-981-19-2169-8_9

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T., Mulrow, C. D., Shamseer, L., Tetzlaff, J., Akl, E. A., Brennan, S., Chou, R., Glanville, J., Grimshaw, J., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *International Journal of Surgery*, *88*, 105906. https://doi.org/10.1016/j.ijsu.2021.105906

Phyak, P., Sah, P. K., Ghimire, N. B., & Lama, A. (2022). Teacher Agency in creating a translingual space in Nepal's multilingual English-medium schools. *RELC Journal*, *53*(2), 431–451. https://doi.org/10.1177/00336882221113950

Serna-Bermejo, I., & Lasagabaster, D. (2022). Translanguaging in Basque and English: Practices and attitudes of university teachers and students. *International Journal of Multilingualism*, 1–20. https://doi.org/10.1080/14790718.2022.2086984

Shohamy, E. (2006). *Language policy: Hidden agendas and new approaches*. Routledge.

Spolsky, B. (2004). *Language polic*y. Cambridge University Press.

Stainton Rogers, W. (2011). Social Psychology. Open University Press.

Thomas, J., & Harden, A. (2008). Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Medical Research Methodology*, *8*(1). https://doi.org/10.1186/1471-2288-8-45

Tri, D. H., & Moskovsky, C. (2021). Language use in English-medium instruction programs in Vietnamese higher education: From policy to practice. Asian Englishes, 1–17. https://doi.org/10.1080/13488678.2021.1891513

Williams, C. (1994). Arfarniad o Ddulliau Dysgu ac Addysgu yng Nghyd-destun Addysg Uwchradd Ddwyieithog [An evaluation of teaching and learning methods in the context of bilingual secondary education]. PhD Thesis, University of Wales, Bangor.

Yuan, R., & Yang, M. (2023). Towards an understanding of translanguaging in EMI teacher education classrooms. *Language Teaching Research*, *27*(4), 884–906. https://doi.org/10.1177/1362168820964123

Applications of Human-Centered Artificial Intelligence and Open Educational Resources to Improve E-learning: Case Study of "Online Journalism" Lesson

Ali Asghar Kia, Allameh Tabataba'i University, Iran
Kaveh Bazargan, Allameh Tabataba'i University, Iran

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Purpose: The purpose of this article is to analyze the evolution of open educational resources and its application in electronic learning and online journalism. For this purpose, the following questions have been answered: a) How did the term open educational resources come about and what is its evolution? b) What are the characteristics of open educational resources? c) What is the use of open educational resources in e-learning?
Method: To answer the research questions and realize the aforementioned goal, the case study method was used. The necessary data has been collected, arranged and analyzed through documents at the national and international level. Among these documents: UNESCO publications and reports, articles and other academic publications were relevant.
Findings: The starting point of the formation of open educational resources has been to make university classrooms available to those interested in higher education by popularizing "open textbooks". Based on this experience, UNESCO named this type of action as Open Educational Resources (OER). After that, several efforts were made and the use of open educational resources was investigated with the participation of academics and the implementers of education programs for sustainable development. Thus, international efforts have expanded to learn how to prepare and disseminate open educational resources.
Conclusion: Open educational resources include those resources that are free of charge, with an "open certificate" (CC), the possibility of receiving, applying, revising, combining and redistributing them is available for users. UNESCO has explained the mentioned concept. Among these, six types of licenses or "open certificates" (CC) have been compiled. Although various types of these certificates can be used in the production and distribution of educational resources and content for face-to-face training and online journalism, it has a potentially wider use. For example, at the end of this article, an example of open educational resources in the field of communication sciences is mentioned.

Keywords: Open Education Resources, CC Certificate, Open Learning, Open Access Publishing, E-learning, Human-Centric Artificial Intelligence

iafor
The International Academic Forum
www.iafor.org

1. Introduction

Open educational resources are a concept whose starting point can be linked to MIT University of Technology. In 2001, in order to make the university's classroom space available to those interested in higher education, "Open Courseware" (OCW) contracted every course for everyone to use on the university's website.

The following year, UNESCO, in the conference on to improve the quality of education, this type of action is called Open Educational Resources (OER). After that, significant efforts were made in order to provide e-learning resources to everyone in order to achieve learning goals in the framework of sustainable development.

In 2017, the second congress of open educational resources was held in Slovenia. In order to hold this congress, UNESCO tried to plan and hold five consultative meetings in different parts of the world. According to the results of the five meetings and the experience of different countries about open educational resources, he decided to hold the second mentioned congress.

The purpose of holding consultative meetings was to find out about the successes and efforts of various open educational resources in order to provide "necessary methods and recommendations" to the member countries. In this way, international efforts to familiarize with how to prepare and disseminate educational resources have expanded (UNESCO, 2019; Butcher, 2015).

2. Definition of Open Educational Resources

In the simplest terms, open educational resources are those educational resources that are freely and freely available to teachers and learners; In other words, these resources can be used without paying a fee (Butcher, 2015). The following are considered educational resources:

- Curriculums (such as OCW)
- Educational materials and content (such as MOOCs content)
- Textbooks (such as Bates book)
- Educational videos (like TED-Ed)
- Multimedia educational materials (such as Wiki-books)
- Podcasts (digital audio media content, such as audiobooks)

As mentioned above, Open Educational Resources has a history that started with the introduction of "Open Curriculum" (OCW). Of course, this usage refers to a smaller subset of Open Educational Resources. A detailed definition can be found in the collection of O.C.W. observed.

The importance of open educational resources lies in using them for education and sharing them. Of course, there is a fundamental difference between open educational resources and other educational resources. This difference is related to the certificate to which it is awarded. In other words, an open educational resource contains a special certificate (CC).

This certificate facilitates the reuse of said resource and allows its potential exchange, without obtaining permission from the "copyright" holder (Butcher, 2015). But it should be noted that although more than two decades have passed since the beginning of the efforts

related to the emergence and expansion of the concept of "open educational resources", there is still a lot of room for related research (Wiley, 2021).

Some people think that open educational resources are synonymous with e-learning. But it should be noted that although these resources are used in electronic learning, they are not synonymous with it. The content of many e-learning courses and lessons can be made into open educational resources, but this does not mean that open educational resources are e-learning. Of course, many open educational resources that are currently produced have a digital format and They can be shared and can be printed. For example, the website of the International Center for Technical and Vocational Education and Training affiliated to UNESCO (UNESCO, 2023) has shared some resources, including books, etc.

Also, it is necessary to remember that open educational resources are different from "open education"/open learning. Although open educational resources can be used in open education, they are not the same. The use of open education (or open learning) in terms of the field of practice, goes far beyond the use of open educational resources in educational programs. An open learning/open teaching system requires validation, assessment of learning, learner support system, curriculum frameworks, mechanisms to ascertain learners' prior knowledge, and other aspects that indicate the degree of "openness" or "non-openness" of the system.

Open learning is an approach to education that seeks to remove all barriers to learning; So that students can successfully achieve learning outcomes and educational goals based on human needs in multiple fields of learning. "Open learning" relies on several key aspects as follows:

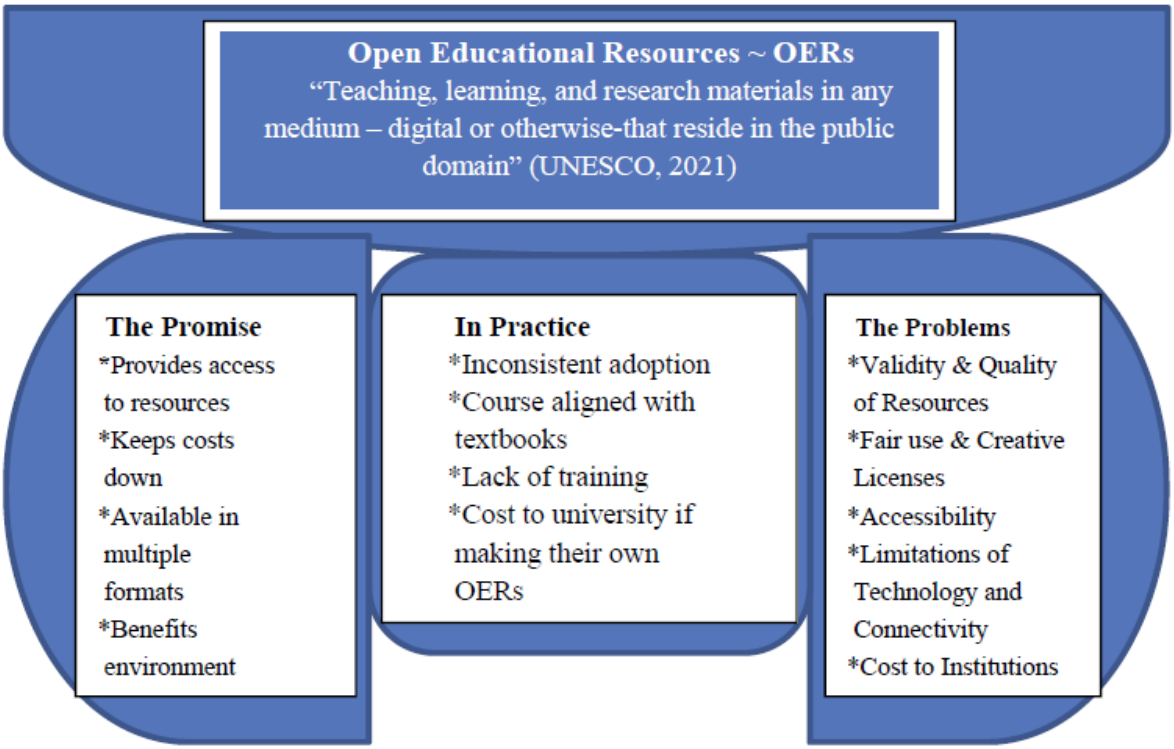
- Learning opportunities should be continuous and include continuous learning (Mashaikh and Bazargan, 1402);
- The education process should be learner-centered, so that it is based on the previous experience of the learner, encouraging critical and independent thinking;
- The provision of learning resources should be so flexible that its learners can choose when, where, with what content and how they will learn according to their learning speed;
- The learner's prior learning, prior experiences, and demonstrated competencies should be recognized so that learners are not denied learning opportunities due to lack of appropriate competencies;
- Learners should be able to save the course units passed in different learning environments;
- Providers of learning opportunities must provide conditions that provide a relative chance for the learner to succeed. As the above shows, the effective use of open educational resources can help some of the mentioned aspects, but open educational resources and open learning/teaching are still different in meaning and in practice (Butcher, 2015).

In short, open educational resources are educational materials that are not "copyrighted". However, to ensure their quality, it is necessary to obtain a license ("open certificate"). Various options are available for open certification. Some legal options grant permission to copy content. But others allow users to modify and use the desired content. The best available framework is the CC open certificate (CC, 2023).

The need to set policies and national plans and programs in comprehensive support of open educational resources to increase access, improve quality and reduce education costs at the global level is demanded (Olivier, J., & Rambow, A. [Eds.], 2023).

The opportunities, operational challenges, and practical issues related to the optimal use of open educational resources in the higher education system are presented in Figure 1.

Figure 1. Banker, D. A., & Manning, D. K 2023



3. Open Certificate Options

The options of this certificate are as follows:

1- Attribution 4.0 (CC BY)
The user can freely copy, use, or modify the content, combine it with other content, or redistribute the same; or for any purpose, including commercial use of contracts, provided that the name and logo Mention the main author of the work.

2- Attribution–NonCommercial 4.0 (CC BY-NC)
User may freely copy, use, revise, combine and redistribute the Content; provided that he mentions the name and sign of the main author of the work; But it is not allowed to make material use of it for commercial purposes. In addition, in this case, there is no need to receive a new certificate.

3-Attribution–NoDerivs 4.0 (CC BY-ND)
The user can copy, use, redistribute the content free of charge and engage in commercial exchange of the original work without changing it, provided that he mentions the name and logo of the original author of the work.

4- Attribution-Noncommercial-Share Alike 4.0 (CC BY-NC-SA)
The user can freely copy, use, revise, combine and redistribute the content, but is not allowed to engage in commercial exchange and material use of it; Also, it should mention the name and logo of the original author of the work and have received the open certificate with the same specifications as the original work.

5- Attribution-Noncommercial-NoDerivs 4.0 (CC BY-NC-ND)
The user can freely copy, use, and redistribute the content without revising it, but is not allowed to engage in commercial exchange and material use of it; Also, he must mention the name and logo of the original author of the work and mention the open certificate with the same specifications as the original work that he received. This framework provides a legal mechanism by which content creators can retain some of their rights to the work while sharing the rights arising from their work with others.

The creation of the CC certificate helps researchers and authors of specialized texts of higher education to provide "open knowledge" to users for free (CC, 2023). In this way, it is expected that such an approach can take a further step in the direction of equality with the agreement of knowledge and culture at the disposal of all.

The creation of the CC certificate helps researchers and authors of specialized texts of higher education to provide "open knowledge" to users for free (CC, 2023). In this way, it is expected that such an approach can take a further step in the direction of equality with the agreement of knowledge and culture at the disposal of all.

4. Electronic Learning, Its Levels and the Use of Open Educational Resources

E-learning is not only the application of science and information and communication technology in education, but ideally, the purpose of its application is to improve the learning environment and the performance of learners. For this purpose, open educational resources play a decisive role (Navarrete, et al., 2016). Considering this ideal state, electronic learning systems have been developed in higher education (AECT, 1977; Stensaker, et al., 2007; Weller, 2023).

Although this development has been noted for the past few decades, the Covid-19 epidemic in 1398-1400 solar years caused electronic learning systems to replace face-to-face classes in all countries of the world (Bazargan, 2021). In addition to that, the application of human-centered artificial intelligence in higher education was also considered (UNESCO, 2021/Bazaregan translation, 1401). The use of human-centered artificial intelligence technologies, especially with the spread of chatbots (same source, p. 45) as well as "G.P.T. chat" (G.P.T.) in higher education is increasingly attracting the attention of teachers, students, as well as managers and policy makers of higher education. has attracted in most countries (Henry, et al., 2021).

The experience that higher education systems gained in implementing e-learning during the Corona epidemic has caused the desire to use a combination of e-learning with face-to-face education to increase in post-corona as well. To make this issue clearer, we consider the definition of e-learning. One of the definitions of e-learning is as follows: "e-learning includes the use of digital technology in teaching and learning along with the use of pedagogy (the science and art of teaching-learning) and teaching strategies to design and implement Internet-based learning environments" (Navarrete and Luján-Mora, 2017).

On the other hand, the approaches of "teaching face-to-face in the classroom" and teaching in the virtual classroom (completely "online)" can be placed on two ends of the same spectrum. Various combinations of these two modes create many cases. Each teacher can decide to choose one of these combinations, which is suitable for the desired situation (Henderson, et al., 2015). It should be remembered that no reliable research information has been provided about the effect of these combinations on the achievement of learning outcomes (Bates, 2015, p. 338).

Therefore, the teacher can choose the right combination according to his previous experiences. Despite the mentioned point, the optimal use of electronic learning systems and the use of open educational resources can lead to the achievement of learning outcomes by learners. Of course, it should be noted that the mentioned systems are composed of a set of factors (infrastructure, organization, input and process) with various combinations of these factors. How these combinations lead to the creation of various electronic learning systems.

Based on the set of mentioned factors and their combination, electronic learning systems can be classified into six types (Bazargan, 2011):

- Type 1: The behavior of the teacher is similar to the face-to-face classroom;
- Type 2: The teacher's use of media resources in addition to the digital text;
- Type 3: The teacher's use of information and communication technology-based tools in the online class;
- Type 4: The teacher in the role of guide and facilitator, emphasizing interaction (with the teacher / with resources / with classmates);
- Type 5: The instructor's use of constructivism and open educational resources (OER);
- Type 6: Implementation of an e-learning ecosystem (including six components), emphasizing the use of open educational resources.

As can be seen in the mentioned list, although open educational resources are widely used in types 5 and 6 of e-learning, open educational resources can also be used in other types of e-learning. However, it depends on the instructor to How to direct learners to open educational resources. However, in this regard, some researchers (Yau, et al., 2009) have pointed out that e-learning requires the use of a constructivist teaching-learning approach.

Therefore, in the professional development programs of teachers, in addition to making them more familiar with the use of techniques and methods based on information and communication technology, how to integrate pedagogy with these techniques in higher education should be considered (Mndzebele, 2013; Stensaker et al., 2007). Also, teachers should get familiar with open educational resources.

On the other hand, models for generating open educational resources for e-learning have also been proposed. These templates include: components as follows: permissions, free, access and rewrite, modification; Change and integration are learning models, resource quality and validity. The researches that have been done in this regard in Iran show that "familiarity with open educational resources is not well established in university education in Iran, and even the terms in this field are unknown to most of the professors and need more promotion" (Norouzion et al., 2020).

5. Conclusion

As a matter of fact, the publication of paper and electronic publications has faced the limitation of "author's right". In the 21st century and the emergence of the fourth industrial revolution, the growth of information is such that it reveals the importance of learning as well as active, in-depth and continuous learning (Mashaikh and Bazargan, 2023) for citizens more than ever. Therefore, it is necessary to facilitate the implementation of the "higher education for all" policy.

According to many experts, in the last two decades when "open educational resources" emerged, they considered it a new revolutionary idea in higher education (Atkins et al., 2007). In other words, according to the aforementioned researchers, equality and greater access to higher education can be provided through open educational resources. However, the benefits of open educational resources have not yet been fully revealed in practice, but it is expected that the idea of "cooperative learning ecosystem" will be considered (same source). In other words, the interweaving of information and communication technology, including technologies related to Human-centered artificial intelligence and the concept of "openness" in teaching and learning enhance the cooperative learning ecosystem.

On the other hand, the process of producing and using open educational resources can be obtained through six types of licenses (certificates) under the title of CC. There is no doubt that open educational resources are free and accessible. But according to one of the six licenses, the following actions can be taken about them:

- Rewriting
- Modification and change
- Integration with educational materials and other content

Of course, the CC certificate of an open educational source shows the quality of the source and its authenticity.

The use of open educational resources should become a top-down priority for all higher education institutions around the world. Often, teaching groups and faculty work in silos, where the same teaching materials are used each time a course is taught. If access and innovation are not prioritized in our courses, the challenge of finding effective textbooks and course resources will be prioritized by students instead of focusing on learning activities.

Global economic conditions not only require an educated and capable workforce, open educational resources also promise equity in education and learning for marginalized global citizens. As the functionality of open educational resources continues to be adopted and evolved, sustainability and challenging issues of open educational resources with innovation, collaboration, and flexibility can be discussed.

Considering that in Iran's educational system, academic staff members and managers are still not familiar enough with the concept of open education resources and its use for teaching and learning (Norouzion et al., 2021), it is necessary to familiarize with this at the level of managers and policy makers first. The concept is implemented. Then, to familiarize the academic staff with how to produce and obtain permission to ensure the quality of resources and their validity, educational workshops and relevant meetings should be held at the university level.

Also, it is necessary for all academic staff members and administrators to familiarize themselves with the basic concepts of human-centered artificial intelligence and then act for its wise application in the field of how to enrich the learning experience and performance of their students.

References

AECT Task Force on Definition and Terminology. (1977). The definition of educational technology. Washington, DC: Association for Educational Communications and Technology (AECT).

Atkins, D. E., Brown, J. S., & Hammond, A. L. (2007). A review of the open educational resources (OER) movement: Achievements, challenges, and new opportunities (p. 84). SanFrancisco, CA: Report to the William and Flora Hewlett Foundation.

Banker, D. A., & Manning, D. K. (2023). Open Educational Resources: The Promise, Practice, and Problems in Tertiary and Post-Secondary Education. Open Educational Resources in Higher Education: A Global Perspective, 55-76.

Bates, T. (2015). Teaching in a Digital Age (Open Textbook). (2nd ed.). Available at: http://opentextbc.ca/teachinginadigitalage/ (accessed 12 August 2018).

Butcher, N. (2015). A Basic Guide to O.E.R. Paris: UNESCO.

CC (Creative Commons). CC Training. Retrieved on 21.3.2023 from:https://creativecommons.org/about/cc-trainings/

Henderson, M., Selwyn, N. & Aston, R. (2015). 'What works and why? Student perceptions of "useful" digital technology in university teaching and learning', Studies in Higher Education, 42(8), pp. 1567–79.

Henry C. B. Chan, Isabel M. Kemp, Winnie C. L. Leung, Edmundo Tovar, Sorel Reisman. (2021)."Enhancing Student Learning Through an Open Educational Resource Competition", 2021 IEEE 45th Annual COMPSAC Conference), pp.127-132.

Mndzebele, N. (2013). Teachers Readiness in Using ICT in the Classroom: The Case of a Developing Country. Int. Journal of Information and Education Technology, 3(4), 409-412.

Navarrete, R. et al., (2016). Use of Open Educational Resources in e-Learning in Higher Education. Proceedings of 3rd International Conference on eDemocracy & eGovernment (ICEDEG 2016), p. 177-183, Quito (Ecuador), March 30 - April 1 2016. ISBN: 978-3-907589-11-3.

Navarrete, Rosa; Luján-Mora, Sergio. (2017). "Use of embedded markup for semantic annotations in e-government and e-education websites", 2017 Fourth International Conference on eDemocracy & eGovernment (ICEDEG), pp.71-78.

Olivier, J., & Rambow, A. (Eds.). (2023). Open Educational Resources in Higher Education: A Global Perspective. Springer Nature.

Stensaker, B., Maassen, P., Borgan, M., Oftebro, M. & Karseth, B. (2007). Use, updating and integration of ICT in higher education: linking purpose, people and pedagogy', Higher Education, 54(3), pp. 417–33.

UNESCO (2018). Journalism, fake news & disinformation: handbook for journalism education and training. UNESCO, Paris, 2018.

UNESCO (2019). Recommendation on Open Educational Resources (OER).

UNESCO (2023). Open Educational Resources in TVET.

Weller, M. (2023). The Rise and Development of Digital Education. In: Zawacki-Richter, O., Jung, I. (eds) Handbook of Open, Distance and Digital Education (pp 75-91). Singapore: Springer. Retrieved on 27.3.2023 from: https://doi.org/10.1007/978-981-19-2080-6_5

Wiley, D. A. (2021). Open educational resources: Undertheorized research and untapped potential. Educational Technology Research and Development, 69(1), 411–414.

Yau, J.; Lam, J. and Cheung, K. S. (2009). A Review of e-Learning Platforms in the Age of e-learning 2.0," in ICHL 2009, DOI:10.1007/978-3-642-03697-2_20

Zancanaro, A., Todesco, J. & Ramos, F. (2015). A Bibliometric Mapping of Open Educational Resources. International Review of Research in Open and Distributed Learning, 16(1), 1–23. https://doi.org/10.19173/irrodl.v16i1.1960

Contact emails: keya@atu.ac.ir
kbazargan@atu.ac.ir

Teachers' Characteristics, School Factors As Correlates of Students Achievement in Basic Science in Secondary School in Oyo State

Ezekiel Olusegun Babatunde, University of Ibadan, Nigeria

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Several factors can influence learning process and the overall students' performance but seems few studies had made attempt to investigate the influence of teachers and school factors on students' achievement especially in a technological-driven world where Basic science performance is low. The study investigated teachers' characteristics and school factors as correlates of students' achievement in Basic Science in Oyo State. The survey research was anchored on constructivism and theory of learning. Multi-stage sampling procedures were employed to select all the 33 Local Government areas of Oyo State. Two schools each, 66 teachers and 1980 students participated in the study. Three validated instruments used to gather information are: Teacher Characteristic and School factors Questionnaire with r = 0.84, Teacher's observational sheet with r = 0.87 and Basic Science Achievement Test with r =0.87. Data were analysed using descriptive and inferential statistics at 0.05 level of significance. Significant relationship was found between teachers' experience, (r = 0.77, 0.003, P < .05), teachers' subject mastery, r = (0.66, 0.019, P < .05), school location, (r = 0.62, 0.031, P < .05) and students' achievement. School facilities (β = 1.244; t = 2.487; p < 0.05) contributed significantly to the prediction. The variables jointly explained 82% of the variance observed in students' achievement in Basic science. There is a strong correlation of variables on students' achievement. Teachers should improve on their subject-mastery skill while enabling enrolment be provided by the government.

Keywords: Teachers Qualification, Teachers Experience, School-Location, Subject Mastery, Basic-Science

iafor
The International Academic Forum
www.iafor.org

Introduction

Education is a purposeful activity directed at achieving certain aim such as transmitting knowledge or fostering skills and character trait. It is a process by which abilities and capabilities of individuals are developed. These abilities might be physical abilities, emotional abilities, social abilities and intellectual abilities. Education is taken as a process of development that consist the passage of human personality from infancy to maturity by adopting various ways of getting physical, mental, emotional as well as social development (Adesoji & Olatubosun, 2008). Education is very important in any given society. It is the actualizing of human potential so that individual can become something more than what he was before. According to Adeyemo (2005), education is the process by which society assist the young people to learn and understand the heritage of the past, participate productively in the society and contribute meaningfully to the development of the society. Little wonder why it is widely regarded as a basic human right, a key to enlightenment, and a source of wealth and power. Education is critical to industrial and technological development with the history of developed nations bearing records of this while developing nations aspiring to realize the same status have to put a premium. Emeka (2008) citing Ferguson (1991) sees education as a process by which any society through schools; colleges, universities and other institutions deliberately transmit knowledge, values and skills from one person to another.

Knowledge holds key to the attainment of the millennium development goals, which include, food security, eradication of child mortality, and reduction of the spread of HIV and AIDS among others. Teacher characteristics influence the knowledge acquired by their students in the classrooms and therefore there might be a relationship between teachers characteristics and pupils performance. The explanations for good or poor student's academic performance have been quite exhaustive; yet, controversy still exists among scholars as to what contribute singly or jointly to students' poor performance (Darling-Hammond, 1998). Teacher characteristics found to be dominant in cross-country studies are related to; qualification, experience, attitude and personality. Scholars and researchers generally are in agreement that the school variables, which include teacher administration, perform a critical role in educational achievement than other variables (Ashton, 2005).

Experience seems to be highly valued in the teaching profession more than in many other professions. With experience playing such a major role in secondary schools complex cost-benefit considerations, it makes sense to consider how teacher experience influences student achievement. Experienced teachers have a richer background of understanding to draw from and can contribute insight and ideas to the course of teaching and learning. Students taught by more experienced teachers achieve at a higher level because their teachers have mastered the content and acquired classroom management skills to deal with different types of classroom problems.

School location on the other hand can also be considered as the second teacher since space has the power to organize and promote pleasant relationships between people of different ages to provide changes, to promote choices of activities and for its potential for sparking different types of social and affective learning (Ali, 2009). It has been generally accepted that location and heredity can hardly be separated from education in influencing performance, hence a child's life and ability is affected by nature and nurture. Differences in location and the differences in the quality of instruction from one school to another can create variances in the level of knowledge acquisition of the students. School location includes the school

building and the surrounding grounds such as noise, temperature and lighting as well as physical, biological or chemical agent within and around where the school is cited.

It is evident that enthusiasm and demand for quality education is high in Oyo state and the country at large but, supply of facilities in schools seems to be grossly inadequate. It is also unclear whether education in schools is under-funded and neglected as schools are characterized by infrastructural decay; shortage of classrooms and toilet facilities, inadequate space, lack of instructional materials, absence of ICT aided facilities which have lowered the performance of both students and teachers as a result of lack of motivation due to unfriendly environment. It is now certain that most secondary school products cannot gain admission into federal universities or university of their choice due to poor performance in the placement examination into these schools. This poor performance may be attributed to poor school factors principally in areas such as schools structure, library services, school location and school facilities which impact on learning and performance in Basic science.

Basic science is a term that refers to any one of the scientific disciplines that provide a fundamental understanding of natural phenomena and the processes by which natural resources are transformed**.** These disciplines include Mathematics, Physics, Chemistry, Biology, and others to describe and explain the physical world and its phenomena. It also involves a pursuit of knowledge covering general truths and the operations of fundamental laws. Its principles are used to build more specialized knowledge in fields such as medical science and engineering. Basic science is essential for understanding how the world works and developing new technologies. Science is a combined effort of mankind to understand the universe by observing nature and natural phenomena.

As important as this subject is, students' performance is still very low which contributed to failure of secondary school leavers to gain admission into the tertiary institutions in Nigeria. Parents also complained about poor performance which is not commensurate with the huge investment made on their children education. Researchers have been investigating students on various subjects but it seems there is dearth of literatures relating to teacher characteristics and school factors on student's achievement particularly in Basic Science. This study therefore investigated teacher characteristics and school factors as correlates of secondary school students' achievement in Basic Science in Oyo State.

Research Questions

Four research questions that guided the study are:

1. What is the relationship between teachers' characteristics [teachers' qualification, teachers' experience, teachers' subject mastery] and students' achievement in Basic Science?
2. What is the relationship between school factors [school location and school facilities] and student achievement in Basic Science?
3. To what extent will teacher characteristics [teacher qualification, teachers experience and teachers subject mastery] and school factors [school location and school facilities] when taken together predict student achievement in Basic Science?
4. What are the relative contributions of teachers' characteristics [teachers' qualification, teachers' experience, teachers' subject mastery] and school factors [school location and school facilities] in the prediction of students' achievement in Basic Science in Ibadan, Oyo State.

Methodology

This study adopted survey research design. The study population comprised all students in the Junior Secondary School (JSS) 2 class and their teachers from the 33 Local Government Areas of Oyo State. Multi stage sampling technique was employed to arrive at the sample. First, Oyo State has been clustered along thirty-three (33) local governments. Simple random sampling technique was used to select two (2) schools from each local government comprising urban and rural school making a total of sixty-six (66) schools. From each of the sampled schools, systematic random sampling technique was employed to select thirty (30) students which give a total of one thousand, nine hundred and eighty (1980) participants while purposive sampling technique was used to sample sixty-six (66) basic science teachers from the State. The independent variables of the study are Teacher characteristics (teacher qualification, teacher experience and teacher subject mastery) while the dependent variable is Student achievement in Basic Science. Three validated instruments used to collect data are: Teacher Characteristic and School Factors Questionnaire (TCSFQ) with r = 0.84, Teacher's Observational Sheet (TOS) with r = 0.87 and Basic Science Achievement Test (BSAT) with r =0.87. Data collected was analysed using descriptive statistics of frequency counts, percentages and inferential statistic using Pearson moment correlation coefficient and ANOVA at 0.05 level of significance.

Results

Teaching Experience	Frequency	Valid Percent
1-5Years	10	15.2
6-10Years	23	33.3
11-15Years	23	33.3
16-20Years	5	8.3
20years & above	5	8.3
Total	**66**	**100.0**

Table 1: Distribution of Participants by Teaching Experience

From Table 1 and the pie chart in Figure 1, it could be observed that majority of the teachers teaching Basic Science in Junior secondary schools in Oyo state has between 6 and 20(84.8%) years and above of teaching experience, followed by those with maximum of 5(15.2%) years of teaching experience. This implies that most of the teachers teaching the subject have the experience it requires to facilitate learning for optimum performance in the subject which could guarantee the future of the learners in gaining admission into higher institutions or choose a career in the sciences.

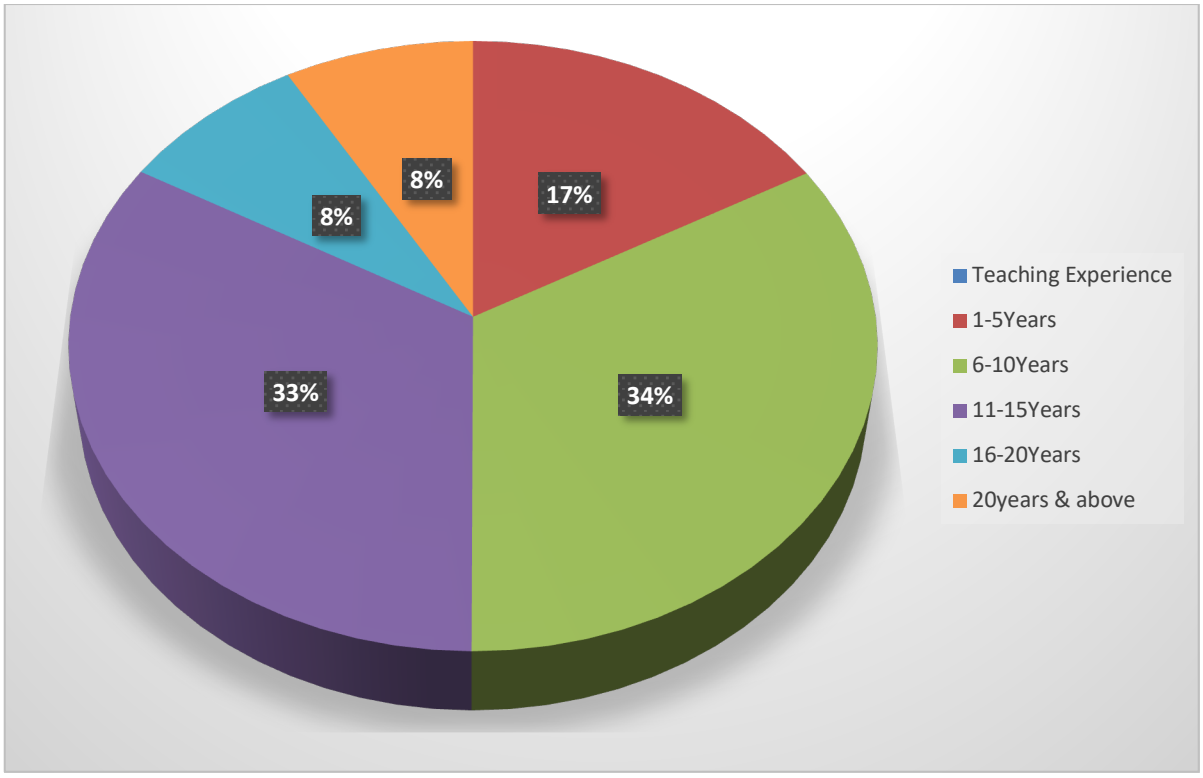


Figure 1: Participants Distribution by Teaching Experience

Educational Qualification	Frequency	Percentage
NCE	5	7.6
B.ED	38	57.6
B.SC/B.A	23	34.8
Total	**66**	**100.0**

Table 2: Participants Distribution by Educational Qualification

Figure 2 and Table 2 reveals the descriptive analysis of the educational qualification of the respondents. It is observed from the table and figure that 5(7.6%) of the teachers that participated are NCE holder, 38(57.6%) are first degree holder in education while 23(34.8%) are holder of first degrees in other disciplines apart from education. Deducing from the findings, it is obvious that majority (65.2%) of the teachers possess education background and are well informed with adequate educational qualification to deliver positive outcome in Basic science. Not only that, it is obvious that majority of the sampled teachers have acquired pedagogical training that will help them in facilitating teaching and learning process to improve students' performance in Basic science.

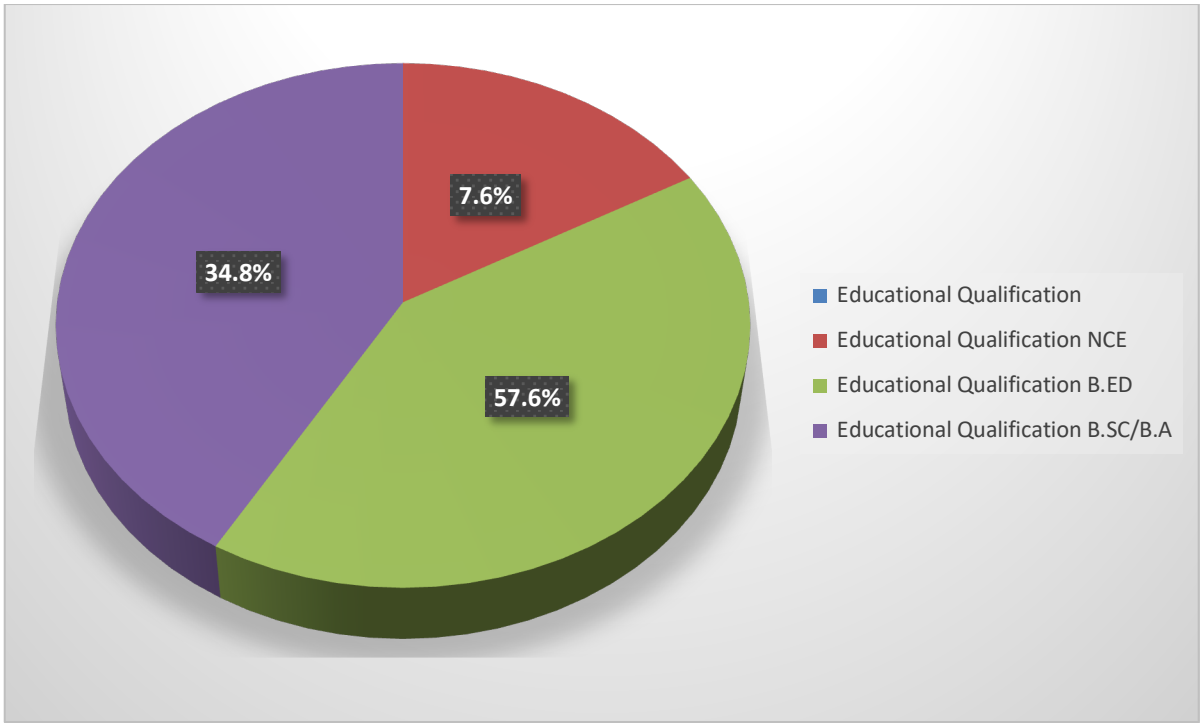


Figure 2: Participants Distribution by Educational Qualification

Variables	Teachers' Qualification	Teachers' Experience	Teachers' Subject Mastery	Students' Achievement in Basic Science
Teachers' Qualification	1			
Teachers' Experience	0.46	1		
Teachers' Subject Mastery	0.51	0.69*	1	
Students' Achievement in Basic Science	0.47	0.77**	0.66**	1

Significant @ p < 0 .05.

Table 3: Correlation Matrix Table of Teachers' Characteristics and Students' Achievement in Basic Science

The result from Table 3 shows the relationship among teachers' characteristics (teachers' qualification, teachers' experience, teachers' subject mastery) and students' achievement in Basic Science. From the table, there is significant high positive correlation between teachers' experience and students' achievement in Basic Science, r = (0.77), 0.003, P < .05. Similarly, there is significant high correlation between teachers' subject mastery and students' achievement in Basic Science, r = (0.66), 0.019, P < .05. However, the finding reveal an insignificant moderate correlation between teachers' qualification and students' achievement in Basic Science, r = (0.47), 0.126, P > .05. This finding reveals that there is significant relationship among teachers' characteristics (teachers' experience, teachers' subject mastery) and students' achievement in Basic Science.

Variables	School Location	School Facilities	Students' Achievement in Basic Science
School Location	1		
School Facilities	0.90** (.000)	1	
Students' Achievement in Basic Science	0.62** (0.031)	0.35	1

Significant @ p < 0 .05.

Table 4: Correlation Matrix Table of School Factors and Students' Achievement in Basic Science

The result from Table 4 shows the relationship among school factors (school location and school facilities) and students' achievement in Basic Science. From the table, there is significant high positive correlation between school location and students' achievement in Basic Science, r = (0.62), 0.031, P < .05. However, the finding reveal an insignificant moderate correlation between school facilities and students' achievement in Basic Science, r = (0.35), 0.265, P > .05. The finding implies that there is a significant relationship between school location and students' achievement in Basic Science.

Multiple R = 0.904 **R Square** = 0.817 **Adjusted R Square** = 0.664 **Standard Error** = 0.813					
Analysis of Variance					
Source of Variance	**Sum of Square**	**df**	**Mean Square**	**F**	**Sig.**
Regression	17.701	5	3.540	5.357	.032
Residual	3.965	6	0.661		
Total	21.667	11			

Significant @ p < 0 .05.

Table 5: Regression Summary and ANOVA

Table 5 indicates that there is joint influence between the independent variables: teacher characteristics (teachers' qualification, teachers' experience and teachers' subject mastery) and school factors (school location and school facilities) and the dependent variable (student achievement in Basic Science) (F (3, 357) = 56.98; R = 0.56, R^2 = 0.313; p < 0.05). This implies that when teacher characteristics (teachers' qualification, teachers' experience and teachers' subject mastery) and school factors (school location and school facilities) are taken together, they jointly influence student achievement in Basic Science. Table 5 further reveals a multiple regression adjusted R^2 = 0.817. This shows that independent variables accounted for 81.7% or by approximation 82% of the total influence on student achievement in Basic Science while the remaining 18% may be due to other factors and residuals not investigated in the study model. The finding implies that there is a joint influence of teacher characteristics (teachers' qualification, teachers' experience and teachers' subject mastery) and school factors (school location and school facilities) on student achievement in Basic Science.

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	30.444	7.027		4.332	0.005
Teacher qualification	0.037	0.274	0.029	0.137	0.896
Teaching experience	0.290	0.344	0.241	0.843	0.432
Teachers Subject Mastery	0.056	0.037	0.732	1.509	0.182
School Location	2.468	1.442	0.918	1.712	0.138
School Facilities	0.504	0.203	1.244	2.487	0.047

Significant @ p < 0 .05.

Table 6: Relative Contributions of Teachers' Characteristics and School Factors in the prediction of Students' Achievement in Basic Science

Table 6 indicates that there were significant relative contributions of teachers' characteristics (teachers' qualification, teachers' experience, and teachers' subject mastery) and school factors (school location and school facilities) in predicting students' achievement in Basic Science. For instance, school facilities ($\beta = 1.244$; $t = 2.487$; $p < 0.05$) when considered with students' achievement in Basic Science, indicates that school facilities independently relate with students' achievement in Basic Science. However, teacher qualification ($\beta = 0.029$; $t = 0.137$; $p > 0.05$), teaching experience ($\beta = 0.241$; $t = 0.843$; $p > 0.05$), teachers subject mastery ($\beta = 0.732$; $t = 1.509$; $p > 0.05$) and school location ($\beta = 0.918$; $t = 1.712$; $p > 0.05$) do not independently predict students achievement in Basic science. The result implies that school facilities are the most influential variable in the prediction of students' achievement in Basic Science.

Discussion of Results

From this study, it was observed that there was a significant relationship between teachers' experience as a component of teachers' characteristics and students' achievement in Basic Science. The finding support Ijaya (2000) who opined that teacher experience improves teaching skills and makes students learn better in the hand of a teacher. It is a known fact that a professional teacher becomes more efficient and more effective as he stays longer on the profession by learning more on the job and learns more about the difficulties students encounter while learning. The result is in consonance with Apata (2007) and Ogunkunle, (2007), who stated that experience serve to furnish teachers through exposure to training, rearing and upbringing and socializing them into the teaching cultures that metamorphose into good pedagogic technique and problem solving strategies required of physics students. This finding indicates that teacher's years of experience is a measure of quality and thus become vitally imperative in the achievement of students' academic performance.

Moreover, the finding support Clotfelter, Ladd and Vigdor, (2007) that suggested small or negative effects associated with a teacher having a graduate degree. They stated, "most of these degrees are master's degrees that generate higher salaries for teachers". Their findings suggested that a graduate degree does not produce higher student achievement. However, it is in agreement with Akinsolu (2010) who asserts that availability of qualified and experience teachers determined the performance of students in schools. The finding did not support Adeogun (2000) who found that the quality of the educational system depends on the quality of its staff and that a school without human resources may not be able to achieve the goal and objectives of the educational system. The result is in agreement with the conclusion of the authors like Goldhaber and Brewer (2008) who opined that the explanations for good or poor

student's academic performance have been quite exhaustive yet controversy still exists among scholars as to what contribute singly or jointly to students' poor performance. The outcome of this study align with Adu and Olatundun (2007) that teachers' characteristics are strong determinants of students' performance in secondary schools as evidenced in this study while it also agreed with Darling-Hammond, Chung, and Frelow, (2002) that there was relationship between teachers characteristics and pupils performance.

The implication of this to teachers is that they must thoroughly understand the content of what they teach. The teacher whose understanding of a topic is thorough will use clearer language and provides better explanation than those whose background is weaker. Additionally, the result from this study also reveals that there was a significant relationship between school location and students' achievement in Basic Science. This outcome was in line with Darling-Hammond, Berry and Thorenson (2001) that school location as the second teacher has a great influence in achievement. The findings of this study was in tandem with the conclusion of Abe and Adu (2013) and Ajayi (2002) who opined that location enrichment regarding physical facilities is a major factor in students' academic performance but does not support Ayodele (2005) as shown that school resources aid students' academic achievement in this study. Moreover, the result was in support of Ekundayo (2012) that school facilities play a vital role in the actualization of educational goals and objectives by satisfying the physical and emotional needs of the staff and students of the school just as it is in consonance with Hale, (2002) who revealed that students in classrooms with large windows, natural lightening and well-designed skylight perform better than their peers in classrooms without proper facilities. However, the result did not agree with the contribution of Michael (2019) that students' achievement depended upon the physical school facilities, its age, the design and the conditions of the school. The implication is that school facilities have a profound impact on both teachers and students' outcome as it affects teachers' recruitment, retention, commitment and effort as it also impact on students' health behavior, engagement, learning and growth in achievement as found in this study.

Conclusion and Recommendations

Conclusively, there was significant relationship among teacher characteristics (teachers' experience and teachers' subject mastery) and school factors (school location) and student achievement in Basic Science. These findings necessitate further investigation into the determinants of student achievement in Basic Science, since the variables considered in this study accounted for only 82%. In view of the findings therefore, teachers should improve on their characteristics such as qualification and subject mastery while government create an enabling environment as these will enhance students' assimilation and greatly increase achievement not only in Basic Science but also in other subjects.

References

Abe T. O and Adu E. I. (2013). Influence of Qualification on Development and Assessment of Computer Programmed Instructional Package on Energy Concept in Upper Basic Technology in Ekiti State, Journal *of Science and Technology*, 3(6): 611-618.

Adeogun, A.A. (2003). Economics of Educational Lagos: Frank Unity.

Adesoji, F.A. and Olatunbosun, S.M. (2008). Student, Teacher and School Environment Factors as Determinants of Achievement in Senior Secondary School Chemistry in Oyo State, Nigeria. *The Journal of International Social Research*, Volume 1(2), pp 13-34.

Adeyemo, D. A. (2005). Parental Involvement Interest in Schooling and School Environment as Predictors of Academic Self-Efficacy among Fresh Secondary School Student in Oyo State, Nigeria. *Journal of Research in Educational Psychology*, Volume 5, (3), pp 163 180.

Adu, E. O and Olatundun, S. O. (2007). Teachers' Perception of Teaching as Correlates of Students' Academic Performance in Oyo State Nigeria. *Essays in Education,* 20: 57-63.

Ajayi, I. A. (2002). Resource factors as correlates of secondary school effectiveness in Ekiti State. *Nigerian Journal of Counselling and Applied Psychology*. 1(1): 109—115.

Akinsolu, A.O. (2010).Teachers and Students' Academic performance in Nigerian Secondary Schools: Implications for Planning. *Florida Journal of Educational Administration and Policy.* Volume 3, issue 2 pp 86-103.

Ali, A. A. (2009). The Impact of Teacher Wages on The Performance of Students: Evidence from *pisampra.ub.unimuenchen.de/.../impact_of_teacher_wages_on_the_ ...*

Apata, F.S. (2007). Influence of teachers 'academic qualification and experience on students" performance in senior secondary school physics in Nigeria.Unpublished M.Ed. Research Project. Science Education Department, University of Ilorin, Ilorin.

Ashton, P. (1996). Improving the Preparation of Teachers. *Educational Researcher,* 25 no. 9: 21-22.

Ayodele J.B. (2004). "The Role of Head Teachers in school plant Management and Maintenance" in Fagbamiye E.O., Babalola, J.B., Fabunmi, M; and Ayeni A.O. Management of Primary and Secondary Education In Nigeria. Ibadan NAEAP 93-100.

Clotfelter, C. T., Ladd, H. F., and Vigdor, J. L. (2007). *Teacher Credentials and Student Achievement in High School: A cross-subject analysis with student fixed effects.* Workingpaper11 Washington, dc: Urban Institute, National Center for Analysis of Longitudinal Data in Education Research.

Darling-Hammond, L. (1998). Teacher and Teaching; Testing Policy Hypothesis from a National Commission Report. *Educational Researcher*. Vol 27(1):5-15.

Darling-Hammond, L. Berry, J. and Thorenson, M. (2001). Does Teacher Certification matter? Evaluating the evidence. *Educational Evaluation and Policy Analysis*, 23(1) 57–77.

Darling-Hammond, L. Chung, C. and Frelow, A. (2002). Variation in Teacher Preparation: How Well Do Different Pathways Prepare Teachers To Teach? *Journal of Teacher Education,* 53(4), 286–302.

Ekundayo, H. T. (2012). School Facilities as correlates of Students' Achievement in the Affective and Psychomotor domains of learning. *European Scientific Journal*, Volume 8 No 6 pp 208-216. ISSN: 1857 – 7881 (Print) e - ISSN 1857- 7431

Ferguson, R. F. (1991). Paying for Public Education: New Evidence on How and why Money Matters. *Harvard Journal of Legislation*, 28:465–498.

Gibbons S, Kimmel, H. and O'shea, M. (1997). Changing Teacher Behaviour Through Staff Development: Implementing the Teaching and Content Standards in Science School. *Science and Mathematics*; 976 (1):302-340.

Goldhaber, D. D., and Brewer, D. J. (2000). Does Teacher Certification Matter? High School Teacher Certification Status and Student Achievement. *Educational Evaluation and Policy Analysis,* 22 (2):129-136.

Hale A.J. (2002). The nature of environmental quality in the workplace. Milwaukee, WI: University of Wisconsin Milwaukee Architecture and Urban Planning.

Ijaiya, N.Y. (2000). Failing schools and national development: Time for reappraisal of school effectiveness in Nigeria. *Niger Journal of Educational Resources Evaluation*, 2(2), 42.

Michael Olugbenga (2019). Impact Of School Facilities On The Academic Performance Of Secondary School Students In Kaduna State, Nigeria. *International Journal of Social Science and Humanities Research,* Vol. 7, Issue 3, pp: (497-507), ISSN 2348-3164 (online) Available at: www.researchpublish.com

Ogunkunle, R. A. (2007). Effects of gender on the mathematics achievement of students in constructivist and non-constructivist groups in secondary schools. ABACUS, *Journal of Mathematics Association of Nigeria,* 20, pp. 41-50.

Contact email: babatundeezekiel11@gmail.com

Unlocking Ice Hockey Prowess: Pose-Centric Analysis With MMaction2, Yolov10, and BoT-Sort for Sports Education

Boyang Zhang, Independent Scholar, Finland

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In contemporary fixed-field team sports, the integration of computer vision techniques has become a popular practice for scrutinizing team strategies and tactics. This study embraces a comprehensive approach that amalgamates action recognition using MMaction2, object detection by Yolov10, and multi-object tracking using Bot-Sort to unravel the intricacies of ice hockey strategies. With a keen focus on pivotal actions such as passing and shooting movements, this research utilizes the McGill Hockey Player Tracking Dataset (MHPTD) to unearth valuable insights into ice hockey strategies. In the methodology, we provide a concise understanding of ice hockey dynamics, highlighting the significance of key actions in team sports. Social Network Analysis (SNA) is performed to understand ice hockey strategies, emphasizing the role of key actions, and fostering innovative approaches to sports education and analysis. We emphasize that key actions, such as precise passing and strategic offensive moves, could offer a profound impact on SNA. Moreover, we use Louvain method for community detection which allows us to uncover latent structures within the player network that extend beyond connections. By adding action patterns to the community, we reveal clusters of players who collaborate closely on the field and exhibit similar playing styles and strategic preferences. This study offers coaches and educators actionable insights for designing training programs and understanding team tactics. By integrating cutting-edge technologies with educational principles, our research contributes to performance analysis and modern coaching methods, enriching the landscape of fixed-field team sports education.

Keywords: Object Detection, Pose Detection, Social Network Analysis

iafor
The International Academic Forum
www.iafor.org

Introduction

In the analysis of modern fix-field sports, computer vision technologies have been commonly used to interpret team strategies. The integration of the advanced computer vision techniques allows for a detailed look at the movements and interactions in sports. This study sets up a comprehensive approach combining action recognition using MMaction2 which are designed by MMaction2 contributors (2020), object detection with Yolov10 (Wang et al., 2024), and multi-object tracking through Bot-Sort Aharon et al. (2022) to unveil the game strategies in ice hockey. By focusing on critical actions like passing and shooting, this study aims to analysis the interactions between players by pose recognition and Social Network Analysis (SNA) to uncover ice hockey team strategies.

As to action recognition, MMActions2 is a powerful open-source toolbox designed for video understanding, particularly excelling in action recognition tasks, which can be used in analyzing group fixed-field sports, such as soccer, basketball, American football, volleyball and ice hockey. These fixed-field sports involve complex player interactions, rapid movements, and diverse actions occurring within a defined space (Zhang & Löwendahl, 2023), for example, like shooting, and passing action. MMActions2 provides a robust solution for identifying and classifying actions which can be used for detailed sports analysis, allowing coaches and analysts to dissect player behaviors and team strategies efficiently.

Figure 1: Shooting position detected by MMaction2

Yolov10 is so far the latest advancement in the You Only Look Once (YOLO) series for real-time object detection in 2024, Yolov10 combines the tradition of balancing computational efficiency with detection performance (Wang et al., 2024). Yolov10 introduces important enhancements in post-processing and model architecture. A key innovation in Yolov10 is the adoption of consistent dual assignments for Non-Maximum Suppression (NMS) free training, which improves efficiency by eliminating redundant predictions and reducing inference latency. What's more, Yolov10 employs a holistic efficiency-accuracy driven design strategy, optimizing various model components to minimize computational overhead while enhancing performance (Wang et al., 2024). Ice hockey is a fixed-field sport characterized by its fast pace and dynamic player interactions. Yolov10 can be utilized for object detection in ice hockey.

As to BoT-SORT which is an advanced tracker designed for multi-object tracking (MOT) tasks, Bot-SORT combines motion and appearance information to track objects across frames, ensuring robust and accurate tracking in challenging scenarios (Aharon et al., 2022).

Moreover, the MOT tasks contain the tracking of multiple objects across a series of video frames, specifically for sport analysis, each players with unique object_ID can be tracked and Re-ID for re-identification, which is to re-track the object ID which is the specific player, like Temmu Selanne with object ID "01". which ensures the same player is consistently tracked across frames, even when it undergoes occlusions or exits and re-enters the scene. Another key advantage of Bot-SORT is the Camera Motion Compensation (CMC), which addresses the challenges posed by camera movement (Aharon et al., 2022). CMC adjusts the predicted positions of objects to account for camera motion, thereby maintaining accurate tracking despite the dynamic background.

Theoretical Background

Skeleton-based action recognition models use human skeletal movements to identify and classify actions in video sequences (Duan et al., 2023). For example, in the Adaptive Graph Convolutional Network (AGCN), it uses a unique approach of the two-stream adaptive graph convolutional network (2s-AGCN), adapting to diverse action patterns and enhancing flexibility and recognition accuracy (Shi et al., 2019). PoseC3D employs a 3D heatmap stack representation of skeletons, which improves robustness against pose estimation noise and supports multi-person scenarios (Duan et al., 2021). The Spatial-Temporal Graph Convolutional Network (STGCN) (Yan et al. 2018) and its enhanced version, STGCN++ (Duan et al., 2022), further refines the approach by automatically learning spatial and temporal patterns. The usage of MMAction2 which can integrate above models to facilitate model implementation, training, and evaluation. MMAction2 enables coaches to leverage AGCN, PoseC3D, STGCN, and STGCN++ for advanced action recognition tasks.

Nowadays Social Network Analysis (SNA) has been commonly used in sport research (Wäsche et al. 2017), by researching the structure and dynamics of the relationship in a network. The SNA in sports analysis can provide a deep understand of player interactions and team dynamics (Zhang & Löwendahl, 2023), by identifying key actions like passing and shooting in SNA, it can help coaches to reveal patterns and connections among players, understand team strategies. Further, utilizing SNA can lead to effective training and strategy planning in team sport (Bruner et al., 2021).

Methodology

The MHPTD (McGill Hockey Player Tracking) dataset is selected to perform the analysis, it includes high-definition NHL gameplay video clips with continuous frames and divided into segments of 30 and 60 frames per second (Zhao, Li, & Chen, 2020), adheres to the Multiple Object Tracking (MOT) challenge format to facilitate the evaluation of computer vision algorithms for tracking the movement of ice hockey players' movements over time. The dataset was annotated in yolo classes format to facilitate comprehensive analysis, and there are six classes: player_color1, goalie_color1, player_color2, goalie_color2, referee, and ball.

Yolov10 is selected to perform the detection, there are 200 epochs in the training. In below Figure2, it provides a comprehensive analysis of training and validation losses, performance metrics, and learning rates over epochs. The training losses for object models consistently decrease, indicating effective learning and reduced errors over time. For instance, the train/box om loss decreases from 5.57 at epoch 1 to 2.67 at epoch 5, and the train/cls om loss decreases from 5.08 to 2.46 over the same period. Similarly, the training losses for object-object models follow a similar trend, with the train/box loss decreasing from 5.47 to 2.44, and

the train/cls loss from 9.20 to 3.17. Validation losses provide further insights into the model's performance. The validation losses decrease, indicating the model's improving ability to generalize to unseen data. Performance metrics include precision, recall, mAP50, and mAP50-95 reflect the model's detection accuracy. Precision is reaching a high of 0.9147 by epoch 199. Recall showed a similar trend, the peaking of recall is at 0.8154 by epoch 200. The Mean Average Precision (MAP) at IoU threshold 0.50 (mAP50) achieves 0.79 by epoch 200. The mAP50-95, averaging over multiple IoU thresholds, and achieving 0.62 at the end of the training.

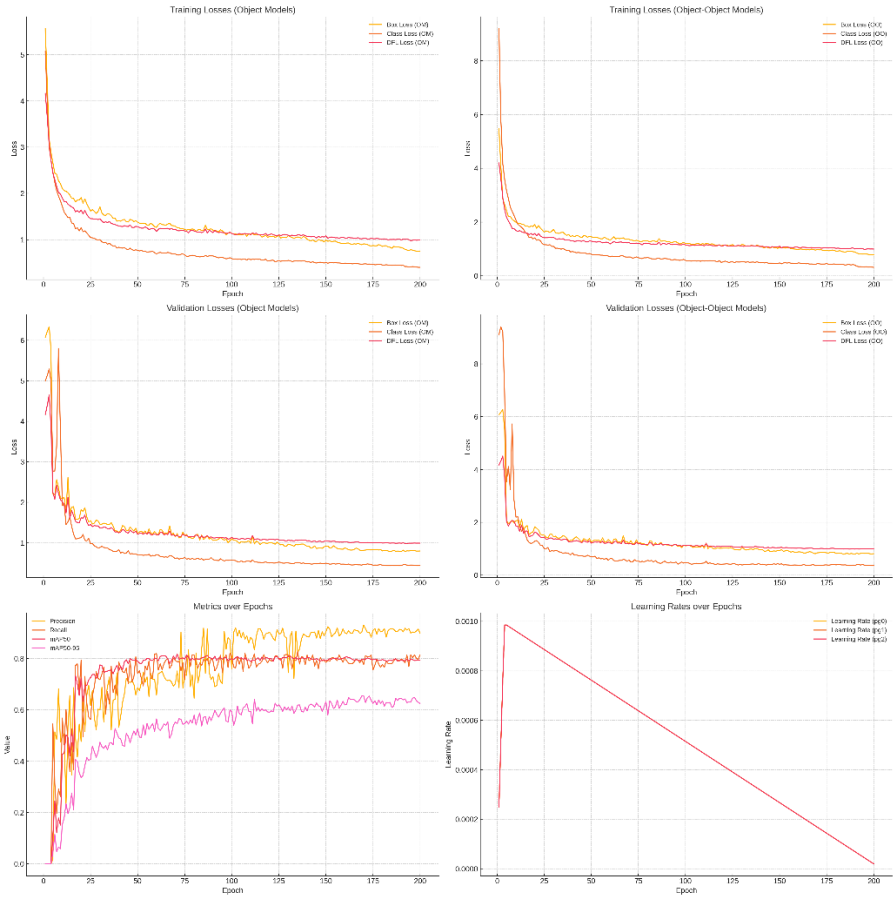


Figure 2: Yolov10 Training and Validation Performance Metrics

To achieve skeleton-based action recognition for identifying shooting and passing actions of ice hockey players, we employed the MMAction2 framework and followed a systematic methodology. Initially, key points were extracted from MHPTD dataset, and actions are annotated in classes: passing and shooting. These key points are converted into the COCO format to ensure compatibility with MMAction2. The dataset was organized into structured annotations indicating the actions. The model was trained using MMAction2's training protocols. After that, the trained model was deployed for inference on new video clips to detect shooting and passing actions. This method integrates advanced computer vision techniques and the MMAction2 framework to facilitate detailed analysis of player actions in passing and shooting actions.

Findings and Discussions

In this chapter, we will discuss the usage of object detection, pose detection and SNA in hockey games. Yolov10 provides the precise identification and classification of ice hockey

players. Each detected object was assigned a class_ID, representing different categories such as players from different teams, referees, and the ball. Within each class_ID, unique object_IDs were assigned to individual instances, enabling detailed tracking using Bot-SORT and analysis of each hockey player over time. For example, in the player_black class, each player was assigned a specific object_ID, such as player_black ID1, ID3, ID5, facilitating the examination of individual player movements and actions. This granularity in object detection and classification of object_ID by Yolov10 allows for comprehensive analysis of player behaviors and interactions. With the usage of Bot-SORT tracker, we can track the player's positions over time accurately, providing valuable insights into understanding players' movements and locations. By ensuring consistent and reliable tracking, even in complex situations when camera moves or players occlusion, Bot-SORT enhances the ability of re-identification of players, it can track players' movements continuously over game time.

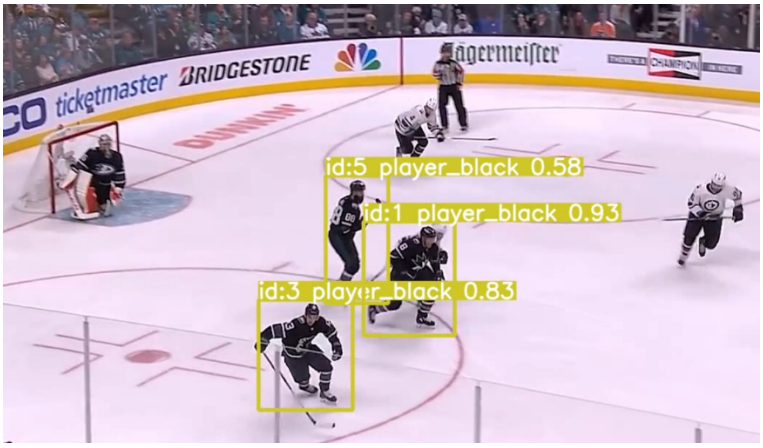


Figure 3: Different object_ID for the same class (player_black) with ID1, ID3, and ID5

In the next step, each ice hockey players' movements are analyzed by MMAction2, which provides, the skeleton based action recognition of each individual player' movement, and it enables the extraction of key points of the skeletal structure of each individual player, the player with specific object_ID, allowing for precise tracking of body movements and poses. By combining the object detection data from Yolov10 with the detailed movement analysis like passing or shooting from MMAction2, we can achieve a comprehensive understanding of player behaviors and interactions inside the fixed-field sports.

In Social Network Analysis, there are nodes and edges, by building from hockey player's movements (passing and shooting), a directed network can be created with all the active players and the ball using Gephi (Figure 4). In the network, the nodes are the players, edges are the passing and shooting connection which have the direction. Social Network Analysis has been proven as a valuable methodology in sport analytics (Zhang & Löwendahl, 2023). By integrating SNA with advanced Yolov10 for object detection frameworks, coaches can track and classify player movements accurately. Each detected player is assigned a unique object_ID within their respective class_ID, allowing for detailed temporal analysis of individual and group behaviors. In hockey team analysis, player_color1_ID1 can be tracked throughout a game to analyze his/her movement patterns, passing frequency, and interactions with other team players. This approach enables a comprehensive understanding of team strategies, player roles, and overall game dynamics.

Figure 4: Social Network Analysis of Ice Hockey Players

After building the directed network, Louvain method (Blondel et al., 2008) is used for community detection which enables us to uncover latent structures within the player network. Louvain method identifies clusters who frequently interact with each other, and provides hierarchical structures within the game, for example, the macro level strategies of offensive and defensive groupings.

Conclusion

The object of this research is to analysis the interactions between different team players by object detection, pose recognition and SNA during an ice hockey game to uncover strategic patterns for coaches to interpret the game dynamics. By focusing on key poses such as the passing and shooting, information of interaction and timestamp can be analyzed of each individual player. The BoT-SORT tracker provides the players' position tracking with accuracy. The tracking activities enable coaches to understand the movement of players.

To better understand the game dynamics, Table 1 shows the interaction and timestamp involving a key player, for example TeamA1. The table outlines each interaction, as passing or shooting, along with the corresponding timestamp of when each action occurred during the game. By examining these interactions, we can gain insights into the strategic roles of different players and the overall team strategy. In Table1, TeamA1 frequently passed the ball to TeamA2 at multiple timestamps (0:01, 0:14, 0:27, 1:24). This suggests a strong connection or reliance between these two players, which could indicate a planned strategy where TeamA2 is positioned to support or advance the ball after receiving it from TeamA1. Moreover, TeamA1 attempted to shoot at the opposing team's goal multiple times (at 0:03, 0:07, 0:22, 0:36, and 2:00). These attempts are critical moments where the team tried to convert the ball possession into scoring opportunities. The fact that most of these shots were aimed directly at the opposing team's goalie or defense players highlights the offensive role of TeamA1. What's more, there are several instances where TeamA1 passed the ball to their

own goalie (at 1:06, 1:19, 1:29, 1:36, 1:40). This indicates a strategy where the team resets or repositions itself during the game, to relieve pressure from the opposing team or to reorganize the play. From the strategic insights' perspective, TeamA1 is a central figure in gameplay, acting as a distributor which uses the passing action, and as an offensive threat which uses the shooting action. The role of TeamA1 is significant in creating scoring opportunities and maintaining ball control.

Source	Target	Interaction	Timestamp
TeamA1	TeamA2	Passing	0:01
TeamA1	TeamB3	Shooting	0:03
TeamA1	TeamB_goalie	Shooting	0:07
TeamA1	TeamA2	Passing	0:14
TeamA1	TeamB2	Shooting	0:22
TeamA1	TeamA2	Passing	0:27
TeamA1	TeamB2	Shooting	0:36
TeamA1	TeamA_goalie	Passing	1:06
TeamA1	TeamA3	Passing	1:14
TeamA1	TeamA_goalie	Passing	1:19
TeamA1	TeamA2	Passing	1:24
TeamA1	TeamA_goalie	Passing	1:29
TeamA1	TeamA_goalie	Passing	1:36
TeamA1	TeamA_goalie	Passing	1:40
TeamA1	TeamA3	Passing	1:46
TeamA1	TeamA3	Passing	1:55
TeamA1	TeamB_goalie	Shooting	2:00

Table 1: Interaction Data Between Different Team Players

In conclusion, this research contributes valuable insights into the ice hockey strategic dynamics. The method of object detection, pose detection, SNA can be utilized in multiple contexts within sport analytics, and extend to a variety of sports, particularly in fix-field sports, such as socker, basketball, American football, and volleyball. The ability to track and analyze player positions, detect poses, and uncover underlying social networks within the game can provide coaches with the understanding on how players move, collaborate, offense, and defense. Furthermore, understanding the patterns of player interactions can help coaches to design offensive and defensive strategies, optimize key players roles, refine player positioning and movements.

References

Aharon, N., Orfaig, R., & Bobrovsky, B.-Z. (2022). Bot-sort: Robust associations multi-pedestrian tracking. *arXiv preprint* arXiv:2206.14651.

Blondel, V. D., Guillaume, J.-L., Lambiotte, R., & Lefebvre, E. (2008). Fast unfolding of communities in large networks. *Journal of Statistical Mechanics: Theory and Experiment, 2008*(10), P1000.

Bruner, M., Mclaren, C., Mertens, N., Steffens, N. K., Boen, F., McKenzie, L., Haslam, S., & Fransen, K. (2021). Identity leadership and social identification within sport teams over a season: A social network analysis. *Psychology of Sport and Exercise, 59,* 102106.

Contributors, M. (2020). OpenMMLab's next generation video understanding toolbox and benchmark. Retrieved from https://github.com/open-mmlab/mmaction2

Duan, H., Wang, J., Chen, K., & Lin, D. (2022). Pyskl: Towards good practices for skeleton action recognition.

Duan, H., Xu, M., Shuai, B., Modolo, D., Tu, Z., Tighe, J., & Bergamo, A. (2023). Skeletr: Towards skeleton-based action recognition in the wild. In *Proceedings of the International Conference on Computer Vision (ICCV) 2023*.

Duan, H., Zhao, Y., Chen, K., Shao, D., Lin, D., & Dai, B. (2022). Revisiting skeleton-based action recognition. *arXiv preprint* arXiv:2104.13586.

Shi, L., Zhang, Y., Cheng, J., & Lu, H. (2019). Two-stream adaptive graph convolutional networks for skeleton-based action recognition. In *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*, 12026–12035.

Wang, A., Chen, H., Liu, L., Chen, K., Lin, Z., Han, J., & Ding, G. (2024). Yolov10: Real-time end-to-end object detection. *arXiv preprint* arXiv:2405.14458.

Wäsche, H., Dickson, G., Woll, A., & Brandes, U. (2017). Social network analysis in sport research: An emerging paradigm. *European Journal for Sport and Society, 14*(1), 1–28.

Yan, S., Xiong, Y., & Lin, D. (2018). Spatial temporal graph convolutional networks for skeleton-based action recognition. In *Thirty-second AAAI conference on artificial intelligence*.

Zhang, B., & Löwendahl, T. (2023). Exploring the dynamics of ice hockey strategies using yolov8 and gephi in sports education. In *The European Conference on Education 2023: Official Conference Proceedings*. IOP Publishing.

Zhao, Y., Li, Z., & Chen, K. (2020). A method for tracking hockey players by exploiting multiple detections and omni-scale appearance features. *Project Report.*

The Strategic Curriculum Redesign of Ingeniería En Ciencia De Materiales (ICMA) at Universidad De Guadalajara

Mariela Bravo-Sanchez, Universidad de Guadalajara, México
Erick Omar Cisneros-Lopez, Universidad de Guadalajara, México
Lorenzo Gildo-Ortiz, Universidad de Guadalajara, México
Oscar Blanco-Alonso, Universidad de Guadalajara, México
Sabrina Lizbeth Vega-Maldonado, Universidad de Guadalajara, México
Marco Antonio Perez-Cisneros, Universidad de Guadalajara, México

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The Universidad de Guadalajara, Mexico, has restructured its *Licenciatura en Ciencia de Materiales* program, now known as *Ingeniería en Ciencia de Materiales* (ICMA), to align with the evolving demands of the materials science and engineering sectors. This overhaul aims to provide graduates with advanced technical skills and essential soft skills like adaptability, teamwork, and problem-solving, which are crucial for innovation and leadership in the modern world. The revised curriculum is supported by high-quality infrastructure, experienced faculty, exchange programs, and comprehensive student services to enhance employability and professional readiness. The redevelopment follows a holistic pedagogical approach structured around a Competency-Based Plan with a Mixed Modular Approach. This process encompassed nine stages: i) conducting a SWOT analysis of the existing program; ii) defining the objectives of the program; iii) creating a competencies map; iv) defining the graduate profile; v) drafting the curriculum structure; vi) designing the educational curriculum; vii) presenting the proposal for university endorsement and review; viii) organizing training for academic and administrative staff, and ix) implementing the plan. The curriculum integrates diverse physics, chemistry, and biology knowledge and methodologies and incorporates economic, ethical, and environmental aspects. It is designed to develop an in-depth understanding of materials at all levels, enabling graduates to apply their knowledge practically and effectively in a rapidly changing global context. This curricular redesign focuses on modernising education in key areas like Management and Society, and Emerging Technologies. It features five disciplinary areas and eight elective modules for specialisation and emphasises interpersonal and management skills competencies.

Keywords: Materials Science Engineering, Curricular Redesign, Competencies

iafor
The International Academic Forum
www.iafor.org

Introduction

Materials Science and Engineering is an interdisciplinary field that studies the relationship between the structure, properties, processing, and performance of materials. Its interdisciplinarity inherently arises from the interaction of various areas of knowledge to create materials with enhanced characteristics that meet the needs of a growing population. In this regard, Johanes P. (Johanes, 2018) establishes that the epistemology of Materials Science and Engineering is characterised by an integrative and pluralistic approach, recognising the need to combine and apply knowledge from various disciplines and areas of expertise to study complex phenomena. This approach, known as integrative pluralism, postulates that multiple theories and models can coexist compatibly and non-competitively to achieve a more complete and robust understanding of the phenomena studied at different levels of analysis. A relevant aspect of epistemology in this field is its emphasis on updating scientific practices through philosophical frameworks and vice versa to promote an inclusive and productive approach that accurately reflects scientific practice. This approach is crucial for teaching and research and preparing students to effectively navigate and collaborate in a multi- and interdisciplinary scientific environment. Thus, under the integrative pluralism approach, Materials Science and Engineering have evolved from traditional areas of knowledge like metallurgy, ceramics, and solid-state physics to a combination of several areas such as materials physics and chemistry, nanomaterials, biomaterials, polymers, and engineering, among others. Its evolution and impact on the vast aspects of human life and the environment demand that its research and application be carried out responsibly and sustainably. Therefore, in addition to the areas mentioned above, design principles, economics, ethics, environmental, and social aspects are also integrated, strengthening this discipline and ensuring a comprehensive education for Materials Science and Engineering graduates.

For the curricular redesign of this degree program, a mixed modular competency-based approach was considered (Vega-Maldonado, 2024). It is essential to describe the competency-based approach, characterised by a structure where learning is organised into sequential modules to develop specific competencies. This organisation promotes integrating skills, content, theory, and practice to ensure that learning is meaningful and applicable to real-life situations. This approach is flexible, allowing it to adapt to the needs of the environment, such as the demands of the labour market and the rapid pace of technological advancements. Regarding evaluation, this model prioritises learning based on demonstrable outcomes that reflect knowledge, skills, attitudes, and values, which constitute the foundation for ensuring that students can apply their knowledge and skills to both present contexts and future scenarios. Implementing this approach fosters comprehensive teaching and learning, where the way of learning, lifelong learning, flexibility in methods, and teamwork are priorities (Vargas, 2008).

The mixed modular approach is characterised by integrating aspects of modular design with other approaches, such as traditional subject-based approaches. These approaches are used when it is necessary to maintain the internal structure of certain disciplines, particularly in areas requiring sequential and structured learning, as in the case of sciences and engineering (Rouvrais, 2006). It is possible to balance the teaching of fundamental knowledge and practical application through the mixed modular approach, thus facilitating the integration of learning with professional activity.

Given the characteristics of the Materials Science and Engineering degree program (here, ICMA) and the knowledge, attitudes, and values demanded by the professionals in this field, the mixed modular competency-based model meets the needs for developing a robust, flexible, and comprehensive curriculum. Moreover, this model aligns coherently with the institutional goals of our university (Universidad de Guadalajara, n.d.) and the university centre where this degree is offered (CUCEI, n.d.), and it fits well with the economic, social, and cultural characteristics of our university environment. At this point, it is relevant to mention some of these characteristics, which are common in developing countries and their public universities, and for which the structure of curricula under the mixed modular competency-based system is an alternative for comprehensively training professionals who can adapt to the contexts of an economic, social, and technological environment that experiences more pronounced changes compared to developed countries. It is important to recognise that, as a developing country, job opportunities may be scarce, competitiveness high, teaching-learning and practice resources limited, and there is a great need for innovation and entrepreneurship to create solutions to local problems.

Acknowledging these characteristics as a country and university, the qualities of the mixed modular model, and the requirements of the addressed discipline, it is possible to project the synergy between these factors to generate and achieve a successful curricular redesign.

Methodology

The curricular redesign of the bachelor's degree in Materials Science at the University of Guadalajara was based on a Competency-Based Plan with a Mixed Modular Approach, in which the key competencies for achieving the expected professional profile were identified and strengthened. The following constitute the phases in which this redesign was developed:

1. Review of the current program under a SWOT analysis framework. In this stage, areas needing reinforcement were identified, as well as opportunities to innovate and align the curriculum with current and future trends in materials science and engineering.
2. Definition of the object of study. Having identified the program's current state, the object of curricular study was focused on the need to train professionals with competencies that allow them to face and adapt to the challenges of the current and future economic, social, cultural, and technological environment.
3. Selection and development of a competency map. The key competencies that students must develop during their education were selected in this phase. For this, national and international universities and accrediting organisms were considered. These competencies were organised by their extent of complexity for each of the disciplinary areas and specialised modules.
4. Definition of the graduate profile. Based on the structured competency map, the graduate profile specifies the knowledge, skills, and attitudes that graduates must possess upon completing their education.
5. Curriculum proposal. Based on the graduate profile and competency map, a new curriculum structure was designed. The learning units were organised into training areas, allowing for a logical and coherent progression of knowledge and skills. The curriculum was also designed to be flexible so students could manage their education according to their interests.

6. Curricular proposal. The new curriculum proposal was consolidated into a formal document that included the academic structure, specific objectives, profiles, structure, implementation criteria of the study plan, teaching methodologies, mechanisms for curricular evaluation and follow-up, and the human and physical resources for its execution.
7. Submission to the University General Council for approval and evaluation. This process included presenting the proposal in Council sessions, where the merits and relevance of the redesign were evaluated in the context of current and future academic, social, and technological needs.
8. Training of teaching and administrative staff. During this phase, a training program was implemented for teaching and administrative staff to familiarise themselves with the new pedagogical approaches, teaching methodologies, and technological tools accompanying the new curriculum.
9. Implementation. This phase included adapting academic infrastructure, updating teaching materials, and creating a continuous monitoring plan to ensure that the objectives of the curricular redesign were fully met.

Results

The nine-phase process of the curricular redesign resulted in a holistic update of the study plan, covering key aspects such as incorporating competencies that respond to the demands of the productive sector and international standards of quality and competitiveness. A flexible curriculum was developed, oriented to the needs of the students, utilising national and international benchmarks and including a competency analysis conducted collaboratively through focal groups and committees. The curriculum was adapted to the latest scientific and technological advancements, considering emerging technologies that allow for the growth and integration of various areas of knowledge. Additionally, the curriculum integrates competencies in management and society and humanistic and social areas, strengthening interpersonal and management skills development and a graduate profile that is aligned with the demands of the current and future productive sector.

As a result of the review conducted on trends and innovation in Materials Science and Engineering, a set of mandatory disciplinary areas was established for all students in this degree program. Additionally, specialisation modules were identified, from which students can choose and complete two. For each of the areas and modules, a set of competencies was assigned, which were selected, strengthened, and organised by their level of complexity through work with different focal groups formed by entrepreneurs, researchers, professors, students, and graduates. Table 1 shows the areas, modules, and respective competencies with the highest level of complexity (exit competencies).

	Areas	Competencies of greater complexity
Disciplinary areas	Structure and processing of materials	Applies, designs, develops, and evaluates synthesis and processing methodologies to obtain new materials, allowing innovation with sustainable and efficient procedures (PLCMAIB/SM GAT EYP.120).
	Properties and performance of materials	Predicts the performance of materials by understanding deterioration processes. Applies methods for evaluating material performance.
	Design and integration of materials	Designs and creates new materials of all types based on the process-structure-properties-performance paradigm to achieve positive economic and social impacts across the field and society.
	Quality and sustainability of materials	Manages materials and processes for their proper operation by applying current environmental legislation and good operating practices
	Management and society	Ability to understand and apply the principles and techniques of quality management and technological innovation in organisations
Modules	Nanomaterials and nanotechnolog y	Designs chemical and physical methods in the production of a nanomaterial substance or nanostructure with the most suitable properties for a specific application.
	Biomaterials	Applies knowledge of biomaterials in devices and technological systems for use in the health sector.
	Metallic materials and alloys	Analyses, evaluates, and improves metallurgical processes.
	Polymeric materials	Creates high-value, sustainable, and high-quality polymeric products. Selects the necessary materials for the optimal development of a polymeric product
	Materials simulation	Uses design tools to predict mechanical properties such as strength, toughness, deformability, and elasticity as well as optical, thermal, and electronic properties, and learns to predict the failure of material in 3D printed designs.
	Additive manufacturing	Applies technology to design in a concurrent engineering context as an activity that meets customer needs and leads to profitable manufacturing.
	Renewable and biodegradable materials	Evaluates and analyses the environmental impact, biodegradability, and lifecycle of renewable materials, specifying key aspects such as production, use, and final disposal to make informed decisions in the selection and design of new materials.
	Emerging Technologies	*The competencies and their learning units will be adapted according to the needs of the modules offered in the educational program.*

Table 1: List of exit competencies by disciplinary area and module.

Similarly, collegial groups established the relationships between competencies and their integration into the curriculum. As illustrated in Figure 1, these relationships were organised into a map that distinguishes the different competencies, each labelled with a unique code, and the simple and complex relationships between them. The simple competencies, represented horizontally, show how competencies are developed from the beginning to the end of each area of knowledge. The initial competencies are represented in yellow, the intermediate in blue, and the final in green. Vertical connections represent the complex relationships between competencies, indicating how they are interrelated with their content and applied in more advanced and multidisciplinary contexts, in essence, among the different areas of knowledge or specialisation.

This approach provides the curriculum with great flexibility, allowing students to design their academic path beyond the traditional structures suggested by a curricular map (simple or

horizontal relationships). This flexibility represents a paradigm shift in higher education and an appreciation for the diversity of skills and perspectives that students can bring to the discipline. The opportunity for students to design their academic journey grants them autonomy, fostering their self-management and adaptability, essential qualities in a constantly evolving professional environment.

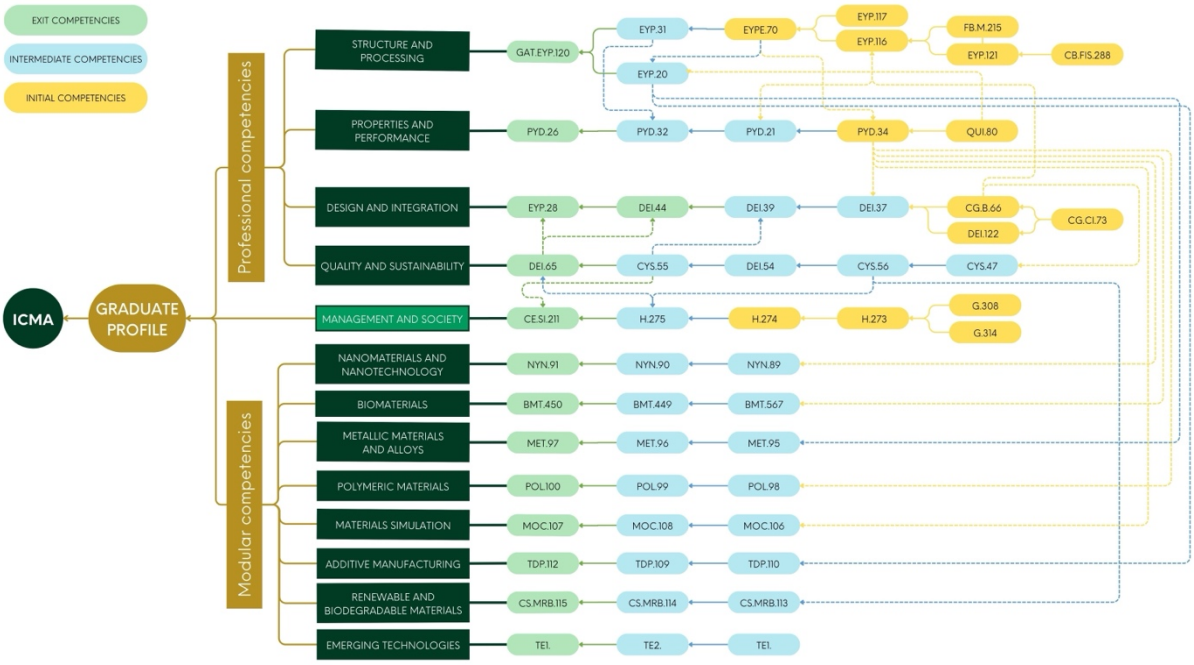


Figure 1: Integration and relationship scheme of competencies for initial, intermediate, and graduate profile.

Based on the most complex competencies for each of the disciplinary areas, the following graduate profile was defined, describing the technical and transversal competencies that students must have upon completing their education:

> *The Materials Science Engineering program graduate will be capable of proposing, developing, and evaluating synthesis and processing methodologies to design and obtain new materials, predict their performance, and apply specialised evaluation methods with an innovative approach oriented towards sustainable and efficient procedures. They will demonstrate management skills by handling materials and processes, ensuring their operation agrees with current regulations. They will promote technological innovation within organisations, consolidating a comprehensive and humanistic professional profile oriented towards sustainable development in national and global contexts, contributing to technological advancement and societal well-being.*

The new curricular proposal was approved by the University General Council, which formally recognises the relevance and quality of the redesign work. Implementing the new curriculum is expected to improve key academic indicators, such as retention rates, academic performance, time to graduation, and graduation rates. A high employment rate for our graduates is anticipated, further enhancing the University of Guadalajara's reputation as a leading institution in the education of professionals in Materials Science Engineering.

Conclusions

- The Materials Science and Engineering (ICMA) program at the University of Guadalajara has been redesigned to meet the current demands of the labour market and society, aiming to adapt education to these needs.

- A flexible curriculum has been created through a strategic process that utilises a mixed modular competency-based approach that enhances students' technical and transversal skills, which are fundamental for achieving success in the globalised professional sphere.

- The new *Ingeniería en Ciencia de Materiales* (ICMA) designation, replacing *Licenciatura en Ciencia de Materiales* (LCMA), represents an educational approach that aligns with current needs, promoting integration and adaptability. This new methodology provides students with advanced technical knowledge and cultivates the social skills and flexibility required to thrive in an ever-changing environment.

- The resulting curriculum integrates interdisciplinary knowledge in materials science and engineering, fostering innovation and sustainable development.

- With training that enables them to adapt and lead in a dynamic environment, students will be better equipped to overcome current technological and social challenges.

- The General University Council has confirmed the relevance and quality of this redesign, which is expected to impact academic indicators and graduate employability positively.

This new curriculum modernises training in key areas such as emerging technologies and management and offers students the opportunity to personalise their academic path, thus fostering their autonomy, self-management, and adaptability. In this way, the University of Guadalajara seeks to position itself as a leading institution in training professionals in materials science and engineering to make outstanding contributions to technological progress and social well-being nationally and internationally.

References

Centro Universitario de Ciencias Exactas e Ingenierías (CUCEI). (n.d.). *Inicio*. Universidad de Guadalajara. Retrieved August 12, 2024, from https://www.cucei.udg.mx/

Johanes, P. (2018, June). *A Multi-Epistemological Mapping of Knowing, Learning, and Analytics in Materials Science and Engineering* Paper presented at 2018 ASEE Annual Conference & Exposition, Salt Lake City, Utah. 10.18260/1-2--29702

Rouvrais, S., Ormrod, J., Landrac, G., Mallet, J., Gilliot, J. M., Thepaut, A., & Tremenbert, P. (2006). A mixed project-based learning framework: preparing and developing student competencies in a French Grande Ecole. European Journal of Engineering Education, 31(1), 83–93. https://doi.org/10.1080/03043790500429500

Universidad de Guadalajara. (n.d.). *Misión y visión*. Retrieved August 12, 2024, from https://www.udg.mx/en/node/60083?q=es/nuestra/presentacion/mision-vision

Vargas Leyva, M. R. (2008). *Diseño curricular por competencias*. Asociación Nacional de Facultades y Escuelas de Ingeniería. ISBN: 978-607-95035-0-5.

Contact email: mariela.bravo@academicos.udg.mx

Identifying How Widening Access Students Build Their Sense of Belonging

John Deane, University of Wales Trinity St. David, United Kingdom
Besty Jose, University of Wales Trinity St. David, United Kingdom
Stephanie Ng, University of Wales Trinity St. David, United Kingdom
Mark Gallagher-Read, University of Wales Trinity St. David, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The purpose of this study is to evaluate the 4 pillars of AdvancedHE building Belonging framework – 'connection, inclusion, support, autonomy'. The research methodologies used in this study were questionnaire, reflective logs and focus group interviews. The phrase 1 data collection were conducted through questionnaire, reflective journal, focus group interview. The result of this study is to report the outcomes for phrase 1. The early finding of this research found that connection and support are most important issues for students from a widening participation background in building their sense of belonging. The study highlighted the development of a fifth pillar of Opportunities focused on employability and skill development to be important in building a sense of belonging. The next phase of this research phase will be conducted in same using the same methodology in August 2024 and December 2024 with the same group of students on same 4 themes. Further new additions pillars may be suggested in future study.

Keywords: Building Belonging, Sense of Belonging, Widening Access, Connection, Inclusion, Support, Autonomy

iafor
The International Academic Forum
www.iafor.org

Introduction

Widening participation in the UK has evolved over the years (Thompson, 2017). The initial focus of widening participation was to increase the representation of high-performing students from economically disadvantaged and ethnic minority communities. However, this evolved to include students who could benefit from higher education to include a more comprehensive vision of inclusivity and accessibility in higher education (Vignoles & Murray, 2016). Student retention is one of the major challenges faced by the higher education sector in the UK (Mckendry, Wright & Stevenson, 2013). Universities with widening participation also face many challenges including low retention, low attainment and low progression rates (Moore, Sanders & Higham, 2013).

At the heart of successful student retention and success is building a strong sense of belonging (Thomas, 2012). The word 'belonging' is deeply rooted in relationships that we establish and hence explored in educational settings (Foster et al., 2011). Previous research suggests that maturity, socioeconomic status, and ethnicity all have a significant impact on student's sense of belonging (Rubin & wright, 2017; Strayhorn, 2018). Therefore, it is important to understand the sense of belonging of widening participation students.

Several studies have been conducted in the UK to understand the sense of belonging of the students to universities (Read, Archer, and Leathwood 2003; Thomas 2012). A study conducted by Ahn & Davis (2020) identified the complex and multidimensional construct of a sense of belonging including physical space and personal space as main contributors to establishing a sense of belonging in students. Physical space includes geographical and cultural space whereas personal space implies identity, life satisfaction and personal interests. This indicates that a sense of belonging is very personal to the student population and hence investigating how students perceive the sense of belonging in different settings is important. Another study by Masika & Jones (2016) identified that creating a community of practice aids the belonging of students to the institution. When students feel valued and connected, interested in their subject area, it is more likely that they will engage more deeply with their studies. So understanding what the sense of belonging means to the student population of each institution is important for designing interventions that support the sense of belonging in students.

Building Belonging Framework

Despite the enormous focus on belonging in the HE sector, belonging can be seen as a complex concept. Therefore, WonkHE & Pearson researched the concept of belonging and developed a framework for belonging. Connection, inclusion, support, and autonomy are the four key areas of the framework (Blake, Capper & Jackson, 2022).

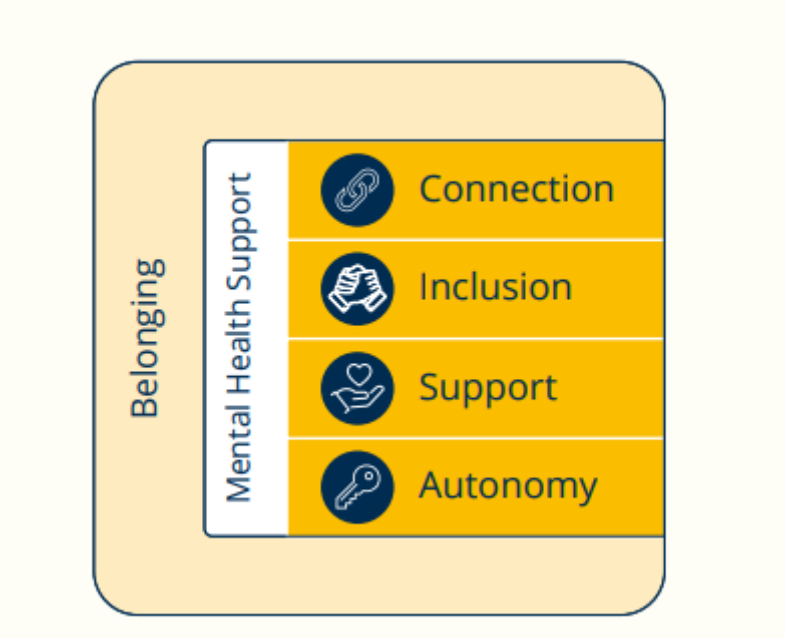


Figure 1: Building Belonging Framework
(Source: Blake, Capper & Jackson, 2022)

Establishing a strong connection at the course level or University level is key to building a sense of belonging. This has been identified in previous studies for example, the study by Hardy & Bryson (2016) identified that supportive networks with peers and staff enormously support student engagement and success. Thomas (2012), and Masika & Jones (2016) also identified the link between social connections and the sense of belonging in their studies.

The second crucial factor of the framework is inclusion which includes accessibility, neurodiversity, access to course materials, inclusive course contents and representation of staff (Blake, Capper & Jackson, 2022). Thomas (2012) affirms that an inclusive learning environment will ensure that students engage and feel like they belong to their course or institution.

The third main factor of the framework is support. Well defined, inclusive support system is integral to building a sense of belonging in students (Blake, Capper & Jackson, 2022). This has been identified by previous studies (Means & Pyne, 2017; Ahn & Davis, 2020). The final factor of the framework is autonomy which makes students feel empowered to make choices and control their learning. A positive relationship with sense of belonging and autonomy in students was affirmed by other studies including Tian et al. (2023), and Vekkaila et al. (2024).

However, there are many barriers to establishing a sense of belonging in students. This includes a lack of integration of course, curriculum, wider experience and future goals, mental health, culture and systemic barriers, lack of connections, conflicting priorities, and personal issues a few to name (Blake, Capper & Jackson, 2022; Meehan & Howells, 2019). The study by Wonkhe & Pearson concludes that when each of the four factors was facilitated well, it improved the sense of belonging in students (Blake, Capper & Jackson, 2022). Therefore, our study aims to evaluate the effectiveness of the four factors for widening participation of students. We will be identifying how our students build their sense of belonging through developing connection, accessing support, accessing an inclusive curriculum, and building their autonomy.

Methodology

This study comprises 3 phases, each designed to capture different dimensions of student belonging throughout the academic year. University of Wales Trinity Saint David ethics committee approval was obtained for this study. This study adopts a mixed methods approach to evaluate the effectiveness of the WonkHE framework. This approach uses both quantitative and qualitative data to provide a comprehensive understanding of the research problem (Creswell & Creswell, 2005). This approach enables us to gain insights into the complex sense of belonging concept and identify the crucial factors affecting students' belonging. This study is conducted in three phases each phase employing online surveys, reflective logs and focus group discussions.

Online surveys are widely used method to collect data from a broad audience and offer advantages such as ease of data collection, entry, and follow-up administration (Evans & Mathur, 2005). The reflective logs are used to capture rich qualitative data providing in-depth insights into participants' thoughts, experiences, and reflections (Ortlipp, 2008). Focus groups allow participants to convey their views, opinions, and experiences allowing them to discuss in a group that also generate data through interactions and group dynamics (Krueger, 1998). Although, each method has its own limitations, using the three methods will help to generate a rich data set for this study.

Findings and Discussion

The data for this study was collected via questionnaire, reflective logs, focus group and interviews. The aim of this study was to validate the four pillars of the Blake et all (2022) Building Belonging Framework. The 4 key pillars being Connection, Inclusion, Support and Autonomy as being essential to widening access students in building their sense of belonging. The aspect of Mental Health which runs through all aspects of the framework was not considered as part of this study.

The findings from phase 1 are shown below:

Questionnaire

Questionnaires was distributed to all new enrolled level 4 students before they joined in welcome week for the September 2023 academic year. 193 students responded the questionnaires. The questionnaire was broken down into the four pillars of the Building Belonging Framework - Connection, Inclusion, Support and Autonomy.

In relation to the Blake et al (2022) four pillars of connection, inclusion, support, and autonomy the students' perceptions one of the key areas of agreement was that building contact with other students and staff was going to crucial if they were to be successful on the course and in building their sense of belonging.

For example students commented:

- *'...actively encouraging student participation and engagement in class.'*
- *'being approachable and available...the tutor should be approachable and available for discussion or clarification if needed. This accessibility will enable me to seek guidance or ask questions that can boost my confidence in providing feedback.'*

In addition, students also agreed with the suggestion that they believed that group work and group activities were going to be important in enabling them to build a connection and build that sense of belonging.

In terms of support the students were keen to access a range of support including academic, and a range of professional services support. Furthermore, in relation to support the students did agree with the view from the Blake et al (2022) study that access to online materials was going to be important in enabling them to succeed and in doing so build their sense of belonging.

For example students commented:

- *'IT support, student engagement, Career services and other forms of support would be most welcome.'*
- *'Each new student is different and needs different care. I have a lot of problems with using a computer and naming names in English. I also need to be guided to choose a good career direction.'*
- *'Easy access to lesson recordings.'*

The questionnaire results which were clearly asking students in advance of starting at the University did not highlight any other major themes that either support of disagree with the 4 pillars and outcomes of the Blake et al (2022) study. The students had not been in a university setting before, so they did not know in terms of what they would need to build their sense of belonging. However, what they did say broadly at this stage of the study was supportive of the connection and support pillars of the framework. There was less information forthcoming on the two pillars of inclusion and autonomy.

Reflective Journal

There were 20 students who completed reflective journals from the 1st term. The sample of students are selected from 3 CERTHE disciplines in Health & Social Care, Business skills for the workplace and Computing skills for the workplace. This journal was broken down into 4 sections and asked students to write their thoughts in their own time in terms of how they felt during their first few weeks with the University in terms of the Blake et al (2022) four pillars of belonging namely connection, inclusion, support and autonomy. Thematic analysis (Braun & Clarke, 2006) was used to generate themes from the reflective journal. There are 4 themes are found from the finding.

In terms of the connection theme the students' views strongly supported the key finding of the Blake et al (2022) study that being able to develop relationships with fellow students and staff through induction and group activities arranged by the University was vital to building their senses of belonging.

For example students commented:

- *'I feel connected and included...on campus.'*
- *'I feel part of UWTSD.'*

Less evident from the journal in the first term was students discussing the importance of online spaces or personal tutors. Plus, a strong factor for students in building their connectedness was developing connections with academic staff.

For example students commented:

- *'I feel supported when access online learning materials on Moodles.'*
- *'Online session and 1-1 face-to-face support are supportive.'*

In terms of the other 3 pillars of inclusion, support and autonomy the key areas that these students commented on in their journals that agreed with the Blake et al (2022) study was in relation to the importance of building an inclusive learning community.

For example students commented:

- *'Giving me advice and explaining what i did wrong so i can learn from my mistakes...'*
- *'Feedback is important and opportunities for us to practice is also important.'*

In terms of support the students felt they were being well supported across a range of academic and non-academic areas and that they found the support accessible and useful in building their confidence and sense of belonging, The support included support from key service areas such as disability and other areas. There was unambiguous evidence that students felt the services offered were inclusive and accessible.

For example students commented:

- *'....Digital skills and library sessions are helpful.'*
- *'Disability team is very helpful when I had 1-1 session with staff...other support services too.'*

Where our findings differ from the Blake et al (2022) four pillars of connection, inclusion, support and autonomy in relation to the students journal submissions is that students identified what we are calling a range of Opportunities that would enhance their sense of belonging that including the opportunity to enhance their employability skills both with and outside the University in roles such as student representatives and student ambassadors as well as developing their digital and academic skills.

For example students commented:

- *'Career services, I am looking for support.'*
- *'Looking for opportunities to practice my skills.'*

Focus Groups

In the focus groups students were asked questions in their first term about the Blake et al (2022) 4 pillars of connection, inclusion, support, and autonomy. The findings of the focus groups broadly validate the importance of the 4 pillars in building a sense of belonging.

There were a range of student comments across the 4 themes that provide evidence of this namely:

Connection

- *'Feel comfortable being in university.'*
- *'Easy access with Hwb, online resources.'*
- *'I know where to go and find the teams when I need supports, like IT, career team, wellbeing team.'*

Inclusion

- *'I like the learning space, lounge area in Lousia House.'*
- *'I feel welcomed...diversity at the university, different culture.'*

Support

- *'Digital skills support helps me to settle into the course.'*

Autonomy

- *'We created WhatsApp group when we start the course...we help each other when we have questions....'*
- *'Being student rep help us to feedback...'*

What came through strongly from students is the importance of building their skills to access the range of support services to enable them to build their sense of belonging. The focus here was on the ability to build their digital and English language and academic skills and in doing so get feedback on their progress. Students felt this support and feedback would build their confidence and sense of belonging.

Implications & Future Research

Overall, this study to date validates the findings of the Blake et al (2022) Building Belonging study and the importance of the 4 pillars of the framework in building student sense of belonging namely connection, inclusion, support, and autonomy.

One of the key differences of this study in terms of the findings from this study in relation to the Blake et al (2022) Building Belonging framework and four pillars of connection, inclusion, support and autonomy is that of adding a fifth pillar of Opportunities. This could be opportunities in to build skills in relation to employment and volunteering opportunities inside or outside the University and both paid and unpaid roles. These Opportunities the students spoke of in building their confidence and sense of belonging related to digital and academic skills. Many of these opportunities exist for students in the sector but are usually offered later in the student journey and not from the first term. Our findings suggest that offering these additional opportunities from the outset of the student journey could be useful in developing student sense of belonging.

This study is ongoing, and students will continue to add to their reflective logs on the four pillars in next term and will also take part in further focus groups on the same four themes.

Conclusion

In conclusion, this study to date has broadly validated the Blake et al (2022) Building Belonging framework and its four pillars of connection, inclusion, support, and autonomy in enabling students from a widening access background to build their sense of belonging. The two pillars of connection and support were felt to be the most important to widening access students in building their sense of belonging.

This study suggests that adding a fifth pillar of Opportunities for skills development including formal and informal opportunities particularly in relation to employability skills was going to be important in building students' sense of belonging. These opportunities also

related to student building digital and academic skills to enhance their confidence and build their sense of belonging.

References

Ahn, M. Y., & Davis, H. H. (2020). Four domains of students' sense of belonging to university. *Studies in Higher Education*, *45*(3), 622-634.

Braun, V. and Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3 (2). pp. 77-101. ISSN 1478-0887 Available from: http://eprints.uwe.ac.uk/11735

Blake, S., Capper, G. and Jackson, A. (2022). Building Belonging in Higher Education: Recommendations for developing an integrated institutional approach (wonkhe.com).

Creswell, J. W., & Creswell, J. D. (2005). Mixed methods research: Developments, debates, and dilemmas. *Research in organizations: Foundations and methods of inquiry*, *2*, 315-326.

Evans, J. R., & Mathur, A. (2005). The value of online surveys. *Internet research*, *15*(2), 195-219.

Hardy, C., & Bryson, C. (2016). The salience of social relationships and networks in enabling student engagement and success. *Student Engagement in Higher Education Journal*, *1*(1).

Krueger, R. A. (1998). *Analyzing and reporting focus group results*. Sage.

Masika, R., & Jones, J. (2016). Building student belonging and engagement: Insights into higher education students' experiences of participating and learning together. *Teaching in higher education*, *21*(2), 138-150.

Mckendry, S., Wright, M., & Stevenson, K. (2014). Why here and why stay? Students' voices on the retention strategies of a widening participation university. *Nurse education today*, *34*(5), 872-877.

Means, D. R., & Pyne, K. B. (2017). Finding my way: Perceptions of institutional support and belonging in low-income, first-generation, first-year college students. *Journal of College Student Development*, *58*(6), 907-924.

Meehan, C., & Howells, K. (2019). In search of the feeling of 'belonging'in higher education: Undergraduate students transition into higher education. *Journal of Further and Higher Education*, *43*(10), 1376-1390.

Moore, J., Sanders, J., & Higham, L. (2013). Literature review of research into widening participation to higher education. *Report to HEFCE and OFFA. AimHigher Research & Consultancy Network*.

Ortlipp, M. (2008). Keeping and using reflective journals in the qualitative research process. *The qualitative report*, *13*(4), 695-705.

Read, B., Archer, L., & Leathwood, C. (2003). Challenging cultures? Student conceptions of belonging and isolation at a post-1992 university. *Studies in higher education*, *28*(3), 261-277.

Rubin, M., & Wright, C. L. (2017). Time and money explain social class differences in students' social integration at university. *Studies in Higher Education*, *42*(2), 315-330.

Strayhorn, T. L. (2018). *College students' sense of belonging: A key to educational success for all students*. Routledge.

Thomas, L. (2012). Building student engagement and belonging in Higher Education at a time of change. *Paul Hamlyn Foundation*, *100*(1-99), 1-102.

Thomas, L. (2013). 'What works? Facilitating an effective transition into higher education', *Widening participation and lifelong learning*, 14(1), pp. 4–24. Available at: https://doi.org/10.5456/WPLL.14.S.4

Thompson, D. W. (2019). Widening participation research and practice in the United Kingdom on the twentieth anniversary of the Dearing report, reflections on a changing landscape. *Educational Review*, *71*(2), 182-197.

Tian, X., Liu, X., Xiao, Z., & Lin, Q. (2023). Undergraduates' Negative Emotion and Academic Procrastination During COVID-19: Life Autonomy as a Mediator and Sense of School Belonging as a Moderator. *Psychology Research and Behavior Management*, 3151-3169.

Vekkaila, J., Pyhältö, K., Hakkarainen, K., Keskinen, J., & Lonka, K. (2012). Doctoral students' key learning experiences in the natural sciences. *International Journal for Researcher Development*, *3*(2), 154-183.

Vignoles, A., & Murray, N. (2016). Widening participation in higher education. *Education Sciences,* 6(2), 13.

Empowering Success: Strategies for Widening Participation Students Facing Personal Commitment Challenges

Mark Gallagher-Read, University of Wales Trinity St David, United Kingdom
Besty Jose, University of Wales Trinity St David, United Kingdom
Stephanie Ng, University of Wales Trinity St David, United Kingdom
John Deane, University of Wales Trinity St David, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This research offers an exploration into the challenges faced by the widening participation students with a specific emphasis on mature individuals. Widening participation in higher education has evolved beyond addressing socio-economic disparities to include individuals who, despite underachieving in school due to disadvantaged circumstances, can benefit from higher education. Existing research suggests that mature students often struggle with their innumerable challenges including time constraints, family responsibilities and financial pressures which can significantly impact their educational journey. This study employed a qualitative research design, to explore the multifaceted experience of student success for mature students in widening participation. This study collected data from nine students from a UK higher education institution focusing on widening participation. Data collected through in-depth semi-structured interviews are analysed using thematic analysis. This study provides constructive perceptions of student success, indicating that success extends beyond traditional metrics of academic achievement. Academic success includes a personal conquest of different personal obstacles including family commitments, mental health and serious physical health conditions. It also identified that student success is perceived as a holistic and shared experience of students. This study not only contributes to the broader discourse of inclusive education, but also provides evidence-based strategies for universities to support the complex needs of mature widening participation students. The empirical findings of this study are set to transform institutional policies and practises, creating an atmosphere that catalyses the success of mature widening participation students in higher education.

Keywords: Student Success, Widening Participation, Mature Students, UK Higher Education

iafor
The International Academic Forum
www.iafor.org

Background

The notion of 'widening participation' in UK higher education policy is aimed at increasing access to university education for underrepresented and disadvantaged groups (Whitty, Hayton, & Tang, 2015; Harman, 2017). This approach to policy has been a foundation of educational change, which is intending to further a more inclusive and diverse academic environment, particularly for those students originating from underprivileged and challenging social-economic circumstances. The historical context of this policy is embedded in the notion that higher education can be an influential instrument of social mobility, since specific demographics have been disproportionately omitted from this opportunity (Kromydas, 2017).

The UK government, along with higher education institutions, have mostly worked to remove obstacles to university access, such as socioeconomic circumstances, ethnicity, and educational difficulties. The widening participation agenda has progressed over the years, with the formation of the Office for Fair Access and the Higher Education Funding Council for England, before consolidating into the UK Research and Innovation and Office for Students (OfS) in 2018, endorsing funding programmes to back this cause (Gallardo, 2016; OfS, 2019).

Given the amount of investment into widening participation, measuring and understanding success is necessary for several reasons. Firstly, it lets policymakers and educators grasp the effectiveness of the approaches and strategies deployed in this area. With no measurement, it is difficult to gauge progress or classify areas that demand additional focus and improvement. Secondly, success metrics deliver accountability, guaranteeing that resources apportioned to widening participation are used efficiently and lead to demonstrable outcomes which can support progress in this area (Pickering, 2021). Thirdly, by appraising the impact of these policies, universities can enhance their approaches, adapting interventions to the needs of their student and local populations (Millward, 2023).

The metrics utilised to measure success in widening participation often incorporate the number of students from underrepresented backgrounds applying to and enrolling in higher education, their retention rates, and academic achievements (Harrison & Waller, 2017). Nevertheless, this range of measurement has expanded to contemplate longer-term outcomes, such as graduate employability and progression to postgraduate study. This wider perspective recognises that admission to university is just the first step in a journey of educational and professional development (Cheng et al., 2022).

The significance of measuring success in widening participation should not be exaggerated. It not only supports the attempts made but further emphasises the transformative ability of higher education in changing life trajectories (Simpson & Hope, 2024). As the UK grapples with the complexities of educational inequality, the purpose of measurement in driving the widening participation agenda forward continues to be necessary. It is through this rigorous method of appraisal and contemplation that universities can persist in breaking down barriers and construct an increasingly equitable environment for all learners.

The backdrop of UK higher education policy associated to widening participation is profoundly connected with the nation's obligation to social equity and is underwritten in the idea as education being a mechanism for change. The measurement of success is not simply a bureaucratic undertaking but a structural aspect of policy development and implementation. It guarantees that the principled ambition of widening participation converts into real-world

impact, permitting a varied range of students to achieve their academic and professional capability within the UK and beyond.

Specific strategies for widening participation in UK universities incorporate a breadth of proposals aimed at tackling inequalities in higher education entry and attainment. These strategies are multifaceted, indicating the complex characteristics of barriers faced by understated groups. Clements, Davies and Mountford-Zimdars (2021) recognise one significant approach is the growth in outreach programmes, which involve universities connecting with schools and communities to raise aspirations and offer information about higher education opportunities. Outreach activities can present in many ways, such as campus visits, workshops, mentorship schemes, and enhanced induction programmes, all constructed to demystify university life and study. Another approach is the provision of financial support, which aims to lessen the economic barriers that may discourage prospective students from lower-income backgrounds engaging. Universities can also use circumstantial admissions policies and procedures, where a student's background and circumstances are considered during the application process. This can mean amending entry requirements for students who have faced substantial educational or personal challenges.

Support does not end at admission; retention and success are significant elements of widening participation and the developing an effective student journey. Universities can provide a selection of support services, such as academic tutoring, mental health counselling, wellbeing support and career and employment advice, adapted to the needs of students from diverse backgrounds (Dost & Mazzoli Smith, 2023). Moreover, there is an emphasis on the progression of students into employment or further study, with programmes to improve employability and support networking prospects. As noted by Hayton and Bengry-Howell (2017), the application of data and evidence to inform practice in this area is a further strategic consideration, safeguarding that interventions are effectively measured, and resources are directed to where they can have the most notable impact. Collective efforts between higher education institutions and diverse stakeholders, such as local authorities and third-sector organisations, are also important in establishing a consistent and reassuring environment for students. Moreover, universities are encouraged to promote equality and diversity within their institutional culture, which incorporates training staff on inclusivity and unconscious bias, as well as encouraging a curriculum that reflects a diverse array of perspectives (Jongbloed, Enders, & Salerno, 2008; Hubble, S. & Connell-Smith, 2018; Chima & Onyebuchi, 2024).

These strategies are not static; they alter in response to continuing research, the varying requirements of society and governmental ambition. Universities are progressively implementing a complete student lifecycle approach, acknowledging that widening participation is a constant process that reaches beyond initial access concerns to incorporate a full student experience.

Approaches to widening participation strategies in the UK need to be far-reaching, clearly defined yet dynamic, adopting a multi-stage approach to understanding the student journey from pre-entry to success. Understanding the full meaning of what success looks like for widening participation students is key to defining how institutions can adapt and support this growing student population.

Method

In our study, we applied the tradition of qualitative research (Tomaszewski, Zarestky, & Gonzalez, 2020; Given, 2021; Cropley, 2023) to understand what academic success means to our wider participation students at UWTSD Birmingham Campus. We conducted nine semi-structured interviews with participants who met our eligibility criteria being: students who have completed at least two terms, maintained a minimum attendance rate of 70%, and passed all their modules. This selection process ensured that the participants had sufficient experience and engagement with the campus milieu and academic prerequisites.

The qualitative interviews were undertaken to extract rich, detailed information from the participants, letting them express their thoughts and feelings in their own words. Each interview was recorded with the consent of the participants, ensuring accurate capture of the students' responses for subsequent analysis.

The subsequent data collection, we undertook a thematic analysis approach to the interview transcripts. This included a rigorous process of coding the data to identify patterns and themes that emerged from the participants' narratives (Saunders et al., 2023). Our analysis was iterative, moving between the dataset and the developing themes to guarantee a comprehensive understanding of the data.

Drawing on Clarke and Braun (2016) approach to thematic analysis, this methodology delivered a robust framework for exploring the complexities of widening participation student experiences in higher education. The approach to thematic analysis allowed us to draw meaningful insights into the students' academic journeys, underlining the factors that contribute to their success and recognising the challenges they face. The findings from this study are expected to inform strategies for enhancing student support and engagement at UWTSD Birmingham Campus and beyond.

Findings

This study aimed to identify how widening participation students perceived success in higher education using semi-structured interviews. From the analysis, we received a different outcome than expected as we learned that the student's success is unique. We decided to embrace the unique perspective to keep the definition of success open. By valuing their perspectives, we allowed for a broader understanding of student success that represents each person's unique experiences and development as a student. Our study associated the unique experiences into 4 themes. They are:

- Success as a personal conquest
- Success as academic achievement
- Success as a holistic experience
- Success as a shared experience

Success as a Personal Conquest

A few students equated success with overcoming personal obstacles. For them, making an effort to get up in the morning and making their way to the university itself is a victory for them. Students struggling with their mental health, family commitments or serious health problems like cancer etc described their daily journey as 'success'. Their stories highlight the resilience and determination to navigate higher education in the face of adversity. This

perspective highlights a different dimension of success – one that is deeply personal and often invisible to others.

> P2: *"Academic success is going to that uni for three years, despite all the personal challenges including my serious physical health conditions and giving your life to that university for when you're in university."*

Moreover, personal growth and self-efficacy emerged as a key factor for student success. Students frequently mentioned gaining confidence as an indicator of success.

> *P3: "I think it's my confidence as well, the fact that I literally started with no confidence, and the fact that I actually stepped foot into uni was my first stepping stone, and now I know I can do it, but it's the self-belief, that strives me."*

Another student affirms personal growth through their academic journey as success.

> *P6: "What academic success is, that achieving what you aimed for, and making sure that you created an example of yourself as a role model for students to follow and to look up to you."*

Students with substantial family commitments view success as balancing their academic and personal life is in itself a success for them. One student undergoing cancer treatment defined success as the ability to continue to attend studies while undergoing treatment. For that student, it is the resilience and determination to continue studies in the face of overwhelming personal challenges is all about success.

Therefore, this theme suggests that academic success is very personalised at the individual level extending beyond academic accomplishments.

Success as Academic Achievement

Academic performance also remained an important determinant of success among the participants. Students who performed well determined higher grades and awards as an indicator of their success.

> *P1: "Academic success, it's where the mark you get, it tells you how much you've understood about the subject, the feedback you get from lecturers tells you your success rate or where you stand, the discussions, it tells you you're understanding your contribution, it tells you you're understanding... I used the grades, to be honest, the grades to measure the success. But I know some people would say 40%, as long as you get your pass, yes, fair play, but as I said, we're aiming for the higher grades."*

Gaining an award for the highest marks gave the student confidence to learn more and the student perceived this as a success indicator.

> P3: "*I can't believe it's actually me that's getting the award, and I think that's down to the fact that I've never had confidence in myself. But it proved to me that I can do it, so to me that's my academic success.*"

Therefore, this theme suggests that success is perceived as tangible outcomes such as grades or awards, that validate their hard work and intellectual capabilities.

Success as a Holistic Experience

A holistic view of success emerged from the data incorporating academic, social, personal and career dimensions. Some students highlighted the importance of balancing academic commitments, social connections, personal challenges and work to succeed. Success is perceived as an integration of these aspects.

> *P5: "So we have the other commitments and then we have the academics as well. So academia and university, personal life, social life, work life etc so managing everything and then achieving something which I wanted to, so I got some confidence and then I got motivated. So I felt like, "Now I can do something. This is a big success for me."*

Another student perceives success as fully engaging in personal, academic and extra-curricular activities and applying it in real-world situations.

> *P9: "Reading books is not learning, unless you apply and implement whatever you have studied. So, for me, academic success is in this field, I go, and then I apply everything. By then, I will learn more than by reading the books, because, you know, the especially few things we did and then we forget, to be honest with you, unless we use them in our life."*

Therefore, this theme suggests that students perceive success as a holistic experience that includes academic achievements, social connections you build, personal life balance and applying your learning to work and real-world scenarios. Success is not confined to the classroom or measured by grades, it is a balance between academic responsibilities, work, and the sense of wellbeing you receive with all your interactions at the University.

Success as a Shared Experience

The narratives from a few students highlighted success as a shared experience. One student shared that the ultimate symbol of success is walking across the stage at the graduation with family watching it online from abroad.

> *P6: "the things is that walking on the stage, as a graduate, that was one thing that made me feel that I have done it. And I'm going to go back in the emotions again, because I was on video call with my mum and my sister. They were back home in Pakistan and I could see my sister jumping with joy and crying her eyes out and she was like that 'it wasn't just an achievement for yourself, it was an achievement for all of us."*

Another student highlighted that success is a shared achievement of my commitment and my children's motivation.

> *P3: "But the support that my children have given me, it's been wicked. It was my son that was pushing me, my older son that was pushing me to do a master's, without their motivation I wouldn't be able to succeed. They are part of this success."*

Therefore, this theme suggests that success is not just a personal accomplishment but a collective journey, where the contributions from others especially family members play a crucial role in helping students achieve success. Participants also described significant milestones such as graduation as a success indicator, but the moments are perceived as a collective celebration reflecting the contributions and support from family members.

The findings of this study reveal that success is a complex and deeply personal concept, extending far beyond the traditional academic metrics of grades. Success is not only defined by high grades but also as a personal conquest of overcoming adversities and pursuing education. The students also acknowledge success as a holistic experience, especially for the widening participation students where they try to balance personal, professional, academic and social life. Finally, success can also be viewed as a shared experience by our students where a collaborative working with them and their families who have supported them along the way to achieve their goals.

Implications to Practice

The findings of this study challenge the traditional view that student success solely depends on academic achievement, enrolment and retention numbers (Harrison & Waller, 2017). Instead, this study shows that success is a very complex construct and is very personal depending on the student's circumstances, goals and broader contextual factors. These findings have significant implications for higher education institutions.

Higher education institutions specifically with a widening participation agenda should recognise the personal challenges that many students face including family commitments, mental and physical health issues. A comprehensive support mechanism should be in place to support students facing the above challenges. This support mechanism will enable students to overcome the challenges resulting in higher retention and success rates. This is consistent with previous literature outlining that universities should provide a selection of services to meet the diverse needs of the students (Dost & Mazzoli Smith, 2023).

As this study indicated success constitutes beyond grades and awards and therefore recognising consistent effort, improvement over time and the application of knowledge in a practical context should be implemented. This will motivate students when they have achieved grades and other personal growth. This is consistent with Cheng et al. (2022) highlighting that a wider perspective should be adopted in acknowledging student success. Finally, creating and fostering a supportive and inclusive campus environment is crucial for creating a sense of belonging in students where their success is celebrated collectively. This could involve organising events that recognise not only academic achievements but also personal milestones and contributions to the campus community.

Conclusion

This study provides valuable insights into the multifaceted perceptions of student success, indicating that success extends beyond traditional metrics of academic achievement. Academic success includes a personal conquest of different atrocities and holistic and shared experiences of students. The findings imply that higher education institutions should take a more comprehensive approach to student support, recognising the diverse issues and ambitions that form part of the student journey. By providing a supportive environment that

values both academic and personal growth, universities can meet the needs of their diverse student populations.

However, this study has some limitations that should be acknowledged here. The findings of this study are based on a sample size of nine semi-structured interviews. Due to this sample size, the perspectives of a broader student population may not be fully captured. The qualitative nature of the study also limits the generalisability of the results as the insights gained are context-specific to widening participation and may not apply to traditional settings. Future studies should be conducted in a larger sample size and in multiple contexts to gain a deeper understanding of student success. Despite these limitations, this study contributes to a unique and deeper understanding of how students perceive success in widening participation institutions.

References

Cheng, M., Adekola, O., Albia, J., & Cai, S. (2022). Employability in higher education: A review of key stakeholders' perspectives. *Higher Education Evaluation and Development,* 16 (1), 16-31. https://doi.org/10.1108/HEED-03-2021-0025

Clarke, V., & Braun, V. (2016). Thematic analysis. *The Journal of Positive Psychology,* 12 (1-2), 1-2. https://doi.org/10.1080/17439760.2016.1262613

Clements, N., Davies, S., & Mountford-Zimdars, A. (2021). How professionalisation of outreach practitioners could improve the quality of evaluation and evidence: A proposal. *Perspectives: Policy and Practice in Higher Education,* 26 (2), 63–68. https://doi.org/10.1080/13603108.2021.1993375

Cropley, A. (2023). Qualitative research methods: A practice-oriented introduction.

Dost, G., & Mazzoli Smith, L. (2023). Understanding higher education students' sense of belonging: A qualitative meta-ethnographic analysis. *Journal of Further and Higher Education*, 47(6), 822–849. https://doi.org/10.1080/0309877X.2023.2191176

Eden, C., & Chisom, O. (2024). Cultural competence in education: Strategies for fostering inclusivity and diversity awareness. *International Journal of Applied Research in Social Sciences*, 6(3), 383-392. https://doi.org/10.51594/ijarss.v6i3.895

Gallardo, C. (2016). 'Balanced funding' replaces dual support in bill before parliament. *Research*. Retrieved July 4, 2024, from https://www.researchresearch.com/news/article/?articleId=1360327

Given, L. M. (Ed.). (2021). The SAGE encyclopedia of qualitative research methods: Third Edition (Vols. 3-0). SAGE Publications, Inc. https://doi.org/10.4135/9781412963909

Harman, K. (2017). Democracy, emancipation and widening participation in the UK: Changing the 'distribution of the sensible.' *Studies in the Education of Adults, 49* (1), 92–108. https://doi.org/10.1080/02660830.2017.1283757

Harrison, N., & Waller, R. (2017). Success and impact in widening participation policy: What works and how do we know? *Higher Education Policy,* 30, 141–160. https://doi.org/10.1057/s41307-016-0020-x

Hayton, A., & Bengry-Howell, A. (2016). Theory, evaluation, and practice in widening participation: A framework approach to assessing impact. *London Review of Education*, 14, 41-53. https://doi.org/10.18546/LRE.14.3.04

Hubble, S., & Connell-Smith, A. (2018). House of Commons Library, widening participation strategy in higher education in England. Retrieved July 7, 2024, from https://commonslibrary.parliament.uk/research-briefings/cbp-8204/

Jongbloed, B., Enders, J., & Salerno, C. (2008). Higher education and its communities: Interconnections, interdependencies and a research agenda. *Higher Education*, 56 (3), 303–324. https://doi.org/10.1007/s10734-008-9128-2

Kromydas, T. (2017). Rethinking higher education and its relationship with social inequalities: Past knowledge, present state and future potential. *Palgrave Communications*, 3(1). https://doi.org/10.1057/s41599-017-0001-8

Millward, C. (2023). Balancing the incentives in English higher education: The imperative to strengthen civic influence for levelling up. *Contemporary Social Science*, 18(3-4), 485–499. https://doi.org/10.1080/21582041.2023.2219664

Office for Students. (2019). English higher education 2019: The Office for Students annual review. Retrieved July 4, 2024, from https://www.officeforstudents.org.uk/annual-review-2019/a-new-approach-to-fair-access-participation-and-success/

Pickering, N. (2021). Enabling equality of access in higher education for underrepresented groups: A realist 'small step' approach to evaluating widening participation. *Research in Post-Compulsory Education*, 26(1), 111–130. https://doi.org/10.1080/13596748.2021.1873410

Saunders, C. H., Sierpe, A., von Plessen, C., Kennedy, A. M., Leviton, L. C., Bernstein, S. L., et al. (2023). Practical thematic analysis: A guide for multidisciplinary health services research teams engaging in qualitative analysis. *BMJ, 2023*, https://doi.org/10.1136/bmj-2022-074256

Simpson, A. V., & Hope, D. (2024). From policy to practice: Measuring success in widening participation. *Medical Education*, 1-3. https://doi.org/10.1111/medu.15443

Tomaszewski, L. E., Zarestky, J., & Gonzalez, E. (2020). Planning qualitative research: Design and decision making for new researchers. *International Journal of Qualitative Methods*, 19. https://doi.org/10.1177/1609406920967174

Whitty, G., Hayton, A., & Tang, S. (2015). Who you know, what you know and knowing the ropes: A review of evidence about access to higher education institutions in England. *Review of Education*, 3(1), 27-67. https://doi.org/10.1002/rev3.3038

Digital Diagnostics and Individualized Support for Reading at the Primary Level With Formative Assessment

Judith Hanke, Europa-Universität Flensburg, Germany

The European Conference on Education 2024
Official Conference Proceedings

Abstract
A lot of students have reading difficulties and need reading support (Mullis et al., 2023). To address this need, the *DaF-L* project developed a digital screening for students' reading abilities as well as aligned digital reading support with diagnostics to foster the individual student's reading comprehension. The reading packages were developed for three reading ability levels. The reading packages consist of the same story line for the literary texts and the same exercise formats with some variation depending on the reading ability level. One key importance of the screening and reading packages is digitalization. Digitalization provides a flexible and easy way to provide individualization as well as collect data for diagnostics. The digital reading packages support different ability levels and individualized learning, where students can work on the exercises at their own speed with integrated tools such as immediate individualized feedback, second try-options, and solutions. The digital reading packages can be used as a diagnostic tool for formative assessment, which enables teachers to support students in the best way possible. The screening, as well as the reading packages are accessible as an Open Educational Resource (OER) to support teachers and students. This approach of an individualized digital reading support with diagnostic functionality for formative assessment as an OER is new and exceptional. The presentation will discuss the conception of the reading packages with focusing on digitalization including the SAMR-Model (Puentedura, 2006; Puentedura, 2020a; Puentedura, 2020b), pedagogical usability (Nokelainen, 2006), a Heuristic for Thinking About Reading Comprehension (Kirby, 2003), and formative assessment (OECD, 2005).

Keywords: A Heuristic for Thinking About Reading Comprehension, Formative Assessment, Pedagogical Usability, Reading Support Packages, SAMR-Model

iafor
The International Academic Forum
www.iafor.org

Introduction

The results of the 2022 Programme for International Student Assessment (PISA) (OECD, 2023) and the 2021 Progress in International Reading Literacy Study (PIRLS) (Mullis et al., 2023) clearly illustrate the urgent need in Germany (and other European countries) to take targeted measures to promote reading. Therefore, Germany's Standing Conference of the Ministers of Education and Cultural Affairs recommends an intensification of diagnostics and appropriate support for reading (abilities) at a young age (Köller et al., 2022). Digitalization is increasingly essential for diagnostics and reading support in schools. Since 2016, PIRLS has not only been carried out as a computer-based assessment, but also focuses on digital forms of reading (Diehl & Hanke, 2024; Hanke & Diehl, 2024b; Junger & Hanke, 2024; Mullis & Martin, 2019).

The collaborative project *Digital Support Diagnostics Integrated Into Everyday Life - Reading In Inclusive Education* (own translation) [*Digitale alltagsintegrierte Förderdiagnostik - Lesen in der inklusiven Bildung (DaF-L)*] uses digitalization to improve reading support and diagnostics. *DaF-L* is funded by the German Federal Ministry of Education and Research and aims to further develop the diagnostic and support tools on the online learning platform *Levumi* (www.levumi.de) (Gebhardt et al., 2016; Jungjohann et al., 2018; Mühling et al., 2017). (Diehl & Hanke, 2024; Hanke & Diehl, 2024b; Junger & Hanke, 2024).

In order to achieve this goal, the project developed a screening and reading support for elementary school children. The *LesIn* screening (Ebenbeck, 2023) is a test to obtain the students' reading abilities. The reading support are the *Reading Path* reading packages (Hanke & Diehl, 2024). The packages consist of eleven digital reading packages with formative assessment that are tailored to reading screening and promote reading skills with a focus on reading comprehension. With the tools for diagnostics (screening) and support (reading packages) established on a common theoretical basis, it is possible to effectively record, observe, and document the learning progress of students. Through the reading packages and in the context of formative assessment, teachers and students can receive valuable feedback (Hattie, 2014, p. 276). Based on the SAMR model (Puentedura, 2006; Puentedura, 2020a; Puentedura, 2020b), the digitalization of the *Reading Path* reading packages offers a modification from an analog to a digital format. The *LesIn* screening and the *Reading Path* reading packages form a comprehensive digital package with formative assessments to promote reading skills (Diehl & Hanke, 2024; Hanke & Diehl, 2024b; Junger & Hanke, 2024).

This article aims to explain the digitization of reading packages in the context of formative assessment by taking the SAMR model into account. In addition, reference is made to pedagogical usability and a Heuristic for Thinking About Reading Comprehension.

Formative Assessment

Assessments play an important role in determining students' competencies and providing individual support. According to the Council of Chief State Officers in the US (CCSSO), "Formative assessment is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes" (2023, p. 2). The overall goal of formative assessment is to collect extensive information about students' learning behavior over a certain period of

time and to use the obtained information in a timely manner to improve teaching and individualized support. Formative assessments are, in comparison to summative assessments, used to continually adapt teaching and learning processes. Because of their effectiveness in enhancing overall student achievement, formative assessment methods have been demonstrated to be crucial for promoting competencies (OECD, 2005). Formative assessments are increasingly becoming the focus of researchers and educators (CCSSO, 2023). With the use of formative assessments, students' learning behavior can be continuously monitored and evaluated. The teacher gains insight into the students' learning trajectories, can better classify performance if necessary and adapt support to individual needs (Connor, 2019; OECD, 2005). The continuous feedback provided to students as part of the formative assessment enables them to contemplate their learning process and make more targeted adjustments (Hanke & Diehl, 2024a; Hanke & Diehl, 2024b; Junger & Hanke, 2024).

Digitalization and Formative Assessment in School

The importance of digital media and digitally conveyed information has increased significantly in many areas of life and is now seen as indispensable for everyday school and professional life as well as lifelong learning (Lorenz et al., 2023). The integration of digital forms of reading into the PIRLS since 2016 and the expansion of the PISA in 2018 to include competency in *Digital Literacy* underline the growing importance of digital skills in the education sector (Garbe, 2020, p. 8; Mullis & Martin, 2019, pp. 7, 12, 42-43). In December 2016, the Standing Conference of the Ministers of Education and Cultural Affairs (KMK, 2017), launched an action plan for the future development of education with the strategy *Education in the Digital World*. This strategy defines the requirements that young people must meet in an increasingly digitally oriented society. In 2021, this strategy was supplemented by a set of recommendations in *Teaching and Learning in the Digital World,* which states that it is the task of teachers of all subjects to consider the changing conditions of teaching and learning in the context of digital change (KMK, 2022). Digitalization supports the formative assessment approach in a very economical way by amplifying its effectiveness and efficiency. Digital tools enable students to complete interactive tasks, check their answers, and receive immediate individual feedback. The immediate feedback helps students to work more specifically on their strengths and weaknesses. By using learning management systems or digital learning platforms, teachers can track the learning process in real time, and collect and analyze data about learning progress. Individual needs of students can be better recognized and appropriate support measures can be tailored to them (Hanke & Diehl, 2024b).

The Digital *Reading Path* Reading Packages

The digital *Reading Path* reading packages comprise literary texts and aligned reading exercises (Figure 1). These focus on a single reading skill (reading fluently) and two reading abilities (reading comprehension and strategies for reading comprehension). The main goal of the packages is the reading ability *reading comprehension*, which is set in bold in the figure below. The skill *reading fluently* and the ability *strategies for reading comprehension* are indirectly strengthened through the reading packages. Additionally, the packages incorporate formative assessment and diagnostics.

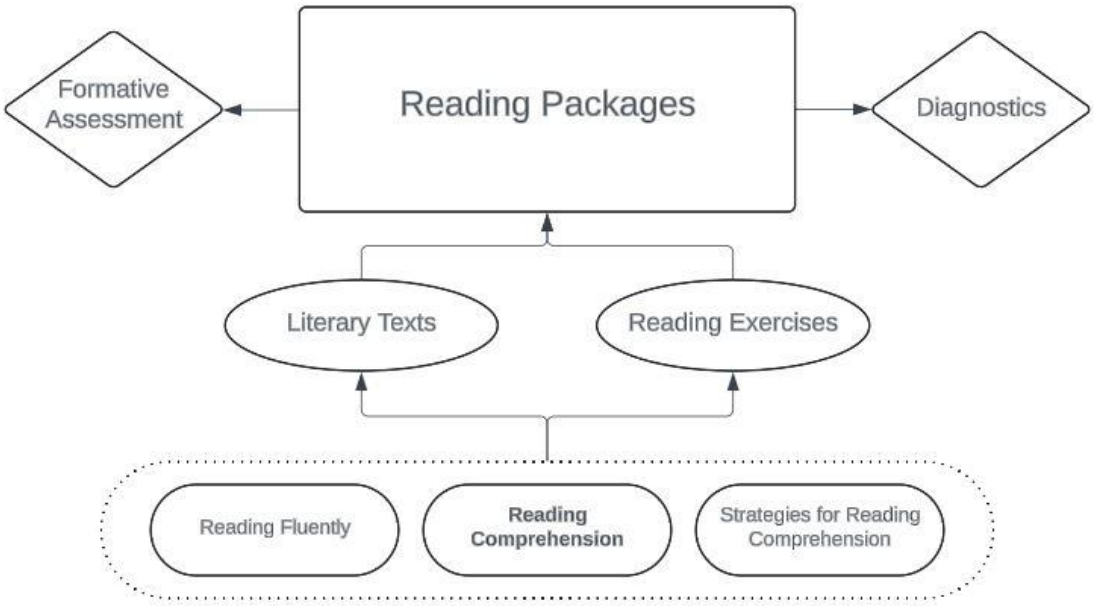


Figure 1: *Reading Path* Reading Packages (Hanke, 2024)

The reading packages are available in three different levels of difficulty. The previously mentioned screenings sorts the students into the appropriate ability level for the reading packages. The literary texts cover a variety of topics to offer students a wide range of reading experiences and to promote their interest in reading. The eleven reading packages can be used both as practice units and for formative assessment. All reading packages follow the same structure: the students first read the literary texts and then solve the aligned reading exercises. Each of the eleven reading packages contain a total of eight reading exercises with the formats: True/False, Multiple Choice, Sequence (determining the order), Find Errors, and Join Parts of Sentences (Diehl & Hanke, 2024; Hanke & Diehl, 2024a; Hanke & Diehl, 2024b).

As students work on the reading tasks in the reading packages, they receive immediate feedback. They also have the option of returning to a literary text at any time using a back to text button (text-lookback-strategy). This gives them the possibility to re-read the text to improve their understanding and to check their answers (Diehl & Hanke, 2024; Garner et al., 1984a; Garner et al., 1984b; Hanke & Diehl, 2024b).

Carrying out the reading tasks on tablets or a laptop offers additional advantages. For example, it enables students to work independently at their own pace in an appealing digital environment (further detailed in the *digitalization of the reading package*s section below). The management and evaluation of exercises is automated. This allows the teacher to concentrate on individual, pedagogical support of the students. Promoting student autonomy is an important aspect of the student-centered digital reading packages. By working independently on the tasks, students are encouraged to strengthen their reading and problem-solving skills and develop their independence.

SAMR Model

The digital design of the reading packages is based on the SAMR model (Figure 2). Puentedura (2006) developed this model as part of his work with the Maine Learning

Technologies Initiative. His goal was to promote the general use of technology (Romrell, 2014; Hamilton, 2016).

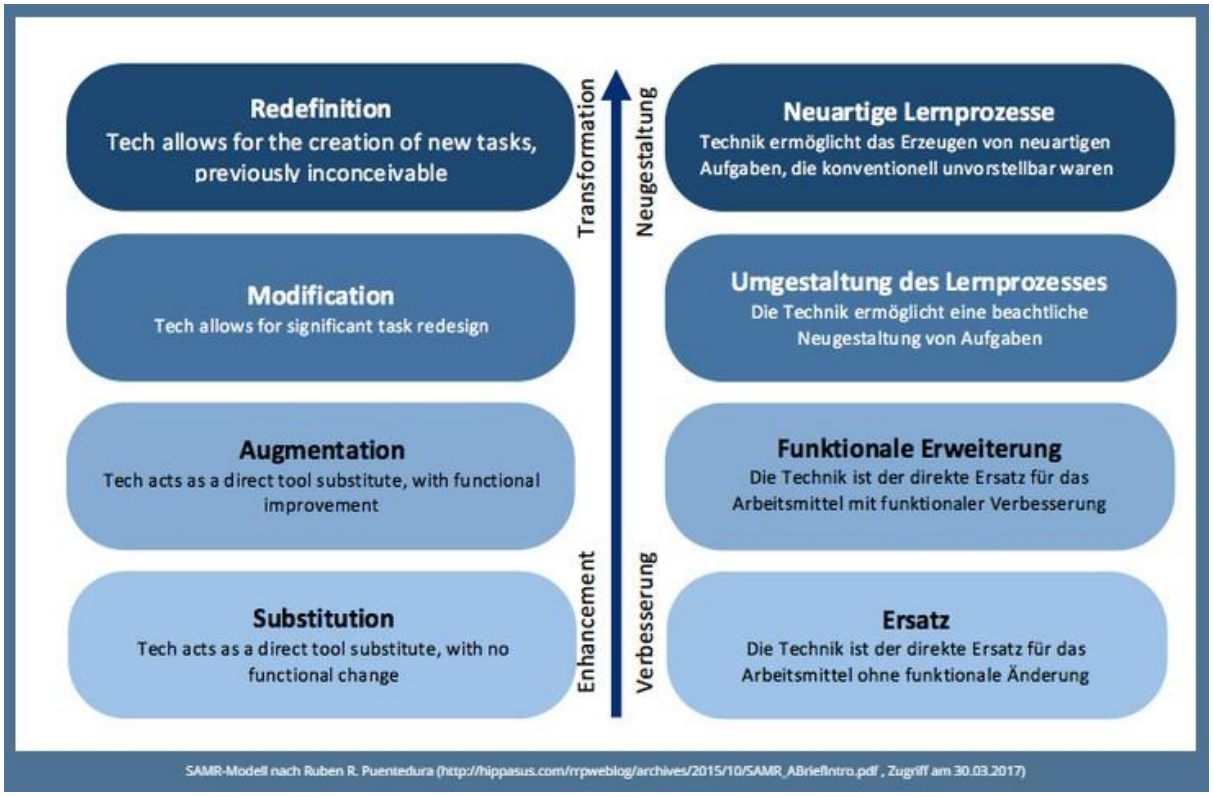


Figure 2: SAMR Model by Ruben R. Puentedura (Albrecht, n.d.)

In his model, Puentedura describes four classifications of technology use. *Substitution* involves the use of technology simply as a replacement for other learning activities without any functional change. In *augmentation*, technology serves as a replacement for other learning activities with functional improvements. *Modification* enables the redesign of the learning activity using technology and *redefinition* realizes the creation of tasks that would not have been possible without the use of technology (Hamilton et al., 2016; Puentedura, 2020a; Puentedura, 2020b; Romrell et al., 2014; Wahyuni et al., 2020).

The *Reading Path* reading packages can be classified as modification.

Substitution occurs as the reading packages are available in digital form. Augmentation involves a change in technology that positively changes the function of the task or tool. Instead of a traditional teacher-centered approach, relying on lesson group reading to complete the same tasks, students use handheld devices to read digital literary texts individually at the same time (cf. Hamilton, 2016, p. 4). This also applies to the reading packages, as the students can read the texts at their own pace and complete the aligned exercises; additionally, they receive reading packages tailored to their individual ability level, as the screening sorts them into the appropriate ability group. In the area of modification, students receive immediate feedback on their reading exercises (see Shippee, 2019). Moreover, students have the opportunity to obtain the correct solution or to attempt most of the exercises for a second time. In addition, data, such as the time required and the points achieved, are saved immediately. Motivating and navigational animations have been integrated. Detailed information on the digitization of the reading packages can be found in the *digitization of the reading packages* section.

Usability

Usability or user-friendliness is the ability of a system to give its users the opportunity to carry out tasks effectively and efficiently, as well as to be pleasant and easy to use. When it comes to websites or platforms, the focus is on the end user. Learning platforms have two important end users: teachers and students. Therefore, usability in this context evolves to pedagogical usability.

Nokelainen (2006) refers to 10 dimensions of pedagogical usability, which are as follows: 1. *Learner control*, 2. *Learner activity*, 3. *Cooperative/collaborative learning*, 4. *Goal orientation*, 5. *Applicability*, 6. *Added value*, 7. *Motivation*, 8. *Valuation of previous knowledge*, 9. *Flexibility* and 10. *Feedback* as well as 51 sub-categories (p. 181).

In the *DaF-L* project, the learning platform *Levumi* provides students with learning materials in the form of the *Reading Path* reading packages, which contain all of the 10 dimensions except *cooperative/collaborative learning* as the reading packages focus on the individual student's abilities and needs.

The reading packages incorporate *learner control* enabling readers to engage with material suited to their ability level. Additionally, the literary texts are segmented into three parts and the accompanying exercises are divided into eight sections; moreover, there are eleven reading packages structured similarly for further practice.

The *learner's activity* is the focus of the reading packages as students work individually on their own reading package while the teacher stays in the background. The reading packages are based on real life stories and of interest to students in elementary age.

The reading packages' *goal* is to increase the students' reading competency, a shared objective among the packages themselves, teachers, and students.

The *applicability* of the reading packages is that learners will need reading skills in their future school, working and general life. The skill of reading is transferable to all kinds of different situations in everyday life in order to be functioning citizens. Additionally, the reading packages were improved with the help of end-users (students and teachers) through interviews with teachers and participatory observation of students who used the reading packages in a reading intervention study. Furthermore, support structures such as formative assessment are integrated to aid student's learning. Moreover, teachers have the ability to observe the learner's activity using digital diagnostics and learning analytics.

The *added value* of the digital reading packages is that students work at their own speed and receive immediate individualized feedback, have the option for second tries, and revelation of solutions. Also, the digitalization of the reading packages reduces the teacher's workload, which consequently helps them support individual students. Additionally, all the data is saved digitally, that means that teachers can analyze student's learning and their learning behavior in order to support the individual student or to modify their lessons.

Observation protocols, attained during a study with the digital reading packages, showed that while working with these students were highly *motivated*. As mentioned before, the students were sorted into ability levels and received literary texts and exercises based on their abilities. Therefore, no student was over- or underwhelmed. One key aspect to the increase of

motivation is the avoidance of failure. This was achieved through the appropriate ability level of the reading packages as well as by the system. The system ensures that on the last page students would see the *Levumi* mascot, a little dragon, holding the trophy, even if they didn't finish all exercises, giving them a feeling of accomplishment. This amplified the motivation, sense of achievement, and pride in themselves. To avoid failure, students were given the option to use a skip-button, which was meant for exercises that were too difficult for the student.

The *valuation of previous knowledge* relates to the motivation and to the reading ability levels, emphasizing the importance of students working within their own ability range. Furthermore, the literary texts used topics and interests of elementary school students and the reading exercises were based on exercises formats found in elementary schools.

One objective of the digital reading packages was to provide continuous, personalized, and instant feedback through formative assessment. The students received feedback if their answer was correct, incorrect, or partly correct. Additionally, the students were able to ask for the solution and, depending on the exercise, the students had the option of a 2. attempt. This also helped the students to reflect on their reading and learning.

The digital reading packages offer a variety of *flexibility* as they were developed using the previously stated reading ability groups with ability-appropriate literary texts and eight suitable exercises. Additionally, students work at their own pace and receive individual support based on their needs.

A Heuristic for Thinking About Reading Comprehension

In addition to pedagogical usability, the complex interaction between the reader, the text, and the activities to promote reading comprehension in relation to digitalization is also considered. The model a Heuristic for Thinking About Reading Comprehension (Figure 3) developed by the Reading Study Group is suitable for this (Kirby, 2003, p. 2).

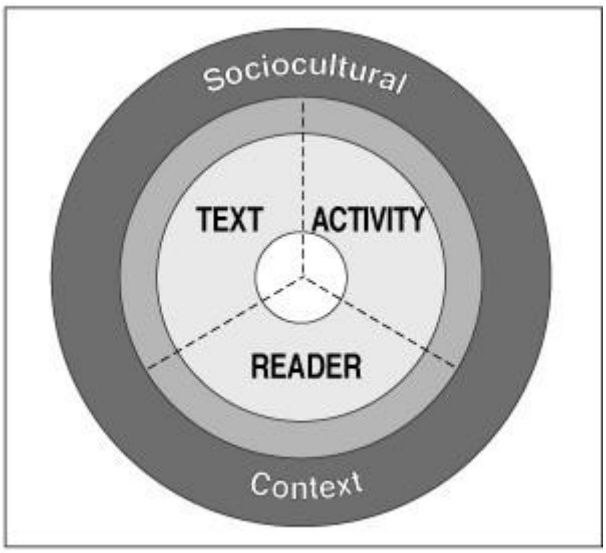


Figure 3: A Heuristic for Thinking About Reading Comprehension (Kirby, 2003)

The model embodies the three elements: the reader, the text, and the (reading) activity or purpose of reading. The heuristic shows how these elements are interconnected and

constantly interact, embedded in a socio-cultural context. The reader shapes these connections and is shaped by them. Throughout the reading process, the reader interacts repeatedly with each of these elements. Readers grasp the text and have the opportunity to deepen and develop their understanding using a variety of activities to promote comprehension. These activities can for example include reflection tasks. Particular emphasis is placed on the dynamic interaction between the reader, the text, and the activities, which together contribute to promoting reading comprehension. The context in which reading is taught also plays a crucial role, including the specific teaching situation. (Frankel et al. 2016; Kirby, 2003) With regard to the digital reading packages, there is an interaction between the digital literary text, the digital reading tasks, and the reading child. Furthermore, the digital reading packages are embedded into the digital learning platform. The extent to which digital reading formats redefine the interactions between the elements and help support students' reading skills needs to be examined.

Digitalization of the Reading Packages

A set time of 30 minutes is allotted for a reading package, including reading the text itself, working on the reading exercises, going back to reread the text, using the 2. attempt. All the durations, such as the time spent reading the text, working on the individual exercises, rereading the text, along with others, are automatically recorded and stored digitally. Consequently, the student's learning can be analyzed. Analytical metrics can be derived, such as how long they took to complete the reading packages, the count of individual exercises, and the time devoted to reading the text (Diehl & Hanke, 2024; Hanke & Diehl, 2024a).

This information can be used in regards to learning analytics, which collects, analyzes and reports data about learners and their contexts to better understand and to improve learning and learning environments. Learning analytics offers researchers and education professionals new opportunities to examine teaching and learning. The collection and analysis enable timely and accurate feedback to learners and provide valuable insights into the learning process for educators, instructional designers, and educational institutions. There are several benefits of learning analytics in education such as the ability to improve or adapt curricula, determining actual student performance, promoting personalized learning, improving teacher performance, and uncovering gaps between industry needs and academic research. A key advantage of learning analytics is that it enables early intervention if a student has difficulties. (Kollom et al., 2021; Hernández-de-Menéndez et al., 2022) In order for students to know if they got the question correct or incorrect colors for the feedback were implemented. The colors green and gray were chosen as the evaluation colors, with green indicating a correct answer and gray indicating an incorrect answer. These colors were preset by default. However, a color changing function has been implemented for children with color blindness or color vision deficiency, such as green-red blindness or blue-yellow blindness. In this way, students have the opportunity to customize the colors to their needs. A font is set as the default in *Levumi*; however, the teacher can change the font in their digital class book, if students need a different one. The reading packages also include the option of adjusting the font size, which the students can do themselves.

As mentioned before, *Levumi* does not only represent the platform, but also the mascot, a small dragon. Images and animations of the *Levumi* dragon are integrated into the digital reading packages to motivate the students. In addition, the mascot helps students navigate through the reading packages. In the literary texts, the *Levumi* dragon is shown reading a book. As stated previously, on the final page, the *Levumi* dragon is presented as an animation

with a trophy. The *Levumi* dragon illustrates the recognition and perseverance of the students. The "Done" button appears under the dragon and signals that the exercise is completed. The *Levumi* timeline (Figure 4) provides students with a comprehensive overview of their progress while working on the exercises (Diehl & Hanke, 2024; Hanke & Diehl, 2024a; Junger & Hanke, 2024).

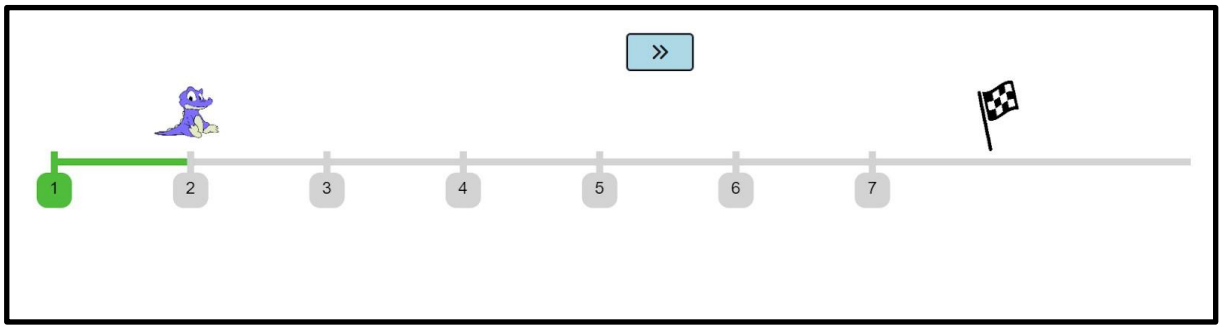


Figure 4: *Levumi timeline* (Gebhardt & Mühling (n.d.). Levumi. www.levumi.de, 2023)

Using this bar, the students can easily see what exercise they are currently working on, what exercise they have already completed, and what exercise lies ahead. This visual aid helps students monitor their own learning and keep track of their work progress.

Exercise 8 was not included in the timeline as this task is an additional exercise for fast-working students. This approach considers the different needs and working speeds of the students are considered.

On the introductory page of the reading packages (Figure 5), students are provided with various interactive buttons.

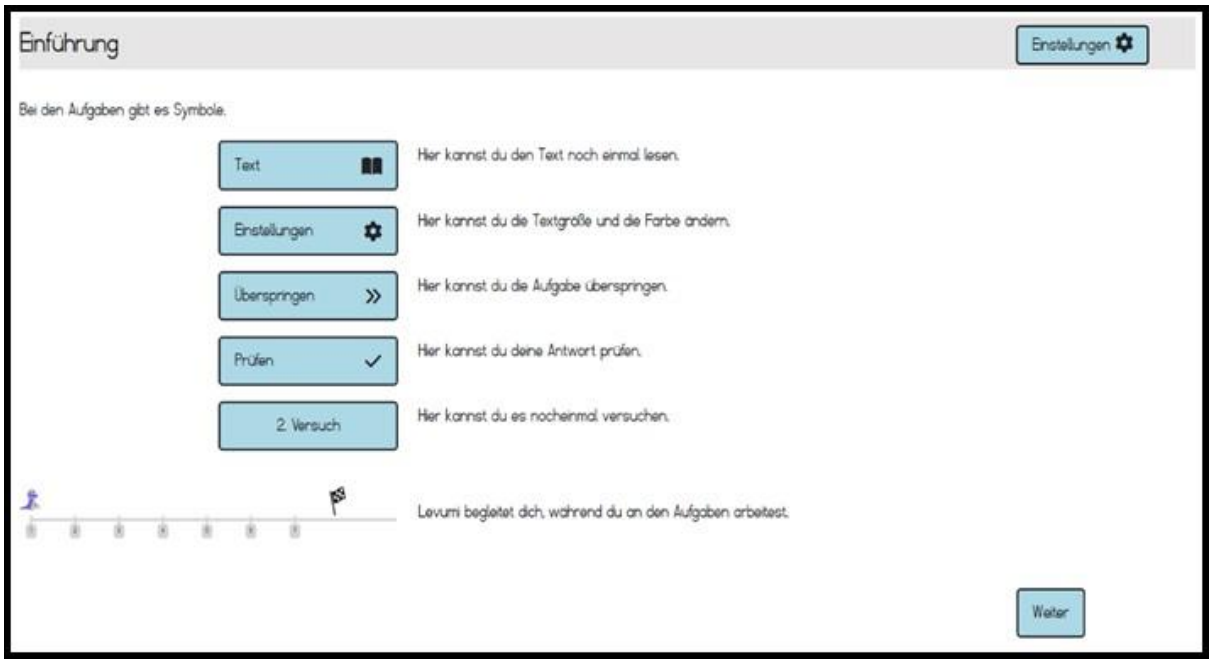


Figure 5: Introduction Page of the Reading Packages
(Gebhardt & Mühling (n.d.). Levumi. www.levumi.de, 2023)

Using the text-button [Text], students can return to the text at any time and read it again. In settings [Einstellungen] they have the option to adjust the font size and colors according to

their own needs. The skip-button [Überspringen] can be used to skip exercises that may be too difficult. The check-button [Prüfen] gives students the opportunity to check their answers and receive immediate feedback on their performance. In addition, students have the option of a second attempt [2. Versuch] if they were unable to solve the exercises successfully the first time (exceptions are the true/false exercises). Furthermore, they can use a solution-button to receive the correct answer if needed. There are also other intuitive buttons such as "Next [Weiter]", "Start" and "Done [Geschafft]", which help students navigate through the application (Hanke & Diehl, 2024a).

The digital user interface of the reading packages was deliberately designed to be minimalist. This ensures that students are not distracted or overstimulated. The targeted integration of precise support buttons aims to draw attention to clear instructions while maintaining motivation. This conscious design is intended to create a supportive and inviting environment so that the students can work on the reading packages in the best possible way (Hanke & Diehl, 2024a).

Conclusion

The digital *Reading Path* reading packages were developed with the end users - teachers and students - in mind. For this reason, interviews with teachers and participatory observation protocols of the students were conducted. The observation protocols were obtained during the reading intervention study in which the reading packages were used. The digital reading packages aim to enhance students' reading comprehension while also reducing teachers' workloads. With the digitalization of the reading packages students receive immediate feedback on their work, while teachers gain insights into their students' learning progress. The packages were developed considering formative assessment, the SAMR Model, pedagogical usability, and a Heuristic for Thinking About Reading Comprehension. The reading packages were observed to effectively engage students according to observation protocols.

The digital *Reading Path* reading packages as well as the *LesIn* screening are available as an OER on the learning platform *Levumi*.

References

Albrecht, S. (o. J.). Das Samr-Modell hilft. Digitaler Unterricht. https://www.digi-teach.de/theoretische hintergr%C3%BCnde-1/samr-modell/

Connor, C. M. (2019). Using Technology and Assessment to Personalize Instruction: Preventing Reading Problems. *Prevention Science*, 20, 89–99. https://doi.org/10.1007/s11121-017-0842-9

The Council of Chief State School Officers. (2023). Revising the definition of formative assessment - CCSSO. https://www.ccsso.org/sites/default/files/2018-06/Revising%20the%20Definition%20of%20Formative%20Assessment.pdf

Diehl, K. & Hanke, J. (2024). *LesePfad* (Lesepakete mit formativem Assessment, digital) [Manuscript in preparation]

Ebenbeck, N., Jungjohann, J., & Gebhardt, M. (2022). Testbeschreibung des Lesescreenings LES-IN für dritte inklusive Klassen Beschreibung der Testkonstruktion sowie der Items der Screeningtests „Phonologische Bewusstheit“, „Sicherheit im lexikalischen Abruf“, „Geschwindigkeit im lexikalischen Abruf“ und „Sinnkonstruierendes Satzlesen“ in deutscher Sprache. Version 1. Bundesministerium für Bildung und Forschung, Förderkennzeichen 01NV2116D

Ebenbeck, N. (2023). *Computerized Adaptive Testing in Inclusive Education* [Dissertation., Universität Regensburg]. Publikation Server der Universität Regensburg. https://epub.uni-regensburg.de/54551/1/Ebenbeck%20-%20CAT%20in%20inclusive%20education_Final_26.07.2023.pdf

Ebenbeck, N., Jungjohann, J., & Gebhardt, M. (2023). Testbeschreibung des Digitalen Levumi-Lesescreenings LES-IN-DIG. Beschreibung der Testkonstruktion sowie der Items der digitalen Screeningtests „Phonologische Bewusstheit“, „Lexikalischer Abruf“, „Blitzlesen“ und „Sinnkonstruierendes Satzlesen“ in deutscher Sprache. Version 1. https://epub.uni-regensburg.de/53993/1/LES-IN-DIG.pdf

Frankel, K. K., Becker, B. L. C., Rowe, M. W., & Pearson, P. D. (2016). From “What is Reading?” to What is Literacy? *Journal of Education*, 196(3), 7–17.

Garbe, C. (2020). *Lesekompetenz fördern*. Reclam Verlag: Stuttgart.

Garner, R., Hare, V. C., Alexander, P. A., Haynes, J., & Winograd, P. (1984a). Inducing use of a text lookback strategy among unsuccessful readers. *American Educational Research Journal*, 21, 789-798.

Garner, R., Macready, G. B., & Wagoner, S. (1984b). Readers’ acquisition of the components of the text-lookback strategy. *Journal of Educational Psychology*, 76, 300-309.

Gebhardt, M., Diehl, K., & Mühling, A. (2016). Online Lernverlaufsmessung für alle SchülerInnen in inklusiven Klassen. www.LEVUMI.de. *Zeitschrift für Heilpädagogik*, 67(10), 444-454.

Gebhardt, M., & Mühling, A. (n.d.). Levumi. http://www.levumi.de/

Hamilton, E. R., Rosenberg, J. M., & Akcaoglu, M. (2016). The substitution augmentation modification redefinition (SAMR) model: A critical review and suggestions for its use. *TechTrends*, 60(5), 1–16. https://doi.org/10.1007/s11528-016-0091-y

Hanke, J., & Diehl, K. (2024a). *Beschreibung der Lesepakete LesePfad für dritte inklusive Klassen: Beschreibung der Konstruktion der Lesepakete sowie Beispiele der Lesetexte und Leseaufgaben in deutscher Sprache.* https://nbn-resolving.org/urn:nbn:de:gbv:8:3-2024-00240-2

Hanke, J., & Diehl, K. (2024b). *LesePfad* - digitale Lesepakete zur Förderung der Lesekompetenz im inklusiven Unterricht. [Manuscript submitted for publication]

Hattie, J., Beywl, W., & Zierer, K. (2014). Lernen sichtbar machen für Lehrpersonen. Schneider-Verl. Hohengehren.

Hernández-de-Menéndez, M., Morales-Menendez, R., Escobar, C.A., & Ramírez Mendoza, R. A. (2022). Learning analytics: state of the art. *International Journal on Interactive Design and Manufacturing (IJIDem), 16*, 1209–1230. https://doi.org/10.1007/s12008-022-00930-0

Junger, R. & Hanke, J. (2024). Technical-Pedagogical Usability Of Digital Inclusive Reading Support Evolving Through Practice To Research Transfer. [Manuscript in preparation]

Jungjohann, J., Diehl, K., Mühling, A., & Gebhardt, M. (2018). Graphen der Lernverlaufsdiagnostik interpretieren und anwenden – Leseförderung mit der Onlineverlaufsmessung Levumi. *Forschung Sprache*, 6(2), 84-91.

Jungjohann, J., Ebenbeck, N., Liebers, K., Diehl, K., & Gebhardt, M. (2023). Das Lesescreening LES-IN für inklusive Grundschulklassen: Entwicklung und psychometrische Prüfung einer Paper-Pencil-Version als Basis für computerbasiertes adaptives Testen (CAT). *Empirische Sonderpädagogik*, 15(2), 141-156.

Kirby, S. N. (2003). *Developing an R&D Program to Improve Reading Comprehension*. Santa Monica, CA: RAND Corporation. https://www.rand.org/pubs/research_briefs/RB8024.html

Köller, O., Thiel, F., van Ackeren, I., Anders, Y., Becker-Mrotzek, M., Cress, U., Diehl, C., Kleickmann, T., Lütje-Klose, B., Prediger, S., Seeber, S., Ziegler, B., Kuper, H., Stanat, P., Maaz, K., & Lewalter, D. (2022). Basale Kompetenzen vermitteln – Bildungschancen sichern. Perspektiven für die Grundschule. Gutachten der Ständigen Wissenschaftlichen Kommission der Kultusministerkonferenz (SWK). SWK: Bonn.

Kollom, K., Tammets, K., Scheffel, M., Tsai, Y.S., Jivet, I., Muñoz-Merino, P.J., & Ley, T. (2021). A four-country cross-case analysis of academic staff expectations about learning analytics in higher education. *The Internet and Higher Education*, 49, 100788 (2021).

Kultusministerkonferenz. (2017). *Bildung in der digitalen Welt: Strategie der Kultusministerkonferenz.* https://www.kmk.org/fileadmin/Dateien/pdf/PresseUndAktuelles/2017/Strategie_neu_2017_datum_1.pdf

Kultusministerkonferenz. (2022). *Bildungsstandards für das Fach Deutsch Primarbereich.* Kmk.org. https://www.kmk.org/fileadmin/Dateien/veroeffentlichungen_beschluesse/2022/2022_06_23-Bista-Primarbereich-Deutsch.pdf

Lorenz, R., Goldhammer, F., & Glondys, M. (2023b). Digitalisierung in der Grundschule. In N. McElvany, R. Lorenz, A. Frey, F. Goldhammer, A. Schilcher, & T. Stubbe (Eds.), *IGLU 2021: Lesekompetenz von Grundschulkindern im internationalen Vergleich und im Trend über 20 Jahre.* (Kapitel 9, S. 197-212) Münster, New York: Waxmann. https://doi.org/10.31244/9783830997009

Mühling, A., Gebhardt, M., & Diehl, K. (2017). Formative Diagnostik durch die Onlineplattform Levumi. *Informatik Spektrum*, 40(6), 556-561.

Mullis, I. V. S., & Martin, M. O. (Eds.). (2019). PIRLS 2021 Assessment Frameworks. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/pirls2021/frameworks/

Mullis, I.V.S., von Davier, M., Foy, P., Fishbein, B., Reynolds, K.A., & Wry, E. (2023). PIRLS 2021 International Results in Reading. Boston College, TIMSS & PIRLS International Study Center. https://doi.org/10.6017/lse.tpisc.tr2103.kb534

Nokelainen, P. (2006). An empirical assessment of pedagogical usability criteria for digital learning material with elementary school students. *Educational Technology & Society*, 9, 178-197.

OECD (Organisation for Economic Co-Operation and Development) (2005). Formative Assessment: Improving Learning in Secondary Classrooms. Policy Brief. OECD. https://www.oecd.org/education/ceri/35661078.pdf

OECD (Organisation for Economic Co-Operation and Development) (2023). PISA 2022 Ergebnisse (Band I): Lernstände und Bildungsgerechtigkeit, PISA, wbv Media, Bielefeld, https://doi.org/10.3278/6004956w

Puentedura, R. R. (2006). Transformation, technology, and education in the state of Maine [Web log post]. http://hippasus.com/blog/archives/18; [Presentation slides]. http://hippasus.com/resources/tte/puentedura_tte.pdf

Puentedura, R. R. (2020a). Research In Practice: SAMR, Observation, Analysis, and Action [Web log post]. http://hippasus.com/rrpweblog/archives/2020/01/SAMR_AResearchPerspective.pdf

Puentedura, R. R. (2020b). Thinking About SAMR: Two-Pass Ladders [Web log post]. http://hippasus.com/rrpweblog/archives/2020/01/2_ThinkingAboutSAMR_TwoPassLadders.pdf

Romrell, D., Kidder, L. C., & Wood, E. (2014). The SAMR model as a framework for evaluating mLearning. *Journal of Asynchronous Learning Network*, 18(2), 1-15. https://doi.org/10.24059/olj.v18i2.435

Shippee, M. (2019). Helping others along – motivation theory and the SAMR model. https://micahshippee.com/2018/10/04/helping-others-along-motivation-theory-and-the-samr-model/

Wahyuni, S., Mujiyanto, J., Rukmini, D., & Fitriati, S. W. (2020). Teachers' technology integration into English instructions: SAMR model. *Proceedings of the International Conference on Science and Education and Technology* (ISET 2019), 443, 546–550. https://doi.org/10.2991/assehr.k.200620.109

Contact email: Judith.hanke@uni-flensburg.de

A Mirror Image of Social Justice: A Case Study of Two Midwestern (USA) Somali Teachers Share Their Perceptions in DEI

Hsuehi Lo, St. Cloud State University, United States

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Via this case study, I explored the social justice of two Somali educators regarding Diversity, Equality, and Inclusion (DEI) perceptions and their related effectiveness with white third graders. In the interpretive study, I follow the two Somali teachers, Iqro, and Ayan, to explore any challenges they experienced in teaching mostly white students. I had a particular interest in the strategies Iqro and Ayan employed in instructing a group made up of mostly white students (Iqro = 92%, Ayan = 87%). I conducted six interviews and eight observations and analyzed them via critical education research methods (Young et al., 2024). I also analyzed students' reactions to working with Somali teachers, mostly addressing their sense of racial diversity. Education researchers in the U.S.A. tend to address the experiences and challenges impacting white teachers dealing with cultural diversity. This investigation turns the issue around looking (as it does) at the experiences of diverse teachers. However, the fact showed 97% of teachers in rural area of state of Minnesota are white people and 87% of their students also represent majority white families. Results showed that Iqro and Ayan traced their success to 1) building the sense of belonging in their educational spaces, 2) creating positive interactions, and 3) setting up clear learning goals to maintain students' success. Qualitative meta-analysis concluded a de-colonizing perspective and use psychological cognition to discuss DEI and social justice.

Keywords: Diverse Teachers, DEI, Social Justices, Elementary Education Program, Critical Race Theory, Decolonized Education

iafor
The International Academic Forum
www.iafor.org

Introduction

The purpose of the study is to explore how diverse teachers transform their pedagogical content knowledge to teach students in their classroom where majority of students are white students. It may involve how diverse teachers revise their mindset, upgrade their DEI perspectives, and explore the meaning of social justice directly. Furthermore, the study used qualitative meta-analysis process to rethink the current teacher preparation programs and critique the decolonized education in the U.S.A. The method of the study used qualitative case study. Two in-service teachers participated in the study. Both graduated from elementary education three years ago and I was their instructors to teach them elementary curriculum and instruction course and elementary math methods.

Ayan and Iqro (Ayan and Iqro are fake name in this study) were not born in the U.S. but raised in the U.S., even though no information can share how long they are here in the U.S. and when they began to go to the school in the U.S. The only thing I know is both were graduated from a high school in the U.S. Ayan seems has more memories from her middle-high school than Iqro; and both felt they are outsiders from their classmates in their whole entire high school experience. Iqro mentioned to me in one of interview, saying, one day, someone whispered each other and called her "Blackie" in the hallway. Similar experiences also happened to Ayan. This kind of racist slur happened sometimes and made them feel "uncomfortable" and for cure in that moment, they don't feel belonging anymore. Then, where do they belong to? They begin to have identity problems. Who are they? What do they need to do in their future life? How can they live a meaningful life? Eventually, Ayan and Iqro are representing most of the diverse high school students' essential question: How they can identify themselves to live a meaningful life in the current U.S. society. Different kinds of identities, including self-identity, personal identity, and social identity (Carr, 2021; Drummond, 2021) represent a positive relationship with diversity (Rummens, 2003). Based on the interview in the research, it showed the K-12 diverse students' mental health may be an important issue to explore.

Ayan in her 10th grade would like to identify themselves to be a teacher because she loved young kids and elementary students. She thought they can provide positive attitude to K-6 Somali students and develop social justice in this job. She does not even think about in the future, she will have any chances to teach white students. Iqro, in her 11th grade decided to study in the university and some humanity-related majors are what she would like to choose. She considered either nurse or elementary education in the beginning. Finally, she decided to study in K-6 education because she assumed her experience to raise 8 children may benefit her to help Somali students in K-6 education. Both agree that in the beginning, they would like to help diverse students, not even think about how to take care of white students or students from white family. This is the initial thought to major in education, helping diverse students in the future.

During the teacher preparation program, however, in the diversity-related courses or topics, they found the knowledge have a presumption. Eventually, there are two worlds in the knowledge. One is "we" world (refer to white Caucasian, rich people, or people living in the colonizing side) and the other one is "them" world (refer to diverse people, people living in poverty, or people living in the de-colonized side). Being a diverse future teacher, they confuse again to learn how white future teachers can take care of diverse students in their future. Seldom instructors teach them how to teach white students in their future. None of any

specific pedagogies or theories teach Ayan and Iqro how take care of their future white students.

The research question of this current study is to explore how the two Somali teachers transformed their teacher preparation programs to teach their students in their classroom where 82% or above of students are white.

Conclusions: Findings, Implication and Limitations

Findings

Three themes emerged as primary findings, related to the research question proposed on an a priori basis. The essential components for the teachers of colors are proved to be, (1) building a sense of belonging, (2) seeking and emphasizing positive interactions with students, and (3) setting clear learning goals that maintain students' success. Each of components is further developed in separative subsections.

Theme One: Building a Sense of Belonging

After a math lesson, Ayan invoked what I coded as belongingness (Osterman, 2023). The following the data:

> Before you come to see my teaching this semester, I have spent most of time building the belonging in my classroom. This is what I really learn and want to share with you that that the sense of belonging from white teachers are different from those of diverse teachers. The white teachers' belonging is more like you [students] and I [white teachers] know the culture and live in the culture without any awareness of difference.... It is more like you-know-what-I-mean feeling. My sense of belonging for students is we [Ayan and her students] belong to the classroom. Certainly, the awareness of the difference is obviously in our mind, and we accept the difference in order to build the belonging culture in my classroom.

Ayan seemingly perceived belongingness in the following terms. To her, a sense of belonging consisted of authenticity of communication across cultures. Differences exist in the world and both teachers and students are well aware of them. Through Ayan's performance, students transform their awareness to acceptance of the difference. So, feelings of belongingness do not automatically evolve from students' experiences but result from the educator's systematic efforts to support a sense of belonging and inclusion in the educational space. "What can I do? What can I do?" Ayan related that she worked hard and plan-fully to achieve acceptance from her pupils. In addition, she argured that her efforts were more demanding than those white teachers.

Two significant questions arise for future research.

1. Do African American teachers **also** see requirements for differential effort on their part to provide white students a sense of belonging?
2. What is the level of efforts required of white teachers to build belongingness into classrooms? Ayan's perception of expending greater effort might be phenomenological and not, strictly speaking, objective.

Iqro also tried hard to build the belongingness into her classroom. She provided clarification as to why a sense of belonging is important to minority educators.

> I do follow your teaching to build a belonging culture in my classroom. It is hard and time consuming, but I know all classroom management and strategies need to base on the belonging culture. I think the mindset is so important for me and my students. Once they can accept me as their teacher, all classroom management turns out to be easy. They begin to share their daily life experience to me like Xbox game. I don't know what Xbox is in the past, but I take the chance to use some characteristic persons in the Xbox as example, in my math lessons and they love it. I really learn from my students about different lifestyle, and I also try to live my life through their mindset, which make my classroom management turns to be much easy and enjoy having them in my classroom.

Iqro's interview reminded me of represented Drummond's (2021) study that successful classroom management eventually depends on the switch of personal identity. Such identity-switching remains a significant challenge for diverse teachers who may insist on the status and thus do not wish to change anything—especially as related to their personal and cultural identity.

Theme Two: Create Positive Interaction

The second generalization, dealing with the nature of interactions, is obviously very closely related to principle number one, that is "belongingness." In fact, the two principles may ultimately prove in separable. However, I saw the interviews as distinguishing between overall classroom climate (belongingness) and the nature of individual interaction. This distinction is worth the attention of researchers in the future. Perhaps, individual positive interactions collectively produce or result in greater levels of belonging.

According to both interviewees, the establish of effective classroom management procedures, requires growing a sense of belonging among their students—a process that respondents views as differentially effortful for them (compared to that exerted by white educator). The following data is categorized by how both educators perceived effective teaching. It demonstrated that positive interaction in the teaching process is a key feature of producing a reasonable valence of positive interactions.

The following data, mostly generated via interviews and via my observation notes, reveal how Ayan and Iqro shaped positive classroom interactions.

> In the beginning of teaching white students, I feel I am not doing everything perfect. I think I can create more lessons and projects, which connect with students based on individual student's needs. It might be related to understand white students' daily lives. After using my student's daily life experience (what movie they like, what online-games they play the most and so on) in my teaching; it is not enough. I need to use their experience to the positive interaction in my teaching. It is so difficult for me. The meaning of positive is not just a term but a real action and I don't know. (from Ayan)

In exploring this topic with the educators, I concluded that management of classrooms initially proves so difficult that all new educators, but particularly these two Somali teachers,

find the challenge daunting (Castro, et al., 2010). The data show that the creation of a positive "working" community proved difficult for these diverse teachers. Ayan struggled to understand the nature of positive interactions so that she could build on this factor. She clearly expressed a sense that the social identity (Evans & Stanovich, 2013) differed in meaning between her, as a teacher, and her students. She concluded that she ultimately accepted accountability for the tone of classroom interactions.

The following evidence clarifies the cultural issues Ayan faced and how she dealt with it. Obviously, these cultural factors remain phenomenal subjective in this study, not necessarily reflecting objective reality.

> I know it is rough for my students to have a Somali teacher wearing "the traditional hijab." …. They might have different perspectives about Somali people, wearing hijab; but they do not say anything about that in front of me. The **myth silence** [model] obviously exists, and we [appear to] respect each other. From some points of you, I feel my white students are mature at this point. They really learn, at least for me, what is called "respect of each other" in my class. This is the reason I like them because of the myth silent, like you know, I know, more listen and less talk.

A positive interaction may build on a magical "myth silence" between Ayan and her white students. The so-called myth silence was not that teachers and students didn't talk with one another, but that they "held fire" when it came to potentially sensitive cultural signals. In addition, one must ponder whether or not, or to what degree white students self-consciously avoided bringing attention to signifiers of cultural or gender differences. In my class observation notes, some white students did mention her dressing; [Somali woman will wear hijab or head coverings, which can be Hijab, Chador, Niqab, or Burka] and held a conversation to talk about the culture differences. The myth silence model presented an intentionality that teachers and students arrive at a common intention stance (Dennett, 2008) as Ayan mentioned "…like you know, I know" in [a] silent situation. It seemed to me that Ayan acted wised in using the silent moment to build positive interactions with her students. The myth silence moment produced a moment to let students understand each other. Here is the myth silence model (see Figure 1) in Ayan's mindset:

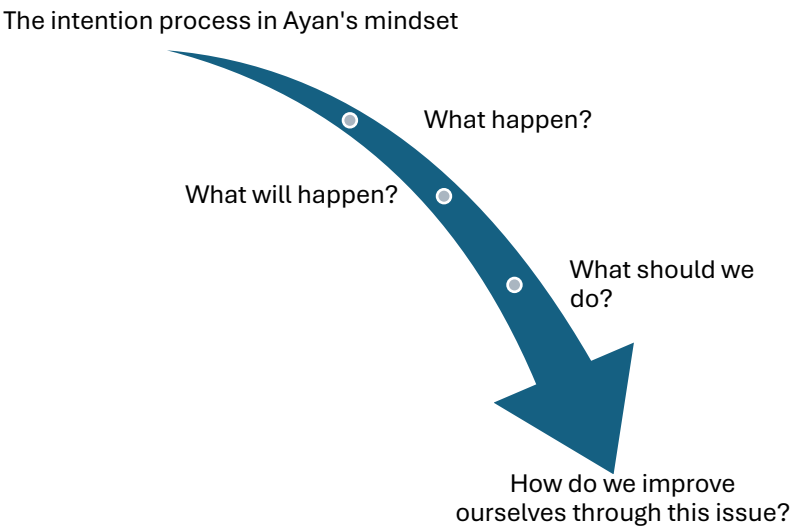


Figure 1: The Myth Silence Model in Ayan's Mindset

In my interview with her, Iqro shared a thought-provoking comment about construction new perspectives via which to engage students learning in order to create positive student-teacher interactions. She argued that teacher preparation faculty members did not prepare her for developing and maintaining positive interactions with white students.

> I am kind of surprised that many of my students are not homeless. It is different from my personal elementary school experience when I was an elementary student. I still remember my classmates are unable to be a part of class too long because of lack of transportation or family issue so they cannot come to school every day. Right now, my students have different kinds of family, cultural background. They don't need to get free lunch and come to the class everyone. It turns out that I need some new perspectives to engage their learning. I found how I can bring a positive interaction with them turns to be the most challenge and needed knowledge and unfortunately, I have to say, your teacher preparation program does not teach me how to.

Igro pointed out that her teacher preparation program seemed aimed at primary white candidates. This means that the DEI-related programming primarily for Caucasian candidates. The following is Iqro's response to a question that I posed related to this issue:

> I don't need to teach my students how to sit in my class and hold their heads high and bring positive interaction by praising their physical behavior. Instead, I found it is so important for me to "elaborate" the language I use, and "articulate" my explanation. For sure, my students like to play math games or do some projects. It is the most time I spend that how to design meaningful math games for different students' needs rather than monitor students' behaviors.
>
> Lo: Do you mean you do not have any DEI issue in your class?
>
> Iqro: Yes, we do. We still have DEI-related problems but different kinds.

Iqro faced diversity issues other than race. For example, some students represent low-income families, most of these individuals manifested limited linguistic ability. When low-income individuals attend classes with other students whose parents are from higher-income groups, they might work together smoothly on a project (Duke, 2000). For another example, one or both of a student's parents may experience drug problems, and the youngster might reside with a foster family. While all the students in Iqro' class were white, they manifested DEI-related issues.

Diversity issues were not only related to racial diversity. The very popular critical race theory material used in our program (Sleeter, 2017) did not really address this "teacher-diversity" situation. DEI perceptions need broadening to account for students' cognitive development, dealing with such topics as self-consciousness, as well as personal and social differences. Thus, positive interaction may result from how students understand and accept classroom differences. In addition, resolution of diversity issues will likely depend upon helping teachers of color interpret and deal with within-race divergence.

Theme Three: Setting Up Clear Learning Goals to Maintain Students' Success

Ayan valued several aspects teaching methods from her preparation program. She expressed particularly she like inquiry-based methods. In addition, she voiced positive remarks about

students' attitudes—their positive viewpoints, she felt, allowed her to place more energy on pedagogy.

> One thing I think I am so proud of myself in teaching my students is I always tell them what they are going to do after my 5-minute teaching. I always set up my teaching time only 5 minutes the most. After that, they need to show me their understanding by doing something. I do appreciate the play-based, project-based, and problem-based inquiry model because my students clearly know what my expectation in my 5-minute teaching. I think it is the key to engage students and the play-based teaching can motivate students' learning attitude strongly.

Ayan primarily allocated short periods for directly instructing skills and orienting her pupils to tasks, subsequently allocated longer periods for student work. She articulated that her students kept learning goals and instructions in mind; they ownership during their learning process. I did not follow up this time on her definition of ownership but from what she said, I infer that it means that the young people independently followed through on her directions and requests.

Language is a sensitive topic for Ayan and Iqro because of their accented English—as both educators came from Somali-speaking backgrounds. They both dealt with language by developing the habit of writing learning goals and similarly recording other important information via an electronic system (Smart board). Eventually, their students came to depend on reading information on the smart board to complete learning activities—especially in situations wherein their accents proved difficult. I will note here that I found that both interviewees spoke English very clearly—though I must admit that my English is also accented—or so I am told (Mandarin background) and that I thus might have missed elements of their speech. Ayan and Iqro played the role of explainers and facilitators in their teaching process:

> No matter how good I feel my English is clear to my students, I still write down and show in the smart board. I always print a hard copy of rubrics for my students, so they firmly know what learning tasks are, how to complete the learning tasks. I will say my teaching is mainly on tasks, not my lecture.

Ayan and Iqro both shared their anxiety about whether the students' parents might question her teaching abilities. This phenomenon has been identified in the literature as qualitative meta-analysis—the notion that members of groups may hold formulaic views about how persons representing other groups view them (Fayyaz, et al., 2023). This is a topic worth exploring for enhancing teacher preparation programs. Even though they did not cite direct statements (from parents), both educators expressed directly that the best way to keep their jobs was to maintain high academic standards. So, both set a high bar for learning.

> To make sure I can keep my teaching job here, honestly speaking, I set my expectations for my students' academic performance higher than those in other classrooms. I mean I don't have the same culture as my students, which make me feel I lose something [some potential tools with which I can connect with my students]. Instead, I really set the academic performance [expectations] high as well as my hopes that they reach team goals. So, academic performance is not just for individuals but also for the whole class performance. (From Iqro)

Obviously diverse teachers can perform excellently in the profession—working primarily with white students. The proved true of Somali candidates who performed extremely well, despite the challenges they experienced. Even though Ayan and Iqro found ways to deal with their cultural differences, I conclude that they did not receive the optimal level of support from their teacher preparation program about how *their* diversity would likely affect them.

Implications

Based on my observations and interviews, I did qualitative meta-analysis of my results on a post-hoc basis. In the future, I would like to determine whether their perception of challenges from white students' families where somehow objective, and finally why both articulated that they failed to learn enough in their preservice education about diversity-based challenges. These perceptions of challenge might well emanate from U.S.A education system's maintenance of an unfortunate colonized perspective in preparing teachers, failing to prepare teachers of color for dealing with the challenges they will likely face. Both were looking for the de-colonializing perspective whereby divers teachers' voices are heard and acknowledged.

Here is the list of the study's primary implications:

1. The myth silence model represents that the intentional theories related to theory of consciousness (Dennett, D. C., 2008) or a theory-sketch in the field of education, where we can rebuild our DEI and social justice perspective from dual-theories in both cognitive and social psychological point of view (Evans & Stanovich, 2013) in redesigning the DEI and social justice aspects of teacher preparation.
2. It remains imperative to avoid of a reductionistic bias. Reductionism in psychology centers on reducing complex phenomena to the most basic, putatively measurable parts. The bias perceived by candidates likely trace from the prejudice that Somali teachers experience on the part of society and thus their students. It should be emphasized here, that while I endorse the precept that the stressors voiced by participants constitute reality—at least for them—that I encountered little objective evidence that parents, for example, or other educators, discriminated against the cultural markers of these individuals. This is well worth the attention of researchers.
3. In our current teacher preparation system, much "we" vs. "they" colonialized thinking still exists. It is obviously that to build a positive interaction process, the de-colonized education may need to be enhanced in the real teaching situation.

Limitations

The first limitation of the study is the sample size. The study is initiated by two participants and all data (6 interviews and 8 classroom observations) are based on two diverse teachers. The further study may enlarge the sample size and design meaningful survey to bring in a quantitative approach.

The second limitation of this study is the two participants were graduated from the same teacher preparation program and I used to be one of their instructors. One positive perspective is we all know what DEI perceptions are taught in the program; the negative perspective, however, is the limitation of the study's generalizability.

Overall, the study provided a detail description of the two cases about how diverse teachers face in vivo challenges in their professional lives. The analysis of DEI and social justice

perceptions may suggest that we come to include cognitive developmental perspectives. Teachers' mental health, not just students' mental health, may be included in our teacher preparation programs.

References

Carr, D. (2021). Personal identity is social identity. *Phenomenology and the cognitive sciences*, *20*(2), 341-351.

Castro, A. J., Kelly, J., & Shih, M. (2010). Resilience strategies for new teachers in high-needs areas. *Teaching and teacher education*, *26*(3), 622-629.

Dennett, D. C. (2008). *Kinds of minds: Toward an understanding of consciousness*. Basic Books.

Drummond, J. J. (2021). Self-identity and personal identity. *Phenomenology and the cognitive sciences*, *20*(2), 235-247.

Duke, N. K. (2000). For the rich it's richer: Print experiences and environments offered to children in very low-and very high-socioeconomic status first-grade classrooms. *American Educational Research Journal*, *37*(2), 441-478.

Evans, J. S. B., & Stanovich, K. E. (2013). Dual-process theories of higher cognition: Advancing the debate. *Perspectives on psychological science*, *8*(3), 223-241.

Fayyaz, H., Adil, A., & Rashid, S. (2023). Effect of Metastereotypes and Conflict Experience on Research Supervisor-Supervisee Relationship Quality Among University Undergraduates. *Pakistan Journal of Psychological Research*, *38*(1).

Osterman, K. F. (2023). Teacher practice and students' sense of belonging. In *Second international research handbook on values education and student wellbeing* (pp. 971-993). Cham: Springer International Publishing.

Rummens, J. A. (2003). Conceptualizing identity and diversity: Overlaps, intersections, and processes. *Canadian Ethnic Studies*, *35*(3).

Sleeter, C. E. (2017). Critical race theory and the whiteness of teacher education. *Urban Education*, *52*(2), 155-169.

Young, M. D., Diem, S., & Sampson, C. (2024). The Vital Necessity of Critical Education Policy Research. *Educational Evaluation and Policy Analysis*, *46*(2), 397-405.

Bridging the Reading Gap: Investigating Pedagogical Approaches in Language Classrooms

Liao Feng Jiao, Panjab University, India
Kuldeep Kaur, Panjab University, India

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Chandigarh Administration's 2020 report highlights a troubling dropout rate of over 10% of students aged between 14 to 18 in Burail. Furthermore, ASER's 2023 report highlights that nearly 25% of students aged between 14-18 struggle to read text fluently. This issue is particularly prevalent among students from low-income families who face various challenges in obtaining a quality education (Sarojadevi & Subramanian, 2018). The present study aims to examine the instructional strategies in English language classrooms and their impact on the development of reading skills among students studying in Burail school. This school presents a special case with many students who are first generation learners dealing with challenging home environments due to parental substance abuse, domestic issues, diverse backgrounds, languages and other socio-economic difficulties. The study adopts a case study approach, using a detailed qualitative analysis through interviews with teachers and students, observations in the classroom, reviews of educational materials and students' work. The study aims to gain a comprehensive understanding of how students' reading skills are being shaped within their complex personal and social environments, along with the pedagogical approaches used in the language classroom. The case study identifies the needs of learners and accordingly seeks to identify effective teaching methods that can enhance their reading skills. The findings in this study offer insights into teaching strategies that could support and empower students facing similar challenges, thereby improving their academic and linguistic competencies for educational and personal development.

Keywords: Reading Gap, Instructional Strategies, First Generation Learners

iafor
The International Academic Forum
www.iafor.org

Introduction

While the National Education Policy of India has helped increase enrolment rates to 90.1% in Chandigarh as per UDISE+ 2021-22 report and from 23.6% to 78.81% nationwide from 1971 to 2022, as per UNESCO via World Bank. The updated National Education Policy 2020 expands compulsory schooling requirements from 6-14 to 3-18 years old, in accordance with Article 21A of the Indian constitution, which requires free and compulsory education for children aged 6-14. The goal of the NEP is to reach a Gross Enrolment Ratio of 100% in pre-school to secondary levels by 2030 and to also see a 50% boost in higher education by 2035. However, challenges persist in enhancing educational standards and tackling concerns such as dropouts, disinterest, and limited higher education prospects. Just looking at enrolment numbers might not be enough, since educational outcomes and quality also play important roles in determining student success. The 2020 report from the Chandigarh Administration reveals that students aged between 14 to 18 are leaving school at a rate of more than 10% and ASER's 2023 also reports that more than 25% of students find it hard to read. Reading is an essential ability for a student's academic performance and personal growth. This problem is found in students coming from low-income families, who face various obstacles in getting a good education (Ferguson et al., 2007; Hair et. al, 2015; Sarojadevi & Subramanian, 2018; Xiao et. al, 2022).

Background

Burail, situated in Chandigarh, India, is known for its mostly low-income residents, making it one of the urban slum. The typical urban slum household earns around INR 8,000 (USD 110) average monthly, with many residents working in informal jobs like daily wage labour, domestic work, selling goods and services on a small scale and mothers work as maids (Prakasam, 2013). As per the Slum Census of 2011, around 25% of the city's residents still remain below the poverty threshold. These people allocate a substantial 80% of their constrained earnings towards essentials like food and energy, resulting in little financial means to handle the increasing expenses of surviving in a society becoming more and more centred around money. Additionally, Shalini (2022) states that almost 89% of children observe parental disagreements or household conflicts and fights caused by limited living space, rigidly assigned gender roles, and their socio-economic status, involving various forms of violence such as physical, verbal, emotional, and sexual abuse. Hence, students encounter a range of difficulties like overcrowding, difficult home situations, lack of basic resources and insufficient educational facilities (Prakasam, 2014; Arora, 2016).

Findings

1. The Current Instructional Strategies Used in English Language Classrooms in Burail School

(a) **Conventional and Convenient Pedagogy.** As per the researcher's observation, conventional and convenient techniques were practiced such as reading aloud, clarifying definitions and writing on the board when required. Chapter reading was done mostly by student's who were good in reading. Also, there was no rotational reading practice. Here are the supporting excerpts from the interview that students testify that there is no turn basis of reading in the classroom:

> Amit said, "*Madam, ek ya do baccho se chapter padhati hai jo reading mein ache hai"* (Teachers will make only one or two student read the chapter who are good in reading.)
>
> Karan said, "*ek ya do bacche read karte hai, jo padne mein acche hai"* (Only one or two students read, who are good in reading.)

The classroom instruction was more teacher-oriented. There was very less discussion on real life examples for better relevance. There was lack of expression, intonation and the feel to connect with the story characters. Bilingualism was used to aid student comprehension of sentences or stories, students do not take notes in class; instead, they wait for the teacher to give them answers to write down for homework or they search for it online. Also, there was no group tasks or activities/ reflective activities nor any emphasis on additional book reading recommendations were given.

(b) **Lack of Resources and Accessibility.** Researcher also observed that the students weren't allowed to go to library but were suggested to look for online resource. When the researcher asked about library period from the students they responded "*koi library period nahi hai*". So that means there is lack of resources and accessibility to reading. Additionally, there is no book recommendation for students for any leisure reading by teachers. Moreover, the school offers sports club, eco club and NSS but lacks a reading club, reading workshops, spelling or story competitions or any form of storytelling especially in English.

(c) **Knowledge-Based Teacher Training.** There are teacher training programs conducted by CBSE and other teacher training platforms like DIKSHA (Digital Infrastructure for Knowledge Sharing) but the teachers find it tedious after a long day work and other administrative duties. Many a times these trainings are just knowledge add-ons and lacks the practical aspects required in training.

2. The Impact of the Current Instructional Strategies Being Used

(a) **Lack of Interest and Motivation.** These existing strategies doesn't have much impact on the students in fact they limit the learnings in the students such as less interactive opportunities and less engagement with text. As student do not find the English stories and texts engaging or relevant to them. They form a belief that English is too difficult and become disinterested in making an effort. Here are some of the excerpts from the interview:

> Amit said, *"Mai English pad leta hu lekin mushkil shabd nahi. Kabhi kabhi dubhara padna padta hai samajh ne ke liye, aur jab samajh nahi aata toh mera interest chale jata hai"* (I can read English but not difficult words. Sometimes, I have to re-read again to understand and if I am not able to understand then I lose interest.)
>
> Arjun said, *"Grammar mushkil lagta hai, sentence bnane me mushkil lagta hai aur kabhi kabhi kuch shabd bolne mein confusion hoti hai"* (I find grammar difficult, sentence making is also difficult and sometimes I get confused on how to read few of the words.)
>
> Karishma said, *"mujhe English mushkil lagti hai, main blank ho jati hu"* (I find English difficult and I become blank.)

Also, rote learning becomes the focus instead of understanding. There is lack of reflective activities, additional resources and additional reading and story-telling workshops. Karan adds "*padne ka iccha nahi hai, kyuki meri baadi nahi ayegi"* which means there is no desire to read because I know my turn to read will not come.

(b) **Exam-Oriented Approach.** The emphasis appears to be on covering the curriculum and getting ready for exams instead of enhancing fundamental skills. Students strive to acquire sufficient English skills solely for the purpose of passing exams and teaching is also solely done for the minimum required marks needed for passing English. When the researcher asked how they try to learn for English exams? Here are some of the excerpts that the students responded:

> Karishma said, *"main paanch ya che baari likhti hu aur English sentence yaad karne ki koshish karti hu"* (I write the sentences five to six times and try to memorize the statements in English.)
>
> Mamta said, *"main yaad karti rehti hu jab lekin tab bhi bhool jati hu"* (I try to keep memorizing again and again but still I forget.)
>
> Anupam said, *"main ya toh youtube istamal karte hu ya fir yaad karta hu"* (I use youtube or I try to memorize.)
>
> Karan said, *"agar samajh nahi ata to bas ese hi sentence yaad karta"* (if I don't understand then I just memorize.)

(c) **Lack of Career Goals and Guidance.** Students share that they desire to see themselves successful, also they believe that if they know English then they will get a decent job. They associate English with status and a white collar job as shared by the following students. Three of the students among them are not sure what they want to do in life, while the rest of them know what they desire to do in life but have no directions.

> Amit said, *"English jaruri hai agar mujhe successful hona kyuki customers se baat karni hoti hai, aur jinko English aati hai, unko job asaani se milti hai"* (English is important if I want to be successful as it is needed to speak with customers and knowing English will easily get me a job.)
>
> Arjun said, *"Agar mujhe bade company aur office mein kaam karna hai toh English jaruri hai"* (If I want to work with a big company or office then English is important.)

Also in opposition to the above statement:

> Karan said, *"Mujhe pta nahi kya karunga magar English jaruri nahi hain, idhar ke log sab Hindi bolte hai"* (I don't know what I want to become but English is not important, people over speak Hindi.)
>
> Karishma said, *"English jaruri hai magar mujhe nahi pta kya karna hai, dekhti hu job options available hoga toh usse karungi"* (English is important but I don't know what I want to do. Let's see whatever options will be available, I will take that up.)

These students may find it difficult to picture themselves achieving academic success or following specific career paths without seeing successful individuals from similar backgrounds as examples (Gibbons & Borders, 2010). The absence of guidance can also restrict their chances to connect with valuable networks and opportunities that can help with their personal and professional development (Stephens et al., 2014).

3. Specific Challenges Being Faced by Students in Developing Reading Skills

(a) **Language Barriers.** A large number of students have limited English exposure at home as they come from non-English speaking backgrounds. This hinders their ability to comprehend the language at school. All the students have shared their plight of not being able to read and speak English confidently as there is no one speaking this language at home or even in school.

(b) **Unhealthy Home Environment.** The majority of students originate from low-income households dealing with different socioeconomic challenges such as substance abuse, family members in jail, financial hardships, etc. This results in a disruptive and unhelpful setting for concentrating on academic work at home.

> As per the case of Karishma, her father died as he was alcoholic and he also used to mistreat her mother. Her mother left her at an early age and then her aunt brought her with her to this area. The financial hardships, lack of resources, lack of space and the mental trauma of being left behind makes it challenging for her academic growth.
>
> Another case is of Mamta, where her 2 elder brothers are drug addicts, the eldest one has died because of it and the younger one is also in it. These issues are add on's that stress her out where she is not able to concentrate much in her studies. At the back of her mind, she worries about her brother or being jailed for dealing in drugs.
>
> In Shubham's case, his father is a drug addict, his father is always getting himself in trouble and associates himself with theft and different gangsters in the area. He is worried for his father. When his father is not in drugs, he is a wonderful father but he cannot escape this situation.

Also, at a general and occasional level, these students also see lots of arguments and disputes between parents and other elders in their room, these instances makes the environment unhealthy shaping a negative purview towards life for any child growing in this area.

Lack of space is also another concern that does not promote reading or studying in a general sense, as stated by the students that they live in one room with their parents and siblings, where TV, talking, cooking and guests visits and other things are going on simultaneously, limited access to basic amenities and inadequate educational resources can further compound the difficulties they face in acquiring language skills and developing reading proficiency (Prakasam, 2014; Arora, 2016).

(c) **Migration From Rural to Urban.** Research also indicates that moving from the rural area to an urban city can create difficulties for migrant children due to language barriers, making it hard for them to understand lessons, take part in classroom conversations, and finish tasks (Geva & Yaghoub, 2006; Gándara & Contreras, 2009; Calderón et al., 2011). Additionally, a recent report from the National Statistical Office (NSO), Ministry of Statistics

and Programme Implementation, Government of India, indicates that a significant number of families relocated from rural areas to urban areas in search of better job prospects during the period from July 2020 to June 2021. Approximately 18.9% of these families opted to relocate to urban areas, typically establishing homes in slums in the urban cities with cheaper rent. This shift poses fresh obstacles, particularly for students who are now attending schools where the language used for teaching is not the same as their native language. Unfortunately, there are currently no concrete plans or initiatives established to assist these relocated children in the city (Pandey, 2021).

(d) **Three Language Formula.** The three language formula in the Indian education system, aims to promote national integration and multilingualism. Even though this implementation is admirable to make the students multilingual but ground reality is completely different, it is far more complex and challenging especially for students who come from low socio-economic background and are first generation learners, lacking the necessary support. The current style of teaching and the syllabus entails more emphasis on learning rules of grammar and vocabulary which often leads to rote learning and neglecting practical communication skills in any of the languages. Here are some experts from the students' interview:

> Karishma said, *"Apni Hindi main grammar confusing lagta hai, usse jada English, uppar se tisra subject Punjabi samajhne me bahut time lag jata hai"*(I still find Hindi grammar confusing, English even more and now I have to learn Punjabi, it's time confusing.)
>
> Amit said, *"humko main subjects jese maths, science, social science ke saath saath teen aur language bhi seekhna pad raha, bahut stressful lagta hai"* (We have to study main subjects like maths, science, social studies and on top of that three languages which becomes stressful.)
>
> Anupam in sarcastic tone said, *"ese lagta hai ki hume language ka gift mila hai, sab language bolenge"* (It feels like we are gifted in languages and we'll speak in all the language.)
>
> Karan said, *"bahut se shabd mein confusion hone lagti hai. Teeno bashay ko main mix kardeta hu, kabhi kabhi ese bhi lagta koi bhi basha mujhe acche se nahi aati"* (I find many words confusing. I often mix these three languages word with one another. Sometimes I feel like I don't know any language properly.)

4. The Underlying Gaps That Remain Unnoticed in the Teaching and Learning Practice

(a) **Feeling of Inadequacy.** As students have stated that teachers choose only one or two students who are better in reading than them are chosen in the class to read, may create a sense of being inadequate in their ability to read due through such perceived observations. This internalizes a belief of not being good enough and thereby reducing confidence. Since there is a lack of engagement and participation, the students interest will overtime decrease and feel as if the student's presence doesn't matter much to the teacher. This also highlights the lack of exposure of practice and unequal opportunities for the students in the classroom.

(b) **Weak Student – Teacher Bond.** A weak student-teacher bond can affect the communication, mutual understanding and trust between students and teachers. The students' are reluctant to ask for help from the teacher which may have stemmed from teacher's non-

availability or may be influenced by feelings of discomfort, shyness or a fear of judgment, which could prevent them from seeking much-needed support in learning.

(c) **State of Hopelessness.** Since these students come from low socio economic background, also being first generation learners, with lack of space; lack of opportunities in and outside the classroom, at the same time managing their home and school responsibilities especially for students with traumatic experiences creates a sense of hopelessness of dealing with situations that are not in their control.

(d) **Need for Caring and Kind Attitude From Teachers.** A caring and kind teacher can actually motivate and instil faith in students who feel discouraged in life or think less of themselves. As Amit and Arjun shared they want their teachers to motivate them and give attention to all students, not few. The students neutral response and the lack of positive experiences indicates the lack of emotional care and support or an emotional disconnection.

Recommendations and Conclusion

1. Social- Emotional Connection and Teacher's Belief on Students

The interaction between teachers and students is an important element in the classroom. During the time in school, students have the learn to develop their emotional intelligence by receiving feedback from teachers while interacting and communicating with them, which can help them learn how to express and manage their emotions effectively**.** However, if teachers do not build this mutual trust, belief and empathy, then this might affect the students' emotional and social well-being. Therefore, it is recommended that teachers should have a good understanding of the significance of emotions, both their own and their students, how they respond and portray their belief system through their actions and responses can affect the students overall. This greatly impacts the social, emotional, and cognitive growth of children (WAN et. al, 2023; Seery, 2019; Poulou, 2015).

2. More Practice Oriented Syllabus

Such methods emphasize more on pronunciation, syntax, and word selection through verbal communication, reading, and writing lessons. However, there is a deficiency in focusing on communication and interaction among students during practical activities. As more language teaching methods have been introduced, the Communicative Language Teaching (CLT) approach has become quite popular in different language learning institutions. The CLT approach in language education is a successful method that emphasizes interaction-based learning, using texts for practice and connecting classroom learning with real-life language use (Nunan, 1991; Santos 2020).

3. Differentiated Instruction

Teachers who practice differentiation believe that every child is unique and has their own individual learning style. They also have the option to tailor their instruction to align with the interests and strengths of the students. This instruction can help in promoting more culturally relevant teaching, that can aid in the literacy growth students from diverse backgrounds (Ladson-Billings, 1995; Gibbons, 2002; Nieto, 2009; Tomlinson, 2014; Gay, 2018).

4. Interactive Teaching Methods

Utilizing interactive teaching methods promote better learning and critical thinking. These strategies also enhance student involvement, enthusiasm and ability to remember. They encourage engagement, smaller group discussions, and communication abilities, which are crucial for achieving success (Gibbons, 2002; Walqui, 2006; Yamashita 2008; Grabe & Stoller, 2011). Also use of real life everyday examples can make the text more relatable. Through the utilization of these strategies, students gain the ability to manage their own learning and develop into self-sufficient learners, a valuable skill that will serve them in all facets of life (Kamran et. al., 2023).

5. Bridging Courses and Remedial Classes

The bridging courses and remedial lessons can help students with language barriers can help them cope up with language gap of understanding. Also in addition, mentorship to students can also aid in their language learning (Soria & Stebleton, 2012; Vijayakumar, 2020).

6. Collaborative Learning

Working together in groups has been proven to help both younger and older students in many different subjects. It's especially helpful for students who are still learning English. These group activities allow them to talk about the lesson and practice using English in a comfortable environment. Some students may feel nervous about speaking in front of the whole class, but in a small group, they feel more at ease and can learn from their peers (Calderón et al., 2011; Roberson & Kleynhans, 2019).

7. Use of Technology

Interactive whiteboards, gamified learning like in applications like Duolingo and many more. Educational Shorts and Reels and some free online courses are also helpful in learning new words and phrases in language learning (Ibrahim & Jadaan, 2024).

8. Reduce Administrative Workload of Teachers

Teachers with much of administrative responsibilities are often seen giving less time for instructional preparation and feedback provision for students. There is a heavy burden and burnout on teachers which have to offer the best in both- teaching and administration. Administrative duties often overshadows the teaching which adversely affects the students learning (Kyung-Nyun, 2019; Kanwal et. al, 2023).

In conclusion, the reading gap among first-generation learners from low-income families in Burail is a complex issue requiring a multifaceted approach. Challenges such as ineffective pedagogy, lack of motivation, language barriers, and limited resources are evident. Current instructional strategies have limited impact on reading skill development. To address this gap, collaborative efforts among school stakeholders, including differentiated instruction, interactive teaching methods, and technology integration, are crucial. By fostering an engaging learning environment and addressing social and economic factors, we can empower these students to succeed academically. This study calls for further research and action to ensure equitable education for all students, emphasizing the importance of continuous evaluation and collaboration to bridge the reading gap effectively.

References

Arora, N. (2016). Socio- Economic and Academic Profile of Teenagers: A Study of A Chandigarh Slum. Asian Resonance. 5(1), 79- 85. https://www.socialresearchfoundation.com/upoadreserchpapers/1/92/1603260623091st%20navneet%20arora.pdf

ASER (2023). Annual Status of Education Report. https://asercentre.org/

Blackwell, E., & Pinder, P. J. (2014). What are the motivational factors of First-Generation minority college students who overcome their family histories to pursue higher education?. College Student Journal. https://eric.ed.gov/?id=EJ103420

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2). Pp. 77-101. ISSN 1478-0887. Retrieved from https://www.researchgate.net/publication/235356393_Using_thematic_analysis_in_psychology

Calderón, M., Slavin, R., & Sanchez, M. (2011). Effective Instruction for English Learners. Future of children. 21(1). 103- 127. https://files.eric.ed.gov/fulltext/EJ920369.pdf

Dreze, J., & Sen, A. (2003). Basic education as a political issue. Education Society and Development: National and International Perspectives. New Delhi: APH Publishing

Engle, J., & Tinto, V. (2008). Moving Beyond Access: College Success for Low-Income, First-Generation students. https://eric.ed.gov/?id=ED504448

Ferguson, H., Bovaird, S., & Mueller, M. (2007). The impact of poverty on educational outcomes for children. Paediatrics & child health, 12(8), 701–706. https://doi.org/10.1093/pch/12.8.701

Flick, U. (2014). An Introduction to Qualitative Research. Sage Publications. 375 – 379.

Gándara, P., & Contreras, F. (2009). Is Language the Problem? In The Latino Education Crisis. Harvard University Press. pp. 121–150. https://doi.org/10.2307/j.ctv13qftm4.7

Gay, G. (2018). Culturally Responsive Teaching: Theory, Research, and Practice. Third edition. Multicultural Education Series. https://eric.ed.gov/?id=ED581130

Geva, E., & Yaghoub Zadeh, Z. (2006). Reading Efficiency in Native English-Speaking and English-as-a-Second-Language Children: The Role of Oral Proficiency and Underlying Cognitive-Linguistic Processes. Scientific Studies of Reading, 10(1), 31–57. https://doi.org/10.1207/s1532799xssr1001_3

Gibbons, M.M. and Borders, L.D. (2010). Prospective First-Generation College Students: A Social-Cognitive Perspective. The Career Development Quarterly, 58: 194-208. https://doi.org/10.1002/j.2161-0045.2010.tb00186.x

Gibbons, P. (2002). Learning language, learning through language, and learning about language: Developing an integrated curriculum. In Scaffolding Language, Scaffolding Learning: Teaching Second Language, Learners in the Mainstream Classroom. pp. 118-138. https://education.ucsc.edu/ellisa/pdfs/Gibbons-2002-Learning-through-language.pdf

Grabe, W.P., & Stoller, F.L. (2011). Teaching and Researching: Reading (2nd ed.). Routledge. https://doi.org/10.4324/9781315833743

Hair, N. L., Hanson, J. L., Wolfe, B. L., & Pollak, S. D. (2015). Association of Child Poverty, Brain Development, and Academic Achievement. JAMA pediatrics, 169(9), 822–829. https://doi.org/10.1001/jamapediatrics.2015.1475

Ibrahim, O., & Jadaan, O. (2024). Online and Mobile-Assisted Language Learning. Level Up! Exploring Gamification's Impact on Research and Innovation. IntechOpen. DOI: http://dx.doi.org/10.5772/intechopen.1003054

Kamran, F., Kanwal, A., Afzal, A., & Rafiq, S. (2023). Impact of Interactive Teaching Methods on Students Learning Outcomes at University level. Journal of Positive School Psychology. (7) 7, 89-105. https://www.researchgate.net/publication/372289203_Impact_of_Interactive_Teaching_Methods_on_Students_Learning_Outcomes_at_University_level

Kanwal, A., Afzal, A., & Rafiq, S. (2023). Impact of Workload on Teachers' Efficiency and Their Students' Academic Achievement at the University Level. Gomal University Journal of Research. 39(2). 131-146. DOI:10.51380/gujr-39-02-02

Kyung-Nyun, K. (2019). Teachers's Administrative workload crowding out instructional activities. Asia Pacific Journal of Education. 39 (1): 1-9. Retrieved from doi:10.1080/02188791.2019.1572592

Ladson-Billings, G. (1995). Toward a Theory of Culturally Relevant Pedagogy. American Educational Research Journal, 32(3), 465–491. https://doi.org/10.2307/1163320

Malkani, R., & Rose, R. (2018). Learning from the voices of first generation learners in a remote community of Maharashtra, India. International Journal of Whole Schooling, 14(2), 104-127. https://files.eric.ed.gov/fulltext/EJ1191334.pdf

National Education Policy (2020). Ministry of Human Resource Development. Government of India. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

National Statistical Office (2020). Migration in India. Periodic Labour Force Survey (PLFS). Ministry of Statistics and Programme Implementation, Government of India. https://www.mospi.gov.in/sites/default/files/publication_reports/Migration%20in%20India%20RL16082023.pdf

Nieto, S. (2009). Language, Culture, and Teaching: Critical Perspectives (2nd ed.). Routledge. https://doi.org/10.4324/9780203872284

Nunan, D. (1991). Communicative Tasks and the Language Curriculum. *TESOL Quarterly*, *25*(2), 279–295. Retrieved from https://doi.org/10.2307/3587464

Our World in Data (2024). Data Page: Gross enrolment ratio in secondary education. Data adapted from World Bank. Retrieved from https://ourworldindata.org/grapher/gross-enrollment-ratio-in-secondary-education

Pandey, P. (2021). Always on the move: The troubling landscape of the right to education for migrant children in India. Times of India Blog. https://timesofindia.indiatimes.com/blogs/voices/always-on-the-move-the-troubling-landscape-of-the-right-to-education-for-migrant-children-in-india/

Poulou, M. (2015). Teacher-Student Relationships, Social and Emotional Skills, and Emotional and Behavioural Difficulties. International Journal of Educational Psychology, 4(1), 84-108. doi:10.4471/ijep.2015.04

Prakasam, S. (2013). Socio-Economic Status of Street Vendors (A Case Study of Chandigarh). Centre for Research in Rural and Industrial Development, Chandigarh. https://www.researchgate.net/publication/355926902_Socio-Economic_Status_of_Street_Vendors_Case_study_of_Chandigarh

Prakasam, S. (2014). Living Conditions of Migrant Service Workers In Urban India (A Case Study of Chandigarh). Journal of Sociology and Social Work. 2(1), 01-23. https://www.researchgate.net/publication/354890266_Living_Conditions_of_Migrant_Service_Workers_In_Urban_India_Case_Study_of_Chandigarh

Raj, A. (2022). First Generation learners: the struggles to fit into the mainstream imagination of 'Merit' and surviving in academia. Feminism in India. https://feminisminindia.com/2022/06/14/first-generation-learners-the-struggles-to-fit-into-the-mainstream-imagination-of-merit-and-surviving-in-academia/

Roberson, J., & Kleynhans, C. (2019). First Generation Learners' Experience of Collaborative Learning. International Journal of Learning and Teaching. 5 (2). 150 - 154. doi: 10.18178/ijlt.5.2.150-154

Santos, L.M.D. (2020). The Discussion of Communicativev Language Teaching Approach in Language Classrooms. Journal of Education and e-Learning Research, 7(2): 104-109. Retrieved from https://www.researchgate.net/publication/340764791_The_Discussion_of_Communicative_Language_Teaching_Approach_in_Language_Classrooms

Sarojadevi, D. R & Subramanian, M. (2018). Special Economic Zones in India: Growth of Exports, Investment and Employment. Indian Journal of Applied Research. 8(11). 48-50. https://www.researchgate.net/publication/331113702_SPECIAL_ECONOMIC_ZONES_IN_INDIA_GROWTH_OF_EXPORTS_INVESTMENT_AND_EMPLOYMENT

Seery, R. L. (2019). Social-Emotional Learning And Teacher-Student Relationships in a Suburban School District: A Descriptive Study. The State University of New Jersey. Retrieved from https://rucore.libraries.rutgers.edu/rutgers-lib/61644/PDF/1/play/

Shalini, S. (2022). Childhoods within Domestic Environments of Gender/ Sexual Violence: A Quantitative Impact Analysis. https://ruralindiaonline.org/en/library/resource/childhoods-within-domestic-environments-of-gender-sexual-violence-a-quantitative-impact-analysis/

Slum Census (2011). Report on the Committee of Slum Statistics/ Census. Ministry of Housing and Urban Poverty Alleviation, Government of India. https://mohua.gov.in/upload/uploadfiles/files/9Slum_Report_NBO(2).pdf

Soria, K. M., & Stebleton, M. J. (2012). First-generation students' academic engagement and retention. Teaching in Higher Education, 17(6), 673–685. https://doi.org/10.1080/13562517.2012.666735

Spiegler, T., & Bednarek, A. (2013). First-generation students: what we ask, what we know and what it means: an international review of the state of research. International Studies in Sociology of Education, 23(4), 318–337. https://doi.org/10.1080/09620214.2013.815441

Stephens, N. M., Hamedani, M. G., & Destin, M. (2014). Closing the Social-Class Achievement Gap: A Difference-Education Intervention Improves First-Generation Students' Academic Performance and All Students' College Transition. Psychological Science, 25(4), 943-953. https://doi.org/10.1177/0956797613518349

Svalberg, A. M.-L. (2009). Engagement with language: Interrogating a construct. Language Awareness, 18(3–4), 242–258.

Svalberg, A. M. (2017). Researching language engagement; current trends and future directions. Language Awareness, 27(1–2), 21–39. https://doi.org/10.1080/09658416.2017.1406490

Tomlinson, C. A. (2014). The differentiated Classroom: responding to the needs of all learners. ASCD. https://files.ascd.org/staticfiles/ascd/pdf/siteASCD/publications/books/differentiated-classroom2nd-sample-chapters.pdf

Unified District Information System For Education Plus – UDISE+ (2022). Flash Statistics. Department of School Education and Literacy. Ministry of Education. Government of India. Retrieved from https://www.education.gov.in/sites/upload_files/mhrd/files/statistics-new/udise_21_22.pdf

Valiandes, S. (2015). Evaluating the Impact of Differentiated Instruction on Literacy and Reading in Mixed Ability Classrooms: Quality and Equity Dimensions of Education Effectiveness. Studies in Educational Evaluation, 45, 17-26. https://doi.org/10.1016/j.stueduc.2015.02.005

Vijayakumar, K. (2020). Bridging Economic Inequality in India through Higher Education: A Study on Rural, First Generation Learners. University of Liverpool. https://livrepository.liverpool.ac.uk/3096426/1/200902103_Jul2020.pdf

Walqui, A. (2006). Scaffolding Instruction for English Language Learners: A Conceptual Framework. International Journal of Bilingual Education and Bilingualism, 9(2), 159–180. https://doi.org/10.1080/13670050608668639

Wan, S., Lin, S., Yirimuwen, Li, S., & Qin, G. (2023). The Relationship Between Teacher-Student Relationship and Adolescent Emotional Intelligence: A Chain-Mediated Mediation Model of Openness and Empathy. Psychology research and behavior management, 16, 1343–1354. https://doi.org/10.2147/PRBM.S399824

Watkins, K. B., & Beresin, G. (2023, June 8). *The challenges of First-Generation college students*. Clay Center for Young Healthy Minds. https://www.mghclaycenter.org/parenting-concerns/young-adults/first-generation-college-studnets/#:~:text=Some%20first%2Dgen%20students%20may,can%20be%20overwhelming%20and%20complex

Xiao, W., & Li, Z. (2022). Impact of Social Support Ecosystem on academic performance of Children from Low-Income Families: a Moderated Mediation model. Frontiers in Psychology, 13. https://doi.org/10.3389/fpsyg.2022.710441

Yamashita, J. (2008). Extensive reading and development of different aspects of L2 Proficiency. 36 (4). 661-672. https://doi.org/10.1016/j.system.2008.04.003

Impact of Topic and Video-Based Learning in Programming on Students' Performance: A Pilot Study in Undergraduate Engineering Education

Burak Bilgi, TED University, Türkiye
Özlem Albayrak, TED University, Türkiye
Mert Çopur, TED University, Türkiye

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This pilot study addresses the effectiveness of different teaching materials on engineering students' learning outcomes through a dual-sectioned approach. 38 participants were administered a pretest and posttest for each of two different topics; This means a total of 76 reviews. Paired two-sample t-test analysis showed a statistically significant increase in performance scores, meaning students showed significant improvement when interacting with instructional materials. Performance scores significantly exceeded scores associated with material use, indicating that instructional content plays an important role in learning success. A notable positive t-statistic suggests that these improvements cannot be due to chance and highlights the effectiveness of the materials in improving educational outcomes. The significance of these results has led to a re-evaluation of material selection processes in engineering education, showing that they are powerful variables in optimizing student performance. In conclusion, this study paves the way for subsequent research on learning methods aimed at establishing evidence-based practices for advanced pedagogical strategies in engineering disciplines.

Keywords*:* Video-Based Learning, Programming, Software Engineering Education, Experiment

iafor
The International Academic Forum
www.iafor.org

Introduction

In the changing world of engineering education, the integration of technology, particularly video-based learning (VBL), has become a crucial component of innovative teaching methods. This adoption of technology driven learning approaches has proven to have an influence on student outcomes by providing a dynamic and interactive educational experience. Noetel et al. (2021) conducted a study on the effectiveness of video in education highlighting its potential to either replace or complement traditional teaching methods and enhance learning results (Noetel et al 2021).

Despite the research conducted on VBL there are still gaps in its implementation and effectiveness in areas, such as engineering education. Culajara's (2023) research on using video-based presentations in education displays the advantages of VBL in enhancing student engagement and performance suggesting its applicability in broader educational contexts (Culajara, 2023). Furthermore Ghilay (2021) emphasizes the significance of integrating high quality videos with text to enhance learning experiences within quantitative courses.

To address these gaps this study seeks to investigate how different instructional materials, within VBL environments impact student learning outcomes in engineering education. According to research conducted by Valero Laparra et al. (2023) on how students engage with video content it appears that using videos has an impact on performance. Moreover, Nadeak and Naibaho (2020), back the notion that incorporating video-based learning environments can enhance students learning achievements in challenging subjects.

By filling these gaps, this study contributes to a deeper understanding of VBL's role in engineering education. Provides insight into the design and implementation of effective VBL strategies by investigating how a variety of video materials impact student performance and engagement. This research enriches academic discourse and provides a foundation that can underpin practical implications for educators in optimizing student learning outcomes through technology-enhanced educational content.

Related Work

The emergence of video-based learning (VBL) in engineering education marks a significant shift towards the adoption of technology-enhanced learning methods. Research increasingly highlights the increasing role of technology in education and highlights the potential of technology to transform traditional pedagogical approaches. Especially in engineering education, where complex concepts and practical applications are crucial, VBL offers an innovative way to increase students' understanding and engagement.

(Noetel et al.'s 2021) systematic literature review underscores this transformation by revealing that video integration as a replacement or complement to traditional teaching methods leads to improved student learning outcomes. This finding is particularly relevant to engineering education, where visual and interactive content can significantly aid the understanding of complex theoretical concepts and practical procedures. Moreover, the study conducted during emergency distance learning in electrical engineering [6] demonstrates the effectiveness of didactic videos in maintaining educational quality and student interest even in challenging learning scenarios (e.g. COVID). Collectively, these studies highlight the growing importance of VBL in engineering education, pointing to an important step towards

more interactive and technologically integrated teaching methodologies, and that this step is inevitable.

Existing research on Video Based Learning (VBL) in various educational contexts and branches highlights its effectiveness in increasing student engagement and performance with different studies and different constructs. Studies such as the study conducted by Bernadetha Nadeak and Lamhot Naibaho [5], focusing on Anatomy Practice, have found significant improvements in student learning outcomes with the use of VBL. Similarly, (Carla Jobelle Culajara, 2023)'s research in physical education showed that video-based presentations significantly increased learning performance, demonstrating the versatility of VBL across different disciplines. Moreover, Meehyun Yoon, Jungeun Lee, and Il-Hyun Jo's work on video learning analytics (2021) offered perspective on behavioral patterns in video-based online learning, pointing to various student engagement styles, that is, individual differences in students' learning. This research highlights the adaptability of VBL to address a variety of learning preferences, thereby improving educational outcomes across multiple learning environments.

While existing studies have demonstrated the effectiveness of VBL in various educational contexts, there remain gaps in the literature, particularly regarding its application and effectiveness in engineering education. Most research has concentrated on the impact of VBL on student engagement and performance in general education or specific subjects like Anatomy and Physical Education. However, there is a relative dearth of comprehensive studies focusing exclusively on engineering education. Addressing this gap is important to tailor VBL strategies to the specific needs of engineering education and maximize their potential benefits.

Comparative analysis of the studies reveals a diverse range of methodologies, populations, and educational contexts. For instance, Noetel et al.'s systematic review encompassed randomized trials in higher education, offering a broad perspective on VBL across various disciplines. Contrastingly, Bernadetha Nadeak and Lamhot Naibaho's study employed classroom action research, focusing specifically on Anatomy, demonstrating the effectiveness of VBL in detailed, subject-specific learning. Similarly, Carla Jobelle Culajara's research in physical education utilized a mixed-method approach, highlighting how VBL can enhance learning in more practical and physical domains. Meehyun Yoon, Jungeun Lee, and Il-Hyun Jo's study on video learning analytics delved into online learning environments, focusing on behavioral patterns and learner engagement styles. These varied approaches underscore the adaptability of VBL across different educational settings and learning styles, although they also indicate a need for more targeted research in specific fields like engineering education.

The significance of video quality and its integration with other learning materials is a critical aspect in the effectiveness of VBL. Ghilay's study on the Text-Based Video (TBV) model (Ghilay, 2021) highlights the importance of combining high-quality videos with textual content to enhance understanding and engagement, particularly in subjects like mathematics. This suggests that the integration of multiple learning modalities can significantly improve learning outcomes. However, there is a lack of comprehensive research specifically focusing on the impact of video quality, such as resolution, production value, and content clarity, on student learning in engineering education. This area presents an opportunity for further exploration to optimize VBL strategies for education.

The studies reviewed often implicitly or explicitly utilize various theoretical frameworks, especially those related to multimedia learning. For instance, the systematic review by (Noetel et al. 2021) aligns with Mayer's Principles of Multimedia Learning, which emphasize the cognitive processes involved in learning through multimedia resources. The focus on integrating text with videos in Ghilay's study (Ghilay, 2021) reflects Dual Coding Theory, suggesting that textual and visual information processed in separate channels can enhance learning. However, a gap in the current literature is the explicit discussion of these theoretical frameworks in the context of engineering education. Future research could benefit from a more direct application of these theories to understand how they can be effectively implemented in engineering-focused VBL strategies.

The studies reveal strengths such as different methodologies and contexts, demonstrating the broad applicability of VBL. For instance, Noetel et al.'s (2021) systematic review offers a comprehensive overview of the field. However, a potential weakness across studies is the lack of deep focus on specific disciplines like engineering education, which may limit the applicability of findings to this field. Additionally, while studies like Ghilay's integrate multiple learning modalities, there's a general lack of emphasis on the role of video quality and its impact on learning outcomes. Another concern is the potential bias in participant selection and the context of the studies, as most research tends to focus on short-term impacts rather than long-term retention and applicability in diverse educational settings. Future research should aim to address these gaps and biases to provide a more comprehensive understanding of VBL in specific educational disciplines.

This study shows some gaps in current research by investigating the impact of different instructional materials in VBL environments on student learning outcomes in engineering education. It provides new insights into how various video materials affect student performance and engagement, enriching academic discourse and offering practical implications for educators in optimizing student learning outcomes through technology-enhanced educational content. This approach aligns well with the identified research gaps and offers valuable contributions to the field of VBL in engineering education. It sheds light on the success of VBL in different disciplines, that is, in different subjects, and its specific applicability in different subjects in the field of engineering.

Research Hypotheses

In this study, we designed and implemented a pilot experiment to examine the impact of topic on individual students' learning performance in video-based learning. Each hypothesis contains one independent variable which is abbreviated in parenthesis at the end of description. The dependent variable in all hypotheses is the student's learning performance. We do not include the alternative hypotheses here and only present the null hypotheses): In the experiment, we have tested the following hypotheses:

$H1_0$: Individual student's learning performance in programming is not impacted by the topic used (t).

$H2_0$: Individual student's learning performance in programming is not impacted by video-based learning (VBL).

In our model there are two independent and one dependent variable. The dependent variable is the individual student's learning performance (delta), while topic (t) and video-based learning (VBL) are the dependent variables.

Figure 1 presents the hypothetical model used in the study.

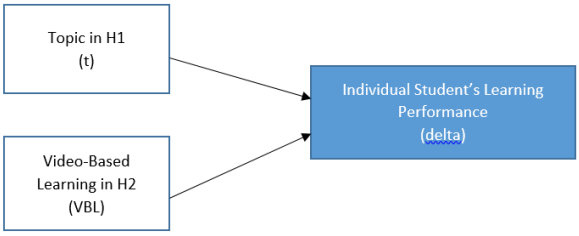


Figure 1: Hypothetical Model

Methodology

To investigate the hypotheses listed in Section III, we designed and conducted an experiment as part of a pilot study that is implemented within the scope of an undergraduate programming course named as: Fundamentals of Programming II.

A. Population and Sample

All 104 students enrolled into the course have been invited to the experiment. The researchers clearly stated that the privacy and confidentiality of the individual students' related data will be preserved. Due to time conflicts, not all students were able to attend the experiment. Out of 104 total, 78 students participated in the experiment. Prior to the experiment, it had been announced that the participants of the experiment would earn a 1% bonus if they actively took part in the experiment.

B. Experiment Design

In the beginning of the experiment, we delivered a brief introduction related to experiment execution. We selected "Exceptions" and "Recursion" as the topics to be learned by the student participants. We preferred these two topics because they were not studied in the lecture previously.

The students were divided equally into two groups based on their performance in the course's first Midterm exam. For each group a pre-test was given on one topic, followed by a video teaching the topic and a post-test. On one topic, all of the questions in the pre-tests and post-tests are the same. The students could submit test results only once. It was mandatory to provide answers to all questions in the tests.

The videos teaching the topics included related content and a subset of questions in these tests. The videos were played by a single computer connected to the projector in the classrooms.

Figure 2 presents the order of material used and duration of the experiment steps for different groups.

C. Experiment Material

For each topic related to programming in Java language, the instructor of the course, and one of the authors of the study created two videos and two presentations. In addition, she prepared a pre-test and a post-test for each of the topics.

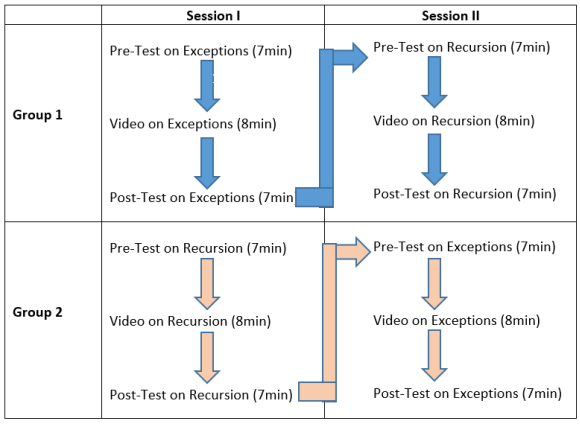


Figure 2: Order of Topics and Material Used in the Experiment

D. Review of Materials

Prepared materials have been reviewed by the other two authors, one of them being the teaching assistant of the programming course. Suggested revisions were reflected to the material and they were finalized before the experiment.

E. Data Cleaning and Analysis

Every participant student is expected to complete four tests. After the experiment, we realized that two of the students did not answer all of the tests, as a result, we decided to remove data of these two participants. Hence, valid data was collected from 76 participants. One of the authors coded the collected data for them to be analyzed. The coded data in MS Excel worksheets were then used by two authors, one of them used IBM SPSS and the other used MS Excel to perform data analysis.

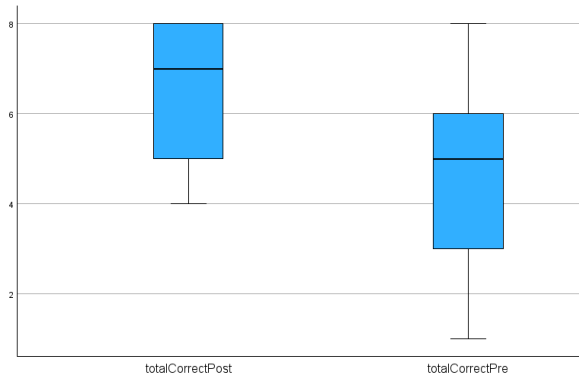


Figure 3: BoxPlot Total Correct Answers Post-test and Pretest

As it can be seen in Figure 3, there is an observable difference between the total number of correct answers given in the post test and that of in the pretest. Paired sample t-test has been used in repeated-measures designs where the same subjects are measured multiple times. This

is common in experimental designs where testing the effect of time or a condition on the same group of subjects.

When the data is grouped according to the material topic (subject), the box plot in Figure4 shows that the participants provided more correct answers in the post test for topic Recursion, denoted by R, than topic Exceptions, represented by E.

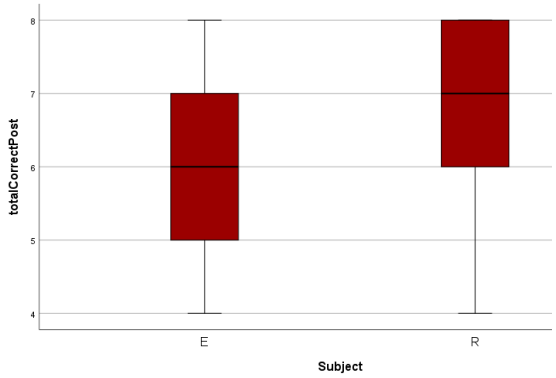


Figure 4: Boxplot for Post test correct answers grouped on Topic

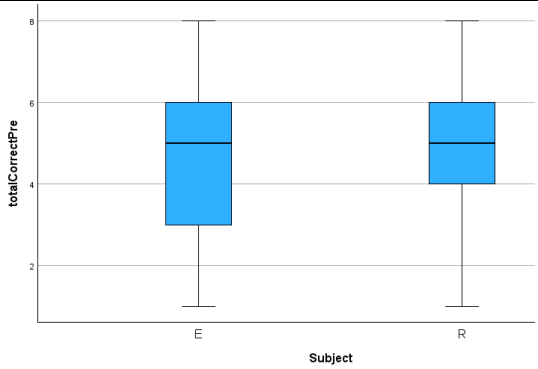


Figure 5: Boxplot for Post test correct answers grouped on Topic

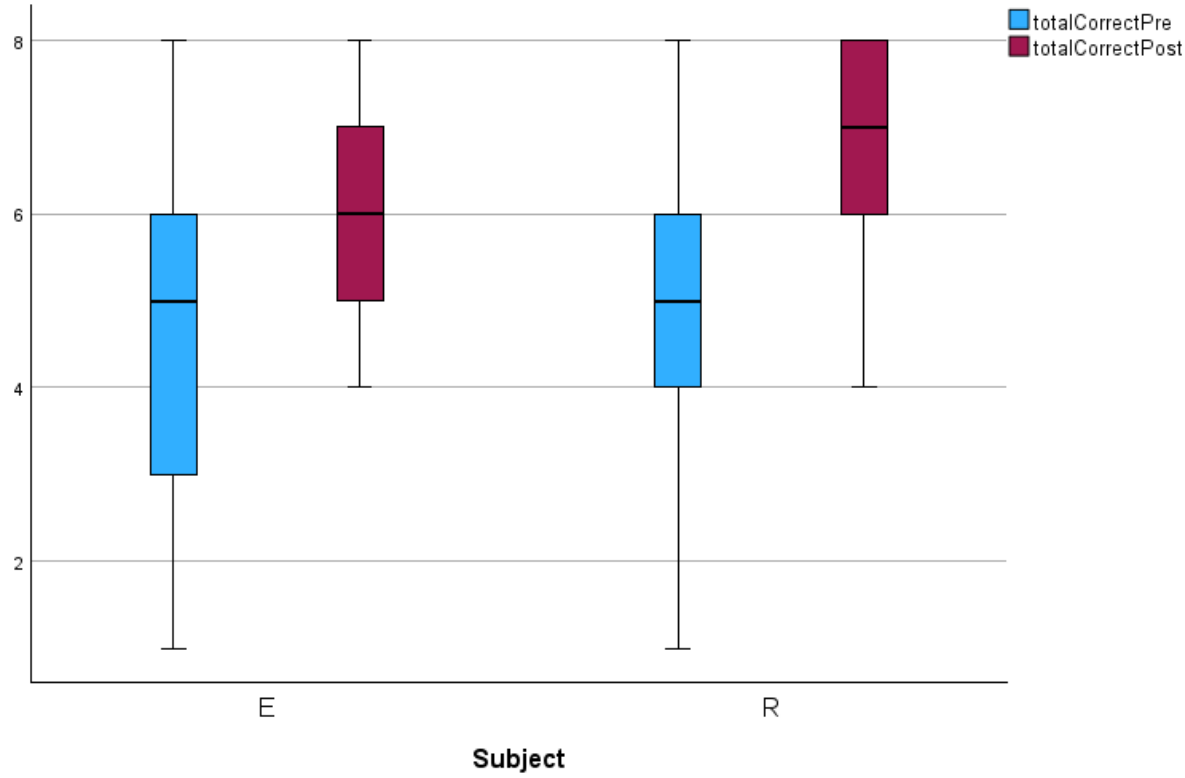


Figure 6: Boxplot for Pretest correct answers grouped on Topic

Paired sample proportions are conducted where success was defined as 7 and 8. Finally, openAI.com ChatGPT was used for interpreting results obtained from the statistical tests.

Results

The results of the paired sample t-tests are provided by Table 1.

Subject denotes topic and delta refers to the performance change in between post and pretests correct results belonging to individual students. Mean: The mean of 'delta' is approximately 1.76, and the mean of 'Subject' is 0.50.

Standard Deviation: 'delta' has a standard deviation of approximately 1.773, which indicates variability around the mean, and 'Subject' has a standard deviation of 0.503.

Paired Samples Correlations:

Correlation: There is a Pearson correlation coefficient of 0.149 between 'delta' and 'Subject', suggesting a weak positive relationship.

Significance: The one-sided p-value is 0.099, and the two-sided p-value is 0.198, which are not statistically significant if we consider a common alpha level of 0.05.

A. Paired Samples Test

Paired Differences: The mean difference between 'delta' and 'Subject' is 1.263.

Standard Error of Mean: The standard error is 0.203, which gives an idea of the precision of the mean difference estimate.

95% Confidence Interval of the Difference: The lower bound is 0.859, and the upper bound is 1.667, which means we can be 95% confident that the true mean difference lies within this range.

t Statistic: The t-statistic is 6.224, which is a measure of how many standard errors the mean difference is away from zero.

Degrees of Freedom (df): The degrees of freedom for the test is 75.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	delta	1,76	76	1,773	,203
	subject	,50	76	,503	,058

Paired Samples Correlations

		N	Correlation	Significance One-Sided p	Significance Two-Sided p
Pair 1	delta & subject	76	,149	,099	,198

Paired Samples Test

		Paired Differences Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper	t	df	Significance One-Sided p	Significance Two-Sided p
Pair 1	delta - subject	1,263	1,769	,203	,859	1,667	6,224	75	<,001	<,001

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Pair 1	delta - subject	Cohen's d	1,769	,714	,460	,964
		Hedges' correction	1,787	,707	,455	,955

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Table 1: Paired Samples t- test Results

B. Paired Samples Proportions Test

Paired-Samples Proportions Statistics

		Successes	Trials	Proportion	Asymptotic Standard Error
Pair 1	totalCorrectPost = 7, 8	41	76	,539	,078
	totalCorrectPre = 7, 8	14	76	,184	,104

Paired-Samples Proportions Confidence Intervals

	Interval Type	Difference in Proportions	Asymptotic Standard Error	95% Confidence Interval of the Difference Lower	Upper
Pair 1: totalCorrectPost - totalCorrectPre	Bonett-Price	,355	,061	,224	,468
	Newcombe	,355	,061	,226	,467
	Wald	,355	,061	,236	,475

Paired-Samples Proportions Tests

	Test Type	Difference in Proportions	Asymptotic Standard Error	Z	Significance One-Sided p	Significance Two-Sided p
Pair 1: totalCorrectPost - totalCorrectPre	Mid-p Adjusted Binomial	,355	,061		<,001	<,001
	McNemar	,355	,061	4,849	<,001	<,001

Table 2: Paired Samples Proportions Statistics Results

Successes Pre: Before the intervention (or in the first condition), there were 14 successes.

Successes Post: After the intervention (or in the second condition), there were 41 successes.

Trials: There were 76 trials in total for both conditions.

Proportion Pre: The proportion of successes pre-intervention is 0.184.

Proportion Post: The proportion of successes post-intervention is 0.539.

Asymptotic Standard Error: The standard error associated with the difference in proportions is 0.078.

Paired-Samples Proportions Confidence Intervals

Difference in Proportions: The observed difference in proportions between the pre and post conditions is 0.355.

95% Confidence Interval of the Difference: The confidence intervals for the difference in proportions have lower bounds ranging from 0.224 to 0.236 and upper bounds from 0.467 to 0.475, depending on the method (Bonett-Price, Newcombe, or Wald). This indicates a high level of confidence that the true difference in proportions lies within these ranges.

Paired-Samples Proportions Tests

McNemar Test:

Asymptotic Standard Error: The standard error for the McNemar test is 0.061.
Z: The z-value for the McNemar test is 4.849, which is a measure of how many standard errors the observed difference is away from zero.

Significance: Both one-sided and two-sided p-values are less than 0.001, indicating a statistically significant difference in proportions from the pre to post conditions.

The results of the proportion paried samples test is provided in Table 2.

Discussion

According to the paired sample t-test, the paired samples t-test indicates that there is a statistically significant difference between the means of 'delta' and 'Subject', with 'delta' being higher on average. The effect size measures (Cohen's d and Hedges' g) suggest that this difference is not only statistically significant but also of a moderate to large magnitude.

The test's statistical significance ($p < 0.001$) strongly suggests that the material represented by 'Subject' has a significant impact on the performance outcomes measured by 'delta'. The results indicate that changes in 'Subject' are associated with substantial changes in 'delta', which could be interpreted as the material having a considerable effect on performance.

The confidence interval for the mean difference does not include zero, which reinforces the conclusion that there is a significant effect. However, the Pearson correlation is relatively low, indicating that while the two variables are related, the relationship is not very strong.

Based on the proportion's tests, the paired-samples proportions test shows a significant increase in the proportion of successes from the pre-condition (around 18.4%) to the post condition (around 53.9%). The 95% confidence intervals are well above zero and do not overlap with it, which supports the significance of the increase in successes.

The McNemar test confirms the significance of this finding, with a very large z-value and p-values far below the conventional threshold of 0.05 ($p < 0.001$ for both one-sided and two-sided tests). This strongly suggests that the intervention or condition change had a significant effect on the proportion of successes.

Threats to Validity and Limitations

One of the authors also performing the experiment is the instructor of the course. The researcher bias that may stem from this fact is avoided via analysis conducted by two researchers independently and comparing the analysis results. Two reviewers who are experts on material and experimental design in computer education investigated the materials and design.

The pilot has been conducted in one course can the results obtained cannot be generalized.

Some students have taken this course previously. By measuring the performance as a difference is posttest and pretest this limitation is mitigated.

The videos are not played by the participants, rather a single computer is used to play the video and a projector is used, allowing all participants in a classroom to watch the videos at the same time from a single source.

Conclusion and Future Work

Overall, we can conclude that according to the data provided, 'Subject' (topic, t) has a significant impact on 'delta', which in the context of your experiment suggests that the choice of material significantly affects performance.

The results of the proportions test indicate that there was a substantial and statistically significant improvement associated with the post condition compared to the pre-condition in the variable being measured. This provides strong evidence that whatever change was implemented between the two measurements had a positive impact on the outcome. The change was the video-based learning material utilization. Thus, VBL has a positive impact on the learning performance.

For future work, we plan to conduct the experiment with more students using different materials and courses. Pilot experiment’s data and the materials will be anonymously available to the researchers willing to conduct further studies.

Acknowledgment

Thanks to Dr. Duygu ALBAYRAK, Ruhi Zafer ÇAĞLAYAN, to the anonymous participants, and anonymous reviewers for their contributions to the study.

References

Culajara, C. J. (2023). Improving Learning Performance in Physical Education through Video-Based Presentations (VBP) Approach, Physical Education and Sports Studies and Research, vol. 2, no. 2, pp. 100–115, Oct. 2023, doi:10.56003/pessr.v2i2.251

Ghilay, Y. (2021). Text-Based Video: The Effectiveness of learning math in higher education through videos and texts," 2021. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3826103

Laparra et al, V. (2023). Assessing the impact of using short videos for teaching at higher Education: Empirical evidence from Log-Files in a Learning Management system, Revista Iberoamericana De Tecnologías Del Aprendizaje, vol. 18, no. 3, pp. 233–238, Aug. 2023, doi:10.1109/rita.2023.3301411

Lijo, R., Quevedo, E., Sánchez, J. J. C. and Horta, R. (2023). Impact of electrical engineering didactic videos during emergency remote learning, IEEE Access, vol. 11, pp. 19622–19634, Jan. 2023, doi:10.1109/access.2023.3248299

Nadeak B. and Naibaho L., (2020). Video-Based learning on improving students' learning output, PalArch's Journal of Archaeology of Egypt / Egyptology, vol. 17, no. 2, pp. 44–54, Oct. 2020, doi:10.48080/jae.v17i2.25

Noetel et al. M. (2021). Video Improves Learning in Higher Education: a Systematic Review, Review of Educational Research, vol.91, no.2, p.003465432199071, Feb. 2021, https://doi.org/10.3102/0034654321990713

Yoon, M., Lee, J.-E. and Jo, I. H. (2021). Video learning analytics: Investigating behavioral patterns and learner clusters in video-based online learning, The Internet and Higher Education, vol. 50, p. 100806, Jun. 2021, doi:10.1016/j.iheduc.2021.100806

Contact email: ozlem.albayrak@tedu.edu.tr

A Conceptualized Framework of University Students' Perceptions of ChatGPT as a Tool for Learning and Research

Sibusisiwe Dube, National University of Science and Technology, Zimbabwe
Belinda Ndlovu, National University of Science and Technology, Zimbabwe
Sinokubekezela Princess Dube, The University of Zambia, Zambia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The swift progressions in artificial intelligence (AI) have resulted in the emergence of ChatGPT, a large language model (LLM) with capabilities in natural language processing. As ChatGPT garners widespread attention, it is imperative to comprehend the factors influencing its adoption in education. Guided by the Procedure for Conceptual Framework Analysis (PCFA), a systematic literature review approach, this research examines scholarly work published from 2020-2024 on the adoption of ChatGPT in education. The research examines students' perceptions about ChatGPT and how these perceptions impact their adoption of ChatGPT for academic purposes. Five categories of factors emerged from these study findings, which included Technological factors – usability, accessibility, availability, affordability and reliability of the ChatGPT technology. The revised literature also identified Institutional factors – organizational culture, leadership support, resource availability and policy framework. In addition are Human factors – technical skills, experience, training, attitude, motivation, trust and familiarity with technology. Ecological – economic conditions, societal norms and environmental sustainability as well as Cognitive – perceived usefulness, perceived ease of use, self-efficacy, curiosity, fear and awareness also emerged. These results inform how students perceive ChatGPT as a tool for performing education activities, enhance comprehension of student interaction with AI-driven educational tools and guide educational strategies that exploit the capabilities of ChatGPT. This article enriches the dialogue by presenting a thorough conceptualization of the factors impacting ChatGPT adoption and informs future studies on the ethical integration of AI tools in education and provides valuable insights for educational policymakers, administrators, and scholars on how to integrate ChatGPT in education activities.

Keywords: ChatGPT, Artificial Intelligence, Education

iafor
The International Academic Forum
www.iafor.org

Introduction

The proliferation of artificial intelligence (AI) technologies has had a significant impact on various sectors, including the field of education. The latest and most notable AI-powered tool is ChatGPT, a sophisticated language model created by OpenAI (2022). ChatGPT has showcased impressive capabilities in natural language processing, allowing it to engage in fluid conversations, respond to inquiries, and aid in a variety of tasks such as writing, analysis, and problem-solving (Weng, 2023).

The emergence of ChatGPT as a tool with the potential to revolutionize educational practices has generated both excitement and apprehension within the realms of educators and policymakers (Brynjolfsson, et al., 2023). While ChatGPT can be utilized to enrich learning experiences, offer personalized support, and cultivate critical thinking and innovation (Metz, 2023). It also brings forth concerns regarding academic honesty, the risk of unethical behaviour, and the evolving landscape of teaching and evaluation (Strickland, 2023).

While this article acknowledges the existence of research on the subject of ChatGPT in education, there is limited research that presents a conceptualized framework of factors influencing the adoption of ChatGPT as a tool for teaching, learning and research. This is contrary to the fact that university students represent a significant demography of ChatGPT users. It is on this background that it became essential to comprehend students' perceptions and factors influencing the integration of ChatGPT into their learning and research practices.

Understanding the students' perceptions and the factors influencing the acceptance of ChatGPT in educational environments is vital for formulating effective approaches and regulations that capitalize on the advantages while addressing the obstacles. To meet this necessity, the objective of this research is to construct a conceptual framework that identifies and amalgamates the principal perspectives of students towards the adoption of ChatGPT in educational contexts. For this purpose, the study advances the academic work by Dube et al., (2024) who through a systematic literature review, presented students' perceptions about the benefits and challenges of using ChatGPT in teaching, learning and research.

The conceptual framework of factors influencing the adoption of ChatGPT as a tool for learning and research is grounded in a systematic literature review using the Procedure for Conceptual Framework Analysis (PCFA) (Jabareen, 2009), which enables a comprehensive examination of the existing research on technology adoption in education and the unique characteristics of ChatGPT.

Methodology

This study utilizes the Procedure for Conceptual Framework Analysis (PCFA) to methodically examine and combine the current literature on the factors that affect the adoption of ChatGPT in education. The PCFA method consists of the following steps:

Mapping the selected data sources: The researchers performed an extensive search of pertinent databases, such as Scopus, Web of Science, and Google Scholar, to locate academic publications, conference proceedings, and reports published from 2020 to 2024. The search queries were various combinations of keywords, including "ChatGPT," "artificial intelligence," "education," "adoption," and "technology acceptance.". the final search of literature yielded a count of 45 articles for inclusion in study.

Extensive reading and categorizing of the selected data: The researchers conducted a comprehensive analysis of the chosen literature to identify and classify the fundamental ideas, themes, and aspects associated with the use of ChatGPT in educational environments. The researchers consolidated the fundamental ideas and patterns that arose from the literature analysis and gave suitable labels to describe the elements that impact the adoption of ChatGPT in education.

Deconstructing and categorizing the concepts: The ideas that were found were analysed and divided into wider categories, including technical, organizational, individual, and contextual variables. The researchers used the classified concepts to create a conceptual framework that clearly illustrates the connections between the main factors influencing the adoption of ChatGPT in education.

Validating the conceptual framework: The conceptual framework was verified by engaging in expert consultations and conversations with educators, policymakers, and academics in the field of educational technology.

Results

The PCFA approach yields a conceptual framework comprising five primary components: technological, institutional, human, ecological and cognitive factors, which are all illustrated in Table 1.

Table1. Factors Influencing Student Perceptions and Adoption of ChatGPT

Main factor	**Sub-factors**	**Citation**
Factors related to technology	Learning (benefits	(Rahim et al., 2023)
	Research:	(Chan & Hu, 2023)
	Affordability	(Dube, 2020)
	Availability	(Jowarder, 2023)
	Accessibility	(Dube, 2020)
	Usability	(Abouammoh et al., 2023), (Hasanein & Sobaih, 2023), (Silvano & Gui, 2024)
	Social Influence (SI)	(Filipec & Woithe, 2023)
	Anxiety levels	(Zhang & Wang, 2022; Wu & Liu, 2024)
	Resource availability)	(Dube, 2020)
	Policies	(Dube, 2020)
	Training	(Dube et al., 2023)
Ecological Factors	Facilitating Conditions (FC)	(Shaengchart, 2023), (Sabeh, 2024), (Alshammari et al., 2024)
	Environmental sustainability	(Elkhodr et al., 2023), (Bin-Nashwan et al., 2023)
Factors related to human characteristics	Attitude towards technology	(Shaengchart, 2023), (Bin-Nashwan et al.,

Main factor	Sub-factors	Citation
		2023), (Dube, 2020)
	Habit	(Gulati, Saini, Singh & Kumar, 2024), (Biloš, 2024)
	Experience	(Chan & Hu, 2023), (García-Alonso, et al., 2024)
	Motivation	(Muñoz et al., 2023), (Dube,, Mutunhu, ; Dube, 2023)
	Awareness	(Mutunhu, et al., 2022)
	Trust	(Silvano, Gui, 2024), (Currie et al., 2023), (Al-shorbagy & Hallit, 2024)
	Self-efficacy	(Sabeh, 2024)
	Fear	(Bin-Nashwan et al., 2023)
	Perceived Usefulness (PU):	(Jowarder, 2023),
	Perceived Ease of Use	(Alshurideh et al., 2024), (Liu & Liu, 2023)
	Curiosity	(Sinaga et al., 2024), (Chatgpt, 2024)

The contents of Table 1 depict the general perceptions of students regarding the adoption of ChatGPT as a tool for learning and research. The identified factors depict both the enabling and inhibiting factors for adopting ChatGPT in education. For example, it is evident in the reviewed literature that the positive perceptions of students are derived from such factors relating to technology, institution, humans, ecology and cognitive factors. While much of these factors facilitate, there are also factors that inhibit the adoption of ChatGPT as a tool for learning and research.

Factors Related to Technology

This component pertains to the technological aspects and functionalities of ChatGPT that impact the way university students perceive and utilize the tool. Prior research indicates that elements such as the language processing capabilities, ease of use, and general usefulness of the tool have a substantial impact on students' opinions.

- **Usability.** It has been shown in literature that students develop a positive perception of technology that is usable and adds value to students' learning and research practices. like ChatGPT is usable and students gain value from using it, it becomes imperative for students to have a positive. (LMS) (Dube, 2020; Dube & Scott, 2016a), information and communication technologies (ICT) enabled learning (Dube & Scott, 2017, Dube, 2017) as well as virtual and augmented reality technologies (Maphosa, Mutunhu Ndlovu & Dube, 2023).

- **Accessibility.** Existing literature proves this importance. For example, Cuban et al. (2001) argues that high access to technology is important for students to have a positive perception towards such technologies as ChatGPT. Similarly, an article published later revealed that access precedes use of any technology (Racherla & Mandviwalla, 2013), a sentiment confirmed by recent studies (Dube, 2020).
- **Affordability.** This is an important factor because the cost of technology could either enable or inhibit the adoption of a technology. This observation is confirmed in a study by Al-Kumaim et al., (2021), who argues that a lack of affordability to technology impacts negatively the adoption of technology.
- **Availability.** Existing studies depict availability as a major factor that determines if a technology is adopted or not (Bringula, 2013; Riddlesden & ;Singleton, 2014; Dube & Scott, 2016b).
- **Reliability.** Existing literatures has shown that reliable technologies are likely to be adopted more than unstable and unreliably technologies (Njaya & Murangwa, 2017; Cui et al., 2021).

Factors Related to Cognition

The cognitive factors focus on how individuals think about and process information related to the technology. This includes perceived usefulness, perceived ease of use, Awareness, Self-efficacy, curiosity and fear.

- **Perceived benefits for learning (PU):** The research emphasizes the capacity of technology to improve research efficiency, facilitate content development for assignments, and provide tailored learning experiences (Zhang & Wang, 2022).
- **Perceived Ease of Use:** Research indicates that the ease of use has a substantial influence on how likely students are to accept a certain product or service (Wu & Liu, 2024). An intuitive user interface and easily accessible lessons are essential for cultivating favourable dispositions towards ChatGPT (Liu, 2023).
- **Self-efficacy.** This is an important factor that influences the adoption of technology that promotes AI supported teaching, learning and research (Dolighan & Owen, 2021; Baroudi & Shaya, 2022).
- **Curiosity.** This is a major factor that can determine if the students would adopt new technologies like ChatGPT. This observation is confirmed in literature, which shows that curious students always try out and adopt technology without any hesitation (Bailey et al., 2021).
- **Fear.** Literature provides evidence that if a technology is perceived as risky, the intended users would shun it because of fear (Juutinen et al., 2011; Tyagi, 2012).

Institutional Factors

The organizational environment encompasses the set of rules, procedures, and support systems inside academic institutions that influence and shape students' utilization of ChatGPT. Prior research has emphasized the significance of institutional rules, academic integrity regulations, and the relationship between instructors and students in relation to this matter; (Mutunhu, et al., 2022; Dube & Scott, 2018).

- **Organizational culture** is closely linked to the adoption of technology such that an absence of such culture will result in the non-adoption of technology (Shahzad et al., 2017).
- **Resource availability.** Access to the right technological resources is essential for the adoption of technology (Dube & Scott, 2018).
- **Leadership support.** A lack of this factor will prevent students from adopting technology (Orlov et al., 2021).
- **Policy framework.** Good policies promote the usage of technology (Dube, 2020).

Ecological Factors

The environmental aspects refer to the wider sociological, technical, and cultural elements that might impact how university students perceive and utilize ChatGPT. These aspects encompass the level of acceptance and knowledge of AI technologies, ethical concerns, and the changing role of technology in education.

- **Facilitating Conditions (FC):** Adoption rates can be influenced by the presence of training workshops, technical assistance, and institutional regulations related to the usage of AI.
- **Societal norms.** The societal norms can be delimiters to the adoption of technology. If a society despises technology, then its adoption can be hindered whereas if the norms are supportive then the technology would be adopted (Dube, 2020; (Hardaker & Singh, 2011).
- **Environmental sustainability.** An unstable environment does not promote the adoption of technology (Omotayo & Tiamiyu, 2017).

Factors Regarding Human Characteristics

This component focuses on the individuals using the technology, including their skills, experience, and perceptions.

- **Technical skills.** Skilled users do not hesitate to adopt any technology that adds value to their practice (Rudhumbu, 2020).
- **Experience.** This is a major factor that influences the adoption of any technology (Kovacs et al., 2021; Cruickshank et al., 2021).
- **Training.** It is imperative for users of technology to acquire knowledge of how to use technology. Without the technical know-how, intended users find it difficult to operate technology to achieve their objectives.
- **Attitude.** Negative attitude hinders while positive attitude promotes the uptake of a technology (Liu, 2023).
- **Motivation.** Highly motivated students tend to adopt technology quicker than those who not motivated (Muñoz et al., 2023).
- **Trust and familiarity.** Trustworthiness of an AI generated assignment or project is the most important reason for adopting a technology (Trust & Whalen, 2023).
- **Familiarity with technology.** Like trust, familiarity with technology plays an important role in the adoption of technology (Byungura et al., 2018; Lapitan et al., 2021).

Conceptual Framework

Based on the findings, a conceptual framework is proposed that integrates the TOE framework with the identified themes (Figure 1). The framework depicts how students' perceived benefits, drawbacks, and anxieties regarding ChatGPT, alongside the influence of the university environment, impact their intention to use it for learning and research.

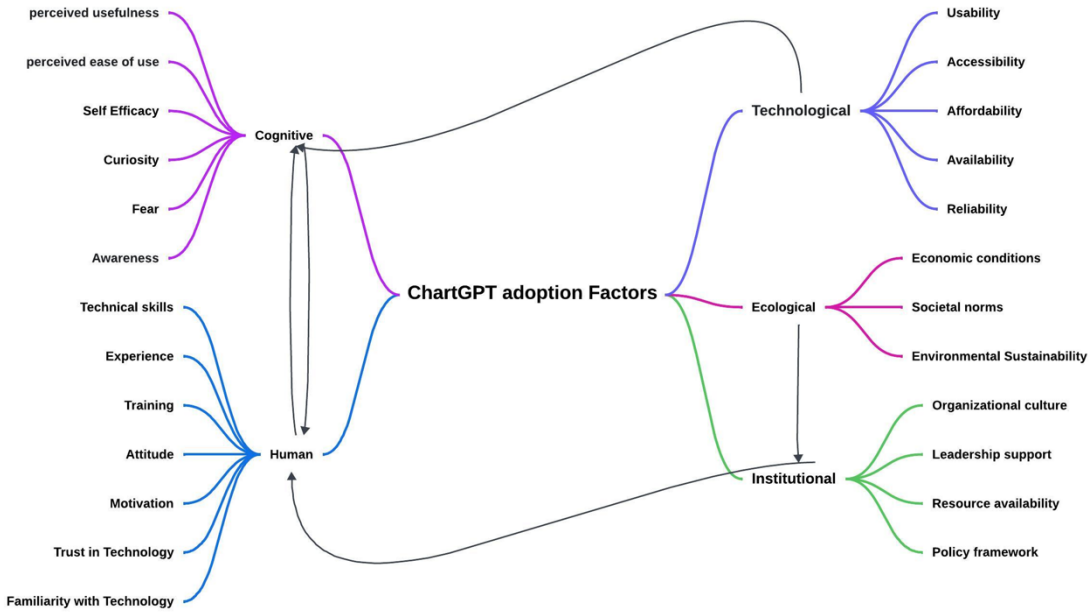


Figure 1: A Conceptual Framework of ChatGPT Adoption Factors

Discussion

This research makes a valuable contribution to the comprehension of university students' perspectives on ChatGPT as a tool for learning and research. The results underscore the potential advantages that students identify in relation to increased efficiency, acquisition of knowledge, and support for research. Nevertheless, issues regarding plagiarism, bias in information, and dependence on AI for critical thinking necessitate thorough examination.

Educational strategies that provide students with the ability to assess AI-generated content critically and employ ChatGPT responsibly are crucial. Academic institutions can organize sessions on information literacy and ethical AI usage to tackle student concerns and encourage the informed integration of ChatGPT into scholarly activities.

The suggested theoretical framework offers a thorough insight into the diverse factors that impact the acceptance of ChatGPT in academia. This framework enhances the current body of knowledge on technology adoption in education by encompassing the distinct features and obstacles linked to the incorporation of advanced language models such as ChatGPT.

This research contributes to the understanding of university students' perceptions of ChatGPT as a learning and research tool. The findings highlight the potential benefits students perceive in terms of enhanced efficiency, knowledge acquisition, and research support. However, concerns about plagiarism, information bias, and reliance on AI for critical thinking require careful consideration.

Educational methods that equip students with the skills to critically assess AI-generated information and use ChatGPT responsibly are imperative. Higher education institutions can play a pivotal role by organizing:

Training workshops: Providing students with the skills to critically evaluate AI-generated information and use ChatGPT responsibly. Technical support: Ensuring that students have the necessary technical assistance to address any challenges encountered while utilizing ChatGPT.

Implications

The implications of this study are far-reaching for educational policymakers, administrators, and researchers. The conceptual framework can serve as a guiding tool for the strategic planning and implementation of ChatGPT in educational institutions. It can provide valuable insights for the creation of regulations, teacher training programs, and support systems to enable the appropriate and efficient integration of ChatGPT, while also tackling the related issues and concerns.

Limitations and Future Research

Conducting a study on faculty perspectives about ChatGPT and its possible influence on teaching methodologies may yield significant insights. Subsequent research endeavours may enhance the credibility and enhance the conceptual framework by conducting empirical inquiries, such as case studies, surveys, and longitudinal analyses, to examine the implementation of ChatGPT in various educational settings. Furthermore, investigating the interaction between the highlighted characteristics and their respective significance in various educational environments will enhance our overall comprehension of the aspects that impact the adoption of ChatGPT in education.

Conclusion

This study introduces a conceptual framework that identifies and combines the main aspects that affect the acceptance of ChatGPT in educational environments. The framework includes technical, organizational, individual, and contextual aspects, emphasizing the intricate and diverse character of this phenomena. The results of this study offer important knowledge for educational policymakers, administrators, and researchers in effectively managing the difficulties and advantages associated with the use of ChatGPT in educational settings. Educational institutions may design effective plans and policies to utilize the potential of ChatGPT while minimizing the dangers and concerns by addressing the mentioned aspects. ChatGPT holds the capacity to serve as a beneficial instrument for university students. Nevertheless, the effective implementation of this needs the direct resolution of student worries and concerns.

By cultivating a discerning and accountable attitude towards AI-driven technologies, educators This study presents a conceptual framework for comprehending the way university students perceive ChatGPT as a tool for learning and research. The results indicate that students generally have a positive perception towards ChatGPT as a tool for learning and research. The reviewed literature shows that students view ChatGPT as a valuable and user-friendly tool, while also acknowledging the importance of striking a balance between its advantages and any difficulties and restrictions. It is imperative to deal with inhibiting factors

to enable an increased adoption of ChatGPT in education. The findings derived from this research can provide valuable input for the formulation of guidelines and regulations pertaining to the suitable and ethical utilization of AI-driven technologies in academic environments.

References

Abouammoh, N., Alhasan, K., Raina, R., & Soliman, M. (2023). *Original Research : Exploring Perceptions and Experiences of ChatGPT in Medical Education : A Qualitative Study Among Medical College Faculty and Students in Saudi Arabia Acknowledgments : Declaration of*.

Al-Kumaim, N. H., Mohammed, F., Gazem, N. A., Fazea, Y., Alhazmi, A. K., & Dakkak, O. (2021). Exploring the Impact of Transformation to Fully Online Learning During COVID-19 on Malaysian University Students' Academic Life and Performance. *International Journal of Interactive Mobile Technologies*, *15*(5), 140–158. https://doi.org/10.3991/ijim.v15i05.20203

Al-shorbagy, M., & Hallit, S. (2024). ChatGPT usage and attitudes are driven by perceptions of usefulness , ease of use , risks , and psycho-social impact : a study among university students in the UAE. *Front. Educ.*, *9*, 1–15. https://doi.org/10.3389/feduc.2024.1414758

Alshammari, S. H., Arabia, S., Alshammari, M. H., & Arabia, S. (2024). Factors Affecting the Adoption and Use of ChatGPT in Higher Education. *Nternational Journal of Information and Communication Technology Education*, *20*(1), 1–16. https://doi.org/10.4018/IJICTE.339557

Alshurideh, M., Jdaitawi, A., Sukkari, L., Al-gasaymeh, A., Haitham, M., Damra, Y., Yasin, S., Kurdi, B. Al, & Alshurideh, H. (2024). Factors affecting ChatGPT use in education employing TAM: A Jordanian universities' perspective. *International Journal of Data and Network Science*, *8*, 1599–1606. https://doi.org/10.5267/j.ijdns.2024.3.007

Bailey, D., Southam, A., & Costley, J. (2021). Digital storytelling with chatbots : mapping L2 participation and perception patterns. *Interactive Technology and Smart Education*. https://doi.org/10.1108/ITSE-08-2020-0170

Baroudi, S., & Shaya, N. (2022). Exploring predictors of teachers' self-efficacy for online teaching in the Arab world amid COVID-19. *Education and Information Technologies*, *27*(6), 8093–8110. https://doi.org/10.1007/s10639-022-10946-4

Biloš, A. (2024). Understanding the Adoption Dynamics of ChatGPT among Generation Z : Insights from a Modified UTAUT2 Model. *Appl. Electron. Commer. Res.*, *19*, 863–879.

Bin-Nashwan, S. A., Sadallah, M., & Bouteraa, M. (2023). Use of ChatGPT in academia: Academic integrity hangs in the balance. *Technology in Society*, *75*, 102370. https://doi.org/10.1016/j.techsoc.2023.102370

Bringula, R. P. (2013). Influence of faculty- and web portal design-related factors on web portal usability: A hierarchical regression analysis. *Computers and Education*, *68*, 187–198. https://doi.org/10.1016/j.compedu.2013.05.008

Brynjolfsson, E., Hui, X., & Liu, M. (2023). Does ChatGPT have a place in schools? The pros and cons of AI-powered chatbots in education. *IEEE Spectrum*, *60*(3), 30–35.

Byungura, J. C., Hansson, H., Muparasi, M., & Ruhinda, B. (2018). Familiarity with technology among first-year students in Rwandan tertiary education. *Electronic Journal of E-Learning*, *16*(1), 30–45.

Chan, K. Y. C., & Hu, W. (2023). Students ' Voices on Generative AI : Perceptions , Benefits , and Challenges in Higher Education. *International Journal of Educational Technology in Higher Education*, *20*(43), 1–18.

Chatgpt, O. (2024). A Study On Evaluating The Antecedents Of The Adoption Of Chatgpt . *Educational Administration: Theory and Practice*, *30*(6), 2243–2262.

Cruickshank, V., Pill, S., & Mainsbridge, C. (2021). 'Just do some physical activity': Exploring experiences of teaching physical education online during Covid-19. *Issues in Educational Research*, *31*(1), 76–93.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High Access and Low Use of Technologies in High School Classrooms : Explaining an Apparent Paradox. *American Educational Research Journal*, *38*(4), 813–834.

Cui, S., Zhang, C., Wang, S., Zhang, X., Wang, L., Zhang, L., Yuan, Q., Huang, C., Cheng, F., Zhang, K., & Zhou, X. (2021). Experiences and attitudes of elementary school students and their parents toward online learning in China during the COVID-19 pandemic: Questionnaire study. *Journal of Medical Internet Research*, *23*(5). https://doi.org/10.2196/24496

Currie, G., Singh, C., Nelson, T., Nabasenja, C., Al-hayek, Y., & Spuur, K. (2023). Radiography ChatGPT in medical imaging higher education. *Radiography*, *29*(4), 792–799. https://doi.org/10.1016/j.radi.2023.05.011

Dolighan, T., & Owen, M. (2021). Teacher efficacy for online teaching during the COVID-19 pandemic. *Brock Education Journal*, *30*(1), 95. https://doi.org/10.26522/brocked.v30i1.851

Dube, S. (2017). *The 21st Century Students ' Educational Ict Preferences*. *December*, 3–6. https://doi.org/10.15406/iratj.2017.03.00069

Dube, S. (2020). *A Paradox of the Second Order Digital Divide in Higher Education Institutions of Developing Countries: Case of Zimbabwe*. University of Cape Town.

Dube, S. Dube, S., Mutunhu Ndlovu, B., Maguraushe, K., Malungana, L., Kiwa, F. J., & Muduva, M. (2024). Students' Perceptions of ChatGPT in Education: A Rapid Systematic Literature Review. In: Arai, K. (eds) Intelligent Computing. SAI 2024. Lecture Notes in Networks and Systems, vol 1019. In *Intelligent Computing* (pp. 258–279). Springer, Cham. https://doi.org/10.1007/978-3-031-62273-1_18

Dube, S., & Scott, E. (2016a). Students' perceptions about learning management systems in education: case of Zimbabwe. In J. Novotná & A. Jancarik (Eds.), *proceedings of the 15th European Conference on e-Learning (ECEL 2016)* (pp. 174–182). Academic Conferences and Publishing International Limited Reading, UK. http://tinyurl.com/ecel2016

Dube, S., & Scott, E. (2016b). Students' perceptions about learning management systems in education: Case of Zimbabwe. *Proceedings of the European Conference on E-Learning, ECEL*, *2016-Janua*.

Dube, S., & Scott, E. (2017). A survey of the university students' perspectives about using digital technologies in education: Zimbabwean case. *IAFOR Journal of Education*, *5*(1), 123–139. iafor.org/iafor-journals/iafor-journal-of-education

Dube, S., & Scott, E. (2018). The organisational constraints of blending e-learning tools in education: lecturers' perceptions. In *Information Technology-New Generations* (pp. 305–310). Springer.

Dube, Sibusisiwe; Mutunhu, Belinda; Dube, Sinokubekezela. (2023). Lecturers' Experiences in Teaching STEM Courses Online During COVID-19: Case of a Zimbabwean University. *The IAFOR Conference on Educational Research & Innovation: 2023 Official Conference Proceedings*, 53–65.

Elkhodr, M., Gide, E., Wu, R., & Darwish, O. (2023). ICT students ' perceptions towards ChatGPT : An experimental reflective lab analysis. *STEM Education, 3*(2), 70–88.

Filipec, O., & Woithe, J. V. (2023). *Understanding the Adoption , Perception , and Learning Impact of ChatGPT in Higher Education*.

García-Alonso EM, León-Mejía AC, Sánchez-Cabrero R, G.-O. R. (2024). Training and Technology Acceptance of ChatGPT in University Students of Social Sciences: A Netcoincidental Analysis. *Behav Sci (Basel). 2*, ;*14*(7), 612. 10.3390/bs14070612. PMID: 39062435; PMCID: PMC11274043.

Gulati, A., Saini, H., Singh, S., & Kumar, V. (2024). Enhancing learning potential: investigating marketing students' behavioral intentions to adopt ChatGPT. *Marketing Education Review*, 1–34. https://doi.org/10.1080/10528008.2023.2300139

Hardaker, G., & Singh, G. (2011). The adoption and diffusion of elearning in UK universities: A comparative case study using Giddens's theory of structuration. *Campus-Wide Information Systems*, *28*(4), 221–233. https://doi.org/10.1108/10650741111162707

Hasanein, A. M., & Sobaih, A. E. E. (2023). Drivers and Consequences of ChatGPT Use in Higher Education : Key Stakeholder Perspectives. *Eur.Opean J.Ournal of Investigation in Health Psychol.Ogy and Education.*, *13*, 2599–2614. https://doi.org/10.3390/ejihpe13110181

Jabareen, Y. (2009). Building a Conceptual Framework : Philosophy , Definitions , and Procedure. *International Journal of Qualitative Methods*, *8*(4), 49–62.

Jowarder, M. I. (2023). The Influence of ChatGPT on Social Science Students: Insights Drawn from Undergraduate Students in the United States. *Indonesian Journal of Innovation and Applied Sciences (IJIAS)*, *3*(2), 194–200. https://doi.org/10.47540/ijias.v3i2.878

Juutinen, S., Huovinen, T., & Yalaho, A. (2011). Emotional Obstacle in E-learning - The fear of technology Statistics Finland. *International Journal for E-Learning Security (IJeLS)*, *1*(3/4), 104–109.

Kovacs, H., Pulfrey, C., & Monnier, E. C. (2021). Surviving but not thriving: Comparing primary, vocational and higher education teachers' experiences during the COVID-19 lockdown. *Education and Information Technologies*, *26*(6), 7543–7567. https://doi.org/10.1007/s10639-021-10616-x

Lapitan, L. D., Tiangco, C. E., Sumalinog, D. A. G., Sabarillo, N. S., & Diaz, J. M. (2021). An effective blended online teaching and learning strategy during the COVID-19 pandemic. *Education for Chemical Engineers*, *35*(May 2020), 116–131. https://doi.org/10.1016/j.ece.2021.01.012

Liu, B. (2023). Chinese University Students ' Attitudes and Perceptions in Learning English Using ChatGPT. *International Journal of Education and Humanities (IJEH)*, *3*(2), 132–140. http://i-jeh.com/index.php/ijeh/index

Liu, X., & Liu, X. (2023). Investigating university students' acceptance of large language models for learning: A TAM perspective. *International Journal of Emerging Technologies in Learning (IJETL), 18*(5), 1–12.

Maphosa, Ngonidzashe Mutunhu Ndlovu, B., & Dube, S. (2023). *Virtual Reality (VR) Simulation of Chemistry Lab Using Blender and Unity*. *July*. https://doi.org/10.22492/issn.2435-1202.2023.8

Metz, C. (2023). *How ChatGPT could change education.*

Muñoz, S., Gayoso, G., Huambo, A. C., Tapia, R., Aguila, O., Cajamarca, J., Acevedo, J., Rivera, H., & Arias-Gonzáles, J. (2023). Examining the Impacts of ChatGPT on Student Motivation and Engagement. *Social SPACE*, *23*(01), 1–27.

Mutunhu, B., Dube, S., Dube, S. P., & Mpofu, S. (2022). A Framework for Transitioning to Virtual Classes During Life-Threatening Pandemics Like COVID-19. *European Conference on E-Learning*, *21*(1), 279–287. https://doi.org/10.34190/ecel.21.1.900

Mutunhu, B., Dube, S., Ncube, N., & Sibanda, S. (2022). Cyber Security Awareness and Education Framework for Zimbabwe Universities : A Case of National University of Science and Technology. *Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka,* 5–7.

Njaya, T., & Murangwa, S. I. (2017). An exploration of the factors affecting learner satisfaction with e-learning at the Zimbabwe Open University. *International Journal of Law*, *1*(6), 37–59. www.ijlhss.com

Omotayo, F. O., & Tiamiyu, W. A. (2017). Influence of socio-environmental forces on use of e-learning by teachers in selected tertiary institutions in Oyo state, Nigeria. *The African Journal of Information Systems*, *9*(1), 1–36.

OpenAI. (2022). *ChatGPT: Optimizing language models for dialog.* https://openai.com/blog/chatgpt/

Orlov, G., McKee, D., Berry, J., Boyle, A., DiCiccio, T., Ransom, T., Rees-Jones, A., & Stoye, J. (2021). Learning during the COVID-19 pandemic: It is not who you teach, but how you teach. *Economics Letters*, *202*, 109812. https://doi.org/10.1016/j.econlet.2021.109812

Racherla, P., & Mandviwalla, M. (2013). Moving from access to use of the information infrastructure: A multilevel sociotechnical framework. *Information Systems Research*, *24*(3), 709–730. https://doi.org/10.1287/isre.2013.0477

Rahim, M. E. A., Rahim, A., Mohamed, N., & Razawi, N. A. (2023). Students ' Perception on the Use of ChatGPT as a Language Learning Tool ChatGPT Large Language Model. *Idealogy Journal*, *8*(2), 70–78.

Riddlesden, D., & Singleton, A. D. (2014). Broadband speed equity: A new digital divide? *Applied Geography*, *52*, 25–33. https://doi.org/10.1016/j.apgeog.2014.04.008

Rudhumbu, N. (2020). Antecedents of university lecturers' intentions to adopt information and communication technology in Zimbabwe. *Education and Information Technologies*, *25*(6), 5117–5132. https://doi.org/10.1007/s10639-020-10205-4

Sabeh, H. N. (2024). What Drives IT Students Toward ChatGPT? Analyzing the Factors Influencing Students' Intention to Use ChatGPT for Educational Purposes,. *2024 21st International Multi-Conference on Systems, Signals & Devices (SSD),* 533–539. 10.1109/SSD61670.2024.10548826

Shaengchart, Y. (2023). A Conceptual Review of TAM and ChatGPT Usage Intentions Among Higher Education Students. *Advance Knowledge for Executives (AKE)*, *2*(25), 1–7.

Shahzad, F., Xiu, G., & Shahbaz, M. (2017). Organizational culture and innovation performance in Pakistan's software industry. *Technology in Society*, *51*, 66–73. https://doi.org/10.1016/j.techsoc.2017.08.002

Silvano, R; Gui, A. (2024). Factors that Influence College Students in the use of ChatGPT in Indonesia,. *28th International Conference on Information Technology (IT),* 1–4. 10.1109/IT61232.2024.10475770

Sinaga, J. N., Panjaitan, E. S., & Nurjanah, S. (2024). Analysis of Factors Affecting the Use of ChatGPT at Mikroskil University : A Study Based on the Extended UTAUT2 Model. *Brilliance: Research of Artificial Intelligence Is*, *4*(1), 151–161.

Strickland, E. (2023). C. sparks new concerns about A. and education. I. (2023). ChatGPT sparks new concerns about AI and education. *EEE Spectrum*, *60*(2), 7-8.

Trust, T., & Whalen, J. (2023). Editorial : ChatGPT : Challenges , Opportunities , and Implications for Teacher Education. *Contemporary Issues in Technology and Teacher Education*, *23*(1), 1–23.

Tyagi, S. (2012). Adoption of Web 2.0 Technology in Higher Education: A Case Study of Universities in National Capital Region, India. *International Journal of Education and Development Using Information and Communication Technology*, *8*(2), 28–43. http://search.ebscohost.com/login.aspx?direct=true&db=eric&AN=EJ1084132&site=ehost-live

Weng, J. (2023). Capabilities and limitations of ChatGPT: A technical perspective. *Patterns*, *4*(2).

Wu, Y., & Liu, X. (2024). University students' perceptions of ChatGPT: Benefits, drawbacks, and anxieties. *Computers & Education*, *178*.

Zhang, Y., & Wang, X. (2022). T. potential of large language models for personalized learning: A. review of the literature. (2022). The potential of large language models for personalized learning: A review of the literature. *Educational Technology & Society, 25*(4), 67-182.

Contact emails: sibusisiwenkonkoni@gmail.com
sibusisiwe.dube@nust.ac.zw

To Investigate Students' Learning Experience by Re-designing a University Science Laboratory Subject Using Alternative Assessment and Digital Technology

Kim Hung Lam, The Hong Kong Polytechnic University, Hong Kong SAR
Dawn Lo, The Hong Kong Polytechnic University, Hong Kong SAR
Chun Sang Chan, The Hong Kong Polytechnic University, Hong Kong SAR

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The COVID-19 pandemic has caused significant changes in education, including the shift to online or hybrid formats for science laboratory sessions. This study utilized Learning Analytics (LA) from 2021/2 to 2023/4 academic year to examine how science students' learning patterns were affected during and after COVID isolation. The findings indicated that a selected laboratory subject, which was re-designed using group project as alternative assessments, can beneficial for student learning and engagement. The study found that students' performance was higher in the F2F mode of delivery and alternative assessment methods enhanced students' learning experience and understanding. Additionally, preliminary findings suggest that around 71% of students found the GenAI-empowered videos were helpful in understanding the subject matter and enhanced students' learning experience. Further research is needed to confirm these findings and explore their implications for science education in a post-pandemic context.

Keywords: Alternative Assessment, Learning Analytics, Digital Technology

iafor
The International Academic Forum
www.iafor.org

Introduction

COVID pandemic posts significant impact on education including assessment practices. such as significant challenges for proctoring online at-home closed book assessments as it is difficult to ensure that students are complying with closed-book instructions. In order to avoid academic misconduct, alternative assessments such as closed-book assessments with online proctoring, open-book examination, project, presentation, essay can be employed to minimize cheating. In addition, those alternative assessments assess students' higher order thinking skills (Dikli, 2003; Gipps & Stobart, 2003; Ashford-Rowe et al., 2014). Alternative assessments, instead of fact memorization, can have a positive influence on learning and instruction, measure higher order skills and motivate is still being substantiated (Wiggins, 2011; Taras, 2002). There are many alternative assessments that can be used in place of traditional exams to reduce the likelihood of cheating, such as projects, presentations, essays and others. By using a variety of different assessment methods, educators can ensure that students are being assessed fairly and accurately, while also promoting deeper learning and engagement.

Rubric articulates the expectations for an assignment by listing the criteria or what counts, and describing levels of quality from excellent to poor (Andrade 2000; Stiggins et al. 2012). Rubrics are effective for both learning and evaluation as they can provide a clear and consistent framework to evaluate students' work. A rubric based on Biggs' Structure of Observed Learning Outcomes (SOLO) taxonomy can assist students in providing assessment criteria, expectations and judgement (Rembach & Dison, 2016). Rubrics have been adopted for assessing students' work in the field of education since the 1960s (Diederich, French, & Carlton, 1961). Rubrics were used in the United States in the early 1970s (Rezaei & Lovorn, 2010). Nowadays, they are widely adopted in higher education. Rubrics can be defined as a collection of criteria for assessing students' work; these criteria consist of descriptions of the performance and standards that students are expected to achieve (Brookhart, 2018). Rubrics enhance transparency in the evaluation of students' work (Williamson, 2017), and as a scoring system is used to calculate final scores from various criteria. When rubrics are established, it makes it easier for stakeholders to know the standard and learning outcomes (Kite & Phongsavan, 2017). Students can also foresee the good quality required in their work, helping them determine how to achieve the required standard (Dickinson & Adams, 2017). Rubrics help them to improve the quality of their work via self-assessment. Using a rubric allows teachers to grade students' work objectively, consistently, and fairly. By providing clear criteria and descriptors, teachers can avoid subjective judgments and ensure that all students are evaluated using the same standards. Rubrics can also communicate expectations and learning outcomes between educators and learners. Exemplars of authentic student work illustrate different levels of performance and enable teachers to share tacit knowledge which may remain opaque to students (Sadler, 2010). A powerful rationale for their use is that students need to gain experience in making judgements about work of different quality, create verbalized accounts of how various works could have been improved, and engage in evaluative conversations with teachers and other students (Sadler, 2010). Criteria can seem highly abstract to students, whereas exemplars represent the concrete embodiment of standards and accordingly can support students in developing their assessment literacy (Price et al., 2012). Azevedo and Amélia (2017) found that project-based learning had a positive effect on students' engagement in chemistry course, and that the effect was mediated by students' sense of autonomy and competence. Chen and Zhou (2019) found that project-based learning had a positive effect on both motivation and engagement, and that the effect was larger for project-based learning than for traditional instruction.

Generative AI is digital technology that can quickly create new and realistic visual, textual and animated content for educators. Digital technology advancement can help create realistic simulations that can help engage learners to actively learn outside of the classroom, such as in virtual tutorials. Generative AI offers teachers a practical and effective way to develop massive amounts of unique materials quickly including quick response to students' frequency asked questions (FAQs) in virtual tutoring, review of concepts and explanation as well as revision exercise/quizzes. In addition, AI can generate scripts for video lectures or podcasts, streamlining multimedia content creation for teaching and learning materials and AI-generated tutors can allow students to interact with a virtual tutor and receive real-time feedback outside of the classroom. Generative AI technology can assist educators to modify their teaching materials, such as adding suitable scripts or subtitle in video recordings and virtual tutorials to help our students including SEN students who cannot hear or cannot concentrate during F2F classes.

Based on the benefits of using alternative assessment with detailed rubrics, together with the current trends of using GenAI-empowered videos was found to enhance students; learning experience in science laboratory teaching. This study aimed to explore the use of project-based alternative assessments with detailed grading rubrics during and after COVID isolation. We also investigated students' perception of rubrics and alternative assessments as well as the impact of GenAI empowered videos to assist students' flipped laboratory learning. Findings of this study will provide insights into the pandemic's impact on students' learning performance in science education and the role of alternative assessments and rubrics as well as digital technology in supporting student learning in a laboratory subject.

Methodology

This study was conducted with undergraduate (UG) students of two cohort who took the subject, ABCT3625 Chromatographic Analysis Laboratory from the academic year 2021/22 to 2022/23. In response to the challenges posed by the COVID-19 pandemic, we substituted traditional tests with a group project with detailed rubrics as an alternate assessment method since 2021/2 academic year. We assessed student performance based on their participation in laboratory classes, their laboratory reports, and their group project. This practice was maintained even after the isolation period, and we examined the effects of this approach on student learning during and post-isolation. During the first semester of 2021/22, we can only deliver our laboratory classes online via a meeting platform. However, by the first semester of 2022/23 and 2023/4, we were able to resume face-to-face (F2F) mode of class delivery.

We utilized 6-point Likert scale online questionnaire survey and focused group interview were conducted to collect students' learning experiences and analyzed their digital activity in the learning management system (Blackboard Learn) and academic performance to gain insights into how the pandemic influenced their learning patterns and performance.

Student Data Collection

E-survey was distributed via email and students' views and experiences about rubrics and the alternative assessment was collected after they submitted their work (post-survey). There are four items gauging students' views about the use of rubrics, twelve items on the helpfulness of rubrics for their learning, and ten items on the ways in which the alternative assessment could help them learn. A few others seek to know the student's background, level of confidence in understanding all the marking criteria in the rubric, their expected grade for the

assessment, their previous experience in doing similar kind of assessments, and if they had referred to the rubric/teachers' feedforward when preparing for the assessment (only appeared in the post-survey). Students were also invited to join a 1-hour focus group discussion after they have completed the course. To show our appreciation, each participating student was rewarded with a set of cash coupons amount to HKD100. A semi structure protocol was used to follow up on participating students' perceptions and experiences about assessment and use of rubric in general, and the alternative assessment and the feedforward/feedback they were given in particular. A total of 65 UG Year 2 students enrolled in the subject in 2021/22 and 2022/23 semester participated in this study. Table 1 shows the student data collected for the student cohorts of 2021/22 to 2022/23.

Table 1. Number of Students Enrolled in the Subjects and Participated in the Study

	2021/22 Cohort	**2022/23 Cohort**
No. of students enrolled	33	32
No. of students participated in the survey	17	24
Response rate	51.5%	75.0%
No. of students participated in focus group	4	N/A

GenAI empowered videos were integrated in the same laboratory subject in 2023/24 cohort. An online survey and focus group was conducted to collect students' views on the impact of GenAI empowered videos in their flipped laboratory learning. 32 out of 38 students (a response rate of 84.2%) answered the online survey and 2 students participated in the focus group interview.

Results and Findings

Referring to the learning analytics data extracted from our learning management system (LMS) Blackboard Learn, the average student access frequency in all course tools is summarized in Figure 1. According to the learning analytics data, the average student access frequency in all course tools is similar between 2021/2 (during COVID isolation) and 2022/3 (after COVID isolation) academic year, except week 9-12. The student access frequency reached a peak in week 10 for 2022/3 cohort while week 11 for 2021/2 cohort. It seems that students in 2022/3 cohort prepared their project presentation earlier than 2021/2 cohort. This observation coherent with their academic performance, where students with average GPA score of 3.42 and 3.15 for 2022/3 and 2021/2 cohort, respectively. In addition, the percentage of A grade students in 2022/3 cohort (43.7%) was much higher than 2021/2 cohort (21.2%). During COVID isolation, we received students' feedback about the pandemic isolation affected their learning mode. From Learning Analytics, it seems that Face-to-face (F2F) mode of class delivery can enhance students' active learning with reference to purely online during isolation.

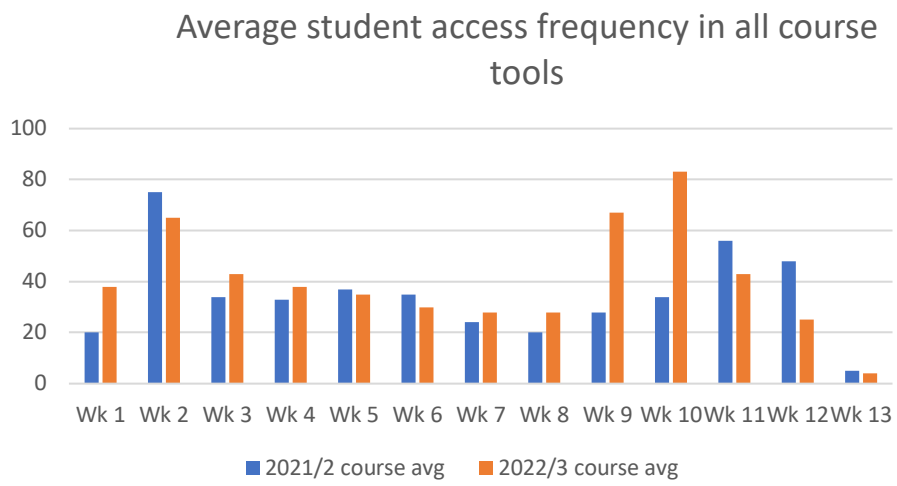


Figure 1. Average ABCT3625 Student Access Frequency in All Course Tools in Blackboard Learn in 2021/2 and 2022/3 Cohort

Students' Perception on Rubrics

Regarding students' perception of rubrics, both cohorts of students were very positive towards rubrics, as over 90% of students agreed or strongly agreed with the four statements about rubrics, with all the average score above 4 out of a 6-point Likert scale. This indicated that the rubric was perceived positively by students in terms of its use as a marking scheme, transparency, objective grading, and provision of assessment criteria and performance descriptors.

Table 2. Students' Perception of Rubrics for Their Alternative Assessment

How much do you agree with the following statements about the rubric? Response options: 6=Strongly agree, 5=Agree, 4=Somewhat agree, 3= Somewhat disagree, 2=Disagree, 1=Strongly disagree	2021/2022 (N=17)		2022/2023 (N=24)	
	% of students choosing 4 to 6	Average score ± SD	% of students choosing 4 to 6	Average score ± SD
It is a marking scheme for teacher use	94.1	4.8±0.7	91.7	4.5±0.9
It makes assessment more transparent	100.0	5.1±0.4	95.8	4.7±0.8
It allows objective, consistent and fair grading	100.0	5.0±0.5	95.8	4.8±0.7
It shows me the assessment criteria and performance descriptors	100.0	4.9±0.6	95.8	4.7±0.8

The questionnaire survey looked into the way how the rubrics of the group presentation had helped students learn. From the 12 items surveyed, average scores of all the items were above 4, suggesting that students generally thought that rubrics helped them adequately in all these areas. In particular, "*assessment the quality of my own work/my peers' work*" got the highest average score for both cohorts of students. This suggested that students agreed that the rubrics helped them to assess the quality of their own work/their peers' work.

Generally speaking, students in 2021/22 rated higher than those in 2022/23. In other words, students in the online mode of delivery tended to appreciate the value of rubrics in helping them in planning, preparing, and reflecting on the assessment. Particularly, "*become less stressed in preparing the assignment*" showed a big drop from 2021/2022 to 2022/23. In

2021/22, 87.5% students agreed that the rubric helped them become less stressed in preparing the assignment whilst in 2022/23 only 65.2% of students in 2022/23 did so. Arguably, students in the online mode of delivery were passive, seldom spoke up during the online sessions, and less opportunities to talk to teacher and students face-to-face. Rubrics played an important role in providing hints to prepare what to include and how to complete the assessment. Students in the face-to-face mode of delivery were with more opportunities to ask teachers and peers to clarify their requirements and expectations on the assignment. Rubric's role became less important.

Table 3. Students' Perception of Rubrics for Their Alternative Assessment

To what extent do you think the rubric used in this group presentation task has helped you learn in the following ways? (Please select "no experience" if you have not used the rubric in the specific way) Response options: 6=very much, 5=much, 4= adequate, 3=little, 2=very little, 1=Not at all, No experience (=X)	2021/2022 Cohort (N=17)		2022/2023 (N=24)	
	% of students choosing 4 to 6	Average score ± SD	Average % of students choosing 4 to 6	Average score ± SD
Understand the expectations and components of an assignment	87.5	4.4±0.8	91.3	4.3±0.8
Plan how much time to spend on my assignment	93.3	4.5±0.6	78.3	4.2±0.9
Prepare for what to include and how to complete my assignment	93.3	4.5±0.6	82.6	4.3±1.0
Obtain the teacher's feedback on how to improve the quality of my assignment	75.0	4.1±0.8	77.3	4.1±1.0
Assess the quality of my own work/my peers' work	100.0	4.6±0.5	91.3	4.5±0.9
Discuss with peers what we are expected to achieve in the assignment	93.3	4.5±0.7	82.6	4.2±0.9
Set my learning goals	81.3	4.1±0.7	78.3	4.0±1.0
Create a work of a higher quality	87.5	4.1±1.0	87.0	4.2±0.9
Become less stressed in preparing the assignment	87.5	4.2±1.1	65.2	4.0±1.1
Become more confident in preparing the assignment	93.3	4.5±0.6	77.3	4.0±1.0
Understand my strengths and weaknesses in the learning	87.5	4.2±0.8	87.0	4.3±0.8
Monitor, reflect and improve my learning	93.8	4.3±0.6	82.6	4.3±0.9

Students' Perception on the Alternative Assessment

The survey also probed into the way how the alternative assessment, i.e., the group presentation, had helped students learn. Our findings suggested that students in both cohorts were very positive towards the alternative assessment. Among the 10 items surveyed, 7 items were with over 90% of students agreed or strongly agreed the specific item. In particular, 95% or more students agreed that alternative assessment:

- Deepened their learning of the knowledge and theories taught in the subject.
- Provided me opportunities to apply their academic learning to real world problems/ situations.
- Helped to develop their skills in evaluating and making judgement about different qualities of work.

Generally speaking, students in 2021/22 cohort rated higher than those in 2022/23. It seemed that students in 2021/22 knew how to perform well and put more time and effort to do well in the alternative assessment than those in 2022/23.

Table 4. Students' Perception of the Impact of Alternative Assessment

How far do you agree the group presentation helped you learn in the following ways? Response options: 6=strongly agree, 5=Agree, 4=somewhat agree, 3= somewhat disagree, 2=Disagree, 1=strongly disagree, Not applicable/ No idea (=X)	2021/2022 (N=17)		2022/2023 (N=24)	
	% of students choosing 4 to 6	Average score ± SD	% of students choosing 4 to 6	Average score ± SD
It deepened my learning of the knowledge and theories taught in the subject	100	4.8±0.5	100.0	4.4±0.6
It provided me opportunities to apply my academic learning to real world problems/ situations	100	4.6±0.7	95.8	4.5±0.7
It helped to develop my own skills in evaluating and making judgement about different qualities of work	100	4.7±0.7	95.8	4.4±0.7
It enhanced my creativity	94.1	4.6±0.7	91.3	4.4±0.8
It enhanced my problem-solving skills	94.1	4.5±0.7	91.7	4.5±0.8
It enhanced my critical analysis	94.1	4.6±0.6	91.7	4.5±0.8
It enhanced my presentation skills	94.1	4.7±0.8	91.7	4.5±0.8
It took me more time and effort to do well in this kind of assessment than in traditional exams/ tests	94.1	4.6±0.7	87.5	4.4±1.0
I know how to perform well in this kind of assessment	93.8	4.7±0.7	87.0	4.3±0.8
I prefer doing this kind of assessment than taking traditional exams/ tests	88.2	4.9±1.4	87.5	4.3±1.1

Students' Views on the GenAI-Empowered Videos

Results of the student survey (Table 5) revealed that all the survey items were with over 60% of students chose "agreed" or "strongly agree", suggesting that students were positive towards the use of GenAI-empowered videos in the virtual tutorials. In particular, 74% of students agreed or strongly agreed that the GenAI-empowered videos (i.e., the virtual tutorial materials) were helpful in aiding their understanding of the subject matter and that the GenAI-empowered videos improved their overall learning experience. Refer to Table 5, more than two thirds of students agreed or strongly agreed that GenAI-empowered videos motivated them to learn new things.

Table 5. Students' Views on the GenAI-Empowered Videos

	2023/2024 (N=32)	
	% of students chose agree and strongly agree	Average score ± SD
1.The GenAI videos were helpful in aiding your understanding of the subject matter.	74.2%	3.6±1.3
2.The materials improve my overall learning experience.	74.2%	3.6±1.1
3.I learnt how to evaluate a problem or issue by analysing different perspectives or viewpoints.	71.0%	3.6±1.1
4.The materials can motivate me to learn new things.	71.0%	3.6±1.1

Discussion and Implications

Our preliminary analysis suggested that the rubric was perceived positively by students in terms of its use as a marking scheme, enhancing transparency, objective grading, and provision of assessment criteria and performance descriptors. It generally helped them in

various aspects of their learning, such as understanding expectations, planning, preparation, assessment, and reflection. Alternative assessment could positively help them to learn, especially deepening learning, application of knowledge, evaluating and making judgement. Our students' feedback showed that they prefer alternative assessment (group project and presentation) over traditional tests/exams; at the same time, acknowledged that such assessment required more time and effort from them, when compared to traditional tests/exams. It appears that alternative assessment with detailed rubrics can enhance students' learning experience and understanding.

Conclusion

The study found that students' performance was higher in the F2F mode of delivery and that alternative assessment methods enhanced students' learning experience and understanding. In addition, 71% students found that the use of GenAI-empowered videos can enhance students' learning experience. Further research is needed to confirm these findings and explore their implications for science education in a post-pandemic context.

Limitations and Suggestions for Future Research

This study was conducted in one subject in two cohorts and with a small sample size. Further investigation is required to confirm the findings.

References

Andrade, H., & Du, Y. (2005). Student perspectives on rubric-referenced assessment. *Practical Assessment, Research & Evaluation*, *10*, 3-.

Andrade, H. G. (2000). Using rubrics to promote thinking and learning. *Educational leadership,* 57(5), 13-19.

Ashford-Rowe, K., Herrington, J., & Brown, C. (2014). Establishing the critical elements that determine authentic assessment. *Assessment and Evaluation in Higher Education*, 39(2), 205–222.

Azevedo, F. S., & Amélia, V. F. (2017). Investigating the impact of project-based learning on students' engagement through the lens of self-determination theory. Journal of Chemical Education, 94(6), 718-725.

Brookhart, S. M. (2018). Appropriate criteria: Key to effective rubrics. In *Frontiers in Education* (Vol. 3, p. 22). Frontiers Media SA.

Chen, X., & Zhou, Y. (2019). The effects of project-based learning on students' motivation and engagement in science: A meta-analysis. *Educational Psychology Review*, 31(2), 385-416.

Diederich, P. B., French, J. W., & T. Carlton, S. (1961). FACTORS IN JUDGMENTS OF WRITING ABILITY. Wiley Online Library | Scientific Research Articles, journals, books, and reference works. https://onlinelibrary.wiley.com/

Dickinson, P., & Adams, J. (2017). Values in evaluation – The use of rubrics. *Evaluation and Program Planning*, *65*, 113–116. https://doi.org/10.1016/j.evalprogplan.2017.07.005

Diederich, P. B., French, J. W., & Carlton, S. T. (1961). Factors in Judgments of Writing Ability. Princeton, NJ: Educational Testing Service.

Dikli, S. (2003). Assessment at a distance: Traditional vs. Alternative Assessments. The Turkish Online Journal of Educational Technology. https://files.eric.ed.gov/fulltext/EJ1101956.pdf

Gipps, C., & Stobart, G. (2003). Alternative assessment. In International handbook of educational evaluation (pp. 549-575). Dordrecht: Springer.

Hmelo-Silver, C. E. (2004). Problem-based learning: What and how do students learn?. *Educational Psychology Review,* 16(3), 235-266.

Kite, J., & Phongsavan, P. (2017). Evaluating standards-based assessment rubrics in a postgraduate public health subject. *Assessment and Evaluation in Higher Education,* 42(6), 837–849. https://doi.org/10.1080/02602938.2016.1199773

Lovorn, M. G., & Rezaei, A. R. (2011). Assessing the Assessment: Rubrics Training for Pre-Service and New In-Service Teachers. *Practical Assessment, Research & Evaluation*, *16*(16), 16-.

Price, M., Rust, C., O'Donovan, B., Handley, K., & Bryant, R. (2012). *Assessment Literacy: the foundation for improving student learning.* Oxford: Oxford Brookes University. ISBN:978-1-873576-83-0.

Rembach, L., and L. Dison. (2016). Transforming Taxonomies into Rubrics: Using SOLO in Social Science and Inclusive Education. *Perspectives in Education,* 34(10), 68–83.

Rezaei, A. R., & Lovorn, M. (2010). Reliability and validity of rubrics for assessment through writing. Assessing Writing, 15(1), 18-39. https://doi.org/10.1016/j.asw.2010.01.003

Sadler, D. R. (2010). Beyond feedback: developing student capability in complex appraisal. *Assessment and Evaluation in Higher Education,* 35(5), 535–550. https://doi.org/10.1080/02602930903541015

Stiggins, R. J., Chappuis, J., & Chappuis, S. (2012). Classroom Assessment for Student Learning: Doing It Right—Using It Well (2nd ed.). Pearson.

Taras, M. (2002). Using assessment for learning and learning from assessment. *Assessment & Evaluation in Higher Education,* 27(6), 501-510.

Wiggins, G. (2011). A True Test: Toward more authentic and equitable assessment. Phi Delta Kappan, 92 (7), 81-93.

Williamson, M. E. (2017). Global Standards and Outcomes of a Legal Education: How Rubrics Can Help to Deliver Objectivity, Transparency, Verifiability and Consistency. *The Law Teacher,* 51(3), 287–311.

Wolf, K., & Stevens, E. (2007). The Role of Rubrics in Advancing and Assessing Student Learning. The Journal of Effective Teaching an online journal devoted to teaching excellence. https://files.eric.ed.gov/fulltext/EJ1055646.pdf

Contact email: kim.hung.lam@polyu.edu.hk

Breaking Boundaries: Exploring Engineering Faculty Perceptions of Transdisciplinary STEM Education

Hebah Alamr, Prince Mohammad bin Fahd University, Saudi Arabia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This research paper explores the perceptions of engineering faculty about transdisciplinary STEM education. The importance of transdisciplinary STEM education, where disciplinary boundaries dissolve, comes from the authenticity of learning when STEM is taught with real-world, ill-defined, wicked problems. Where students find relevant and authentic solutions when learning by navigating between STEM disciplines as well as other disciplines. The researcher interviewed four engineering faculty from three different engineering departments in this paper. The data shows that the faculty's understandings of transdisciplinary STEM education are related to the specific fields of engineering. Civil engineering and architecture faculty use an integrative STEM approach in several levels of integration in their teaching and research. While faculty from the electrical engineering department, use less integrative approaches in teaching and research, boundaries are more solid and present. The justification behind the different levels of integrations, according to the data, is the nature of the courses taught, and the nature of the field of engineering. This research will contribute to growing research related to the transdisciplinarity of STEM education and its importance in delivering authentic, relevant, and sustainable learning experiences to students at all levels of education.

Keywords: Integrative STEM Education, Transdisciplinary Education, Engineering Education, Authentic Learning, STEM Education

iafor
The International Academic Forum
www.iafor.org

Introduction

The Transdisciplinarity of STEM education is increasingly recognized for its potential to address complex real-world problems. The term transdisciplinarity in academia, according to Bernstein (2001), is a way of thinking about education and research that challenges the opposing idea of dividing disciplines and fields of knowledge (Bernstein, 2001).

In this paper, we refer to the transdisciplinarity of STEM education to point out the full integration of science, technology, engineering, and mathematics with other disciplines, where boundaries between disciplines dissolve and fade (Bybee, 2018). This approach breaks down traditional disciplinary boundaries, encouraging authentic learning experiences and fostering innovative problem-solving skills among students (Bybee, 2018; Bernstein, 2001; Shanahan, 2016, Pratim et al. 2020). For instance, addressing wicked problems—complex, ill-defined issues with no clear solution—requires input from various disciplines to find sustainable and effective solutions. This type of education mirrors real-world scenarios where engineers must collaborate with experts from other fields to develop comprehensive solutions (Knowl, 2016, Holly, 2017, Stanly 2020).

The significance of transdisciplinary education is rooted in its ability to provide students with a more holistic, authentic, and sustainable understanding of the challenges they will face in their careers (Herrinton, 2014). Traditional education models, which often compartmentalize knowledge into discrete subjects, may not adequately prepare students for the complexities of the modern world (Baybee, 2018, Pratim et al. 2019, Honey et al. 2014).

By contrast, a transdisciplinary approach encourages students to think critically and creatively, integrating knowledge from various fields to address multifaceted problems (Bybee 2018; Harrington, 2014; Margot & Kettler 2019). This educational paradigm aligns with the needs of the 21st-century workforce, where professionals must navigate a rapidly changing landscape and collaborate across disciplines (Harrington, 2014). Also, it is one of the goals defined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) Vision 2030, including globalization citizenship, and sustainable education. Moreover, this is one of the Saudi Arabian Vision 2030 goals to educate its students by providing quality education that graduates globally competitive citizens.

This research explores the perceptions of engineering faculty at Prince Mohammed Bin Fahd University (PMU) regarding transdisciplinary STEM education. Through phenomenological methodology, this study aims to understand how faculty members from various engineering departments perceive and implement transdisciplinary approaches in their teaching and research. The study's findings will contribute to the ongoing discourse on the importance of transdisciplinary education and provide insights into the challenges and benefits of implementing such an approach in higher education.

Methodology

This study employs a phenomenological methodology to capture the lived experiences and perceptions of engineering faculty regarding transdisciplinary STEM education (Creswell, 2013). Phenomenology is chosen for its effectiveness in exploring participants' subjective experiences and uncovering the essence of their perceptions (Creswell, 2013; Husserl, 1970). It will allow for a deep understanding of how faculty members conceptualize and practice STEM transdisciplinarity in teaching and research within the context of their specific

disciplines. According to Creswell (2013) and Husserl (1970), phenomenology seeks to understand how individuals perceive and make sense of their experiences, making it an ideal methodology for this study.

Phenomenology also involves several key steps: bracketing, where the researcher sets aside their preconceptions; collecting data through in-depth interviews; and analyzing the data to identify common themes and patterns. This process ensures that the study captures the true essence of the participants' experiences without being influenced by the researcher's biases (Creswell, 2018; Husserl, 1970).

Methods

Participants

The study involved four faculty members from different engineering departments at PMU, including civil engineering, electrical engineering, and energy engineering. The participants were selected to provide diverse perspectives on transdisciplinary STEM education across various engineering fields. The selection criteria included faculty members with varying levels of experience in teaching and research, ensuring a comprehensive understanding of how transdisciplinary approaches are perceived and implemented at PMU.

Data Collection

Data were collected through semi-structured interviews, each lasting approximately thirty minutes. The interviews were conducted face-to-face and were audio-recorded with the participants' consent. The interview questions focused on the participants' educational backgrounds, definitions of transdisciplinary education, integration of other disciplines in their research and teaching, and perceived barriers and benefits of such integration. The semi-structured format allowed for flexibility, enabling participants to share their experiences and insights in depth while ensuring that the core topics were covered.

Data Analysis

The recorded interviews were transcribed verbatim. The transcriptions were then analyzed thematically to identify recurring themes and patterns. This process involved coding the data and categorizing the codes into broader themes. According to Braun and Clarke (2006), thematic analysis is a method for identifying, analyzing, and reporting patterns within data. It involves familiarizing oneself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final report. The analysis aimed to uncover the core themes that reflect the faculty's perceptions and practices regarding transdisciplinary STEM education.

Analysis and Findings

The thematic analysis of the interviews revealed several key themes related to the faculty's perceptions of transdisciplinary STEM education. The following table summarizes the main insights from the interviews:

Interview	Theme
Interview #1 (Male, Electrical Engineering)	Recognizes the value of interdisciplinary integration within engineering, but finds it challenging to extend to the broader fields without specific collaboration.
Interview #2 (Female, Civil Engineering)	Emphasizes the incorporation of economic and environmental aspects in engineering research, and highlights projects like carbon emission studies and the feasibility of wind farms.
Interview #3 (Female, Energy Engineering)	It focuses on sustainability and renewable energy, integrating economics into teaching.
Interview #4 (Female, Civil Engineering)	Discusses the application of sustainable materials in civil engineering and cultural considerations in design, acknowledging barriers related to curriculum and student diversity.

Table 1: Main Insights and Themes Found in the Interviews

Main Themes

Understand the Importance of Transdisciplinary STEM Education

Faculty recognize the importance of integrating multiple disciplines to address complex real-world problems. This includes the integration of STEM with broader fields such as economics, social sciences, and sustainability. For example, Dr. E emphasized the significance of sustainability and the integration of materials research in civil engineering (Interview #4). According to Holley (2017), interdisciplinary curriculum development in higher education is essential for addressing the multifaceted nature of modern challenges.

Application of Transdisciplinary in Teaching and Research

There is a variation in how transdisciplinary approaches are applied in research and teaching. Faculty from civil engineering and architecture departments employ integrative approaches more frequently compared to those in electrical engineering. For instance, Dr. C integrates economic feasibility studies in engineering projects, while Dr. B focuses primarily on technical aspects within engineering disciplines without extending to broader contexts such as culture or social sciences (Interviews #2 and #1). This variation aligns with findings by Honey et al. (2014), who noted that the degree of STEM integration can vary significantly across different educational contexts.

Barriers of Implementation

Several barriers hinder the full integration of transdisciplinary approaches in both teaching and research. These include curriculum constraints, time limitations, and the varying levels of students' preparedness. Dr. D pointed out that while she incorporates sustainability into her courses, some engineering subjects naturally limit the integration of broader disciplines due to their technical nature (Interview #3). Bybee (2018) discusses similar challenges, highlighting the need for systemic support to overcome these barriers.

Benefits of Transdisciplinary STEM Education

Faculty noted several benefits of adopting transdisciplinary methods, such as increased student motivation, better problem-solving skills, and a deeper understanding of real-world applications. Dr. C highlighted how real-life examples and projects enhance students' learning experiences and prepare them for practical challenges (Interview #2). Margot and Kettler (2019) found that transdisciplinary approaches can significantly enhance students' engagement and learning outcomes.

Discussion

The findings of this study align with recent scholarly work on transdisciplinary STEM education. Researchers such as Harrington (2020) and Honey et al. (2014) have emphasized the importance of integrating multiple disciplines to foster authentic learning experiences and prepare students for complex, real-world challenges. Engineering Faculty members at PMU recognize these benefits but also face significant barriers, similar to those reported in the literature. For instance, Klein (2017) and Bybee (2018) discuss the challenges of curriculum constraints and time limitations in implementing transdisciplinary approaches effectively.

Comparing the findings with the current literature, it is evident that while there is a strong acknowledgment of the importance of transdisciplinary STEM education, practical implementation remains a challenge. Faculty members at PMU, like their counterparts elsewhere, are navigating these challenges by focusing on integrative projects and highlighting real-world applications in their teaching. However, there is still a need for more systemic support and resources to overcome the barriers identified in this study.

The variation in the application of transdisciplinary approaches across different engineering fields at PMU reflects a broader trend in higher education (Harrington, 2020; Honey et al., 2014). While some fields, such as civil engineering, are more conducive to integrating broader disciplines due to the nature of their projects, others, like electrical engineering, face more significant challenges in doing so. This disparity underscores the need for tailored strategies to support transdisciplinary education across various contexts.

Conclusion

This study provides valuable insights into the perceptions and practices of engineering faculty at Prince Mohammed Bin Fahd University regarding transdisciplinary STEM education. The findings highlight the recognized importance of integrating multiple disciplines to address complex problems and enhance student learning. However, significant barriers such as curriculum constraints and varying student preparedness levels hinder full implementation. Future research should explore strategies to overcome these barriers and support faculty in adopting more integrative approaches. For instance, developing flexible curricula that allow for interdisciplinary projects and providing professional development opportunities for faculty could help address some of these challenges.

The implications of this study extend beyond PMU, offering insights for other institutions seeking to implement transdisciplinary STEM education. By understanding the perceptions and experiences of faculty, educational leaders can better support the adoption of transdisciplinary approaches and ultimately enhance the quality of STEM education.

Acknowledgment

This research was made possible through the generous support and funding provided by Prince Mohammad Bin Fahd University (PMU). We extend our sincere gratitude to PMU for their unwavering commitment to advancing rigid research and for their financial support, which has been instrumental in the successful completion and publication of this paper. The resources and encouragement provided by the PMU administration have greatly enriched our research capabilities and outcomes.

References

Beers, S. Z. (2020). Authentic learning: Real-world experiences that build 21st-century skills. Solution Tree Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Bybee, R. W. (2018). STEM Education Now More Than Ever. National Science Teachers Association.

Creswell, J. W. (2013). Qualitative inquiry and research design: Choosing among five approaches (3rd ed.). SAGE Publications.

Herrington, J., Reeves, T. C., & Oliver, R. (2014). *Authentic learning environments* (pp. 401-412). Springer New York.

Honey, M., Pearson, G., & Schweingruber, H. (Eds.). (2014). *STEM integration in K-12 education: Status, prospects, and an agenda for research*. National Academies Press. https://doi.org/10.17226/18612

Holley, K. A. (2017). Interdisciplinary Curriculum and Learning in Higher Education. Oxford Research Encyclopedia of Education.

Husserl, E. (1970). *Logical investigations* (J. N. Findlay, Trans.). Routledge & Kegan Paul. (Original work published 1900–1901)

Klein, J. T. (2017). *Interdisciplinary curriculum and learning in higher education*. Oxford Research Encyclopedia of Education. https://doi.org/10.1093/acrefore/9780190264093.013.138

Lombardi, M. M., & Oblinger, D. G. (2007). Authentic learning for the 21st century: An overview. *Educause learning initiative*, *1*(2007), 1-12.

Margot, K. C., & Kettler, T. (2019). Teachers' perception of STEM integration and education: A systematic literature review. *International Journal of STEM Education*, 6(1), 1-16. https://doi.org/10.1186/s40594-018-0151-2

Sengupta, P., Shanahan, M. C., & Kim, B. (2019). Reimagining STEM education: Critical, transdisciplinary, and embodied approaches. *Critical, transdisciplinary and embodied approaches in STEM education*, 3-19.

Shanahan, M. C., Carol-Ann Burke, L. E., & Francis, K. (2016). Using a boundary object perspective to reconsider the meaning of STEM in a Canadian context. *Canadian Journal of Science, Mathematics and Technology Education*, *16*, 129-139.

United Nations Educational, Scientific and Cultural Organization (UNESCO). (n.d.). *Education 2030: Incheon declaration and framework for action for the implementation of Sustainable Development Goal 4*. UNESCO. https://en.unesco.org/education2030-sdg4

Contact email: halamr@pmu.edu.sa

Teaching in the Era of AI: Teachers' Perspectives of Utilizing ChatGPT in Education

Nato Pachuashvili, International Black Sea University, Georgia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The emergence of Artificial Intelligence (AI) in teaching has had a transformative impact on various aspects of education. AI tools, such as OpenAI's ChatGPT, have introduced innovative approaches to teaching and emphasized the necessity for personalised learning materials. Its application to teaching has heightened the significance of digitization, especially in the age of AI when technologies determine the future priorities of education. The integration of such technology has streamlined material development processes and provided a number of benefits. It has also accelerated the need to incorporate AI in classrooms to keep up with modern trends in pedagogy. With AI assistance, the education processes have become more efficient and productive. The objective of this paper is to explore the versatile use of ChatGPT as a valuable digital resource in teaching processes. The quantitative study, which was conducted with 50 university teachers in Georgia, examined teachers' perspectives on using AI in education. In particular, the research dealt with the ways university teachers utilize ChatGPT to design engaging and context-relevant materials. It also analysed teachers' perceptions of AI's potential to enhance their overall teaching experience. The study further explored the disadvantages that ChatGPT presented in the teaching and learning processes. By examining these areas, the study revealed a number of the affordances of ChatGPT as well as its potential limitations in educational processes.

Keywords: AI, ChatGPT, Artificial Intelligence, Digitalization of Education, 21st Century Teaching

iafor
The International Academic Forum
www.iafor.org

Introduction

It is an undeniable fact that the advancement in digital technologies has revolutionized the educational system. Digital tools have become an inseparable part of teaching and learning processes since they equip educators with advanced opportunities. The latter plays a crucial role in facilitating human work and classroom activities (Fitria, 2021). One such technological breakthrough that has gained significant recognition and importance is Artificial Intelligence (AI). The urgency to facilitate human work through the use of digital tools accelerated the necessity to incorporate AI into educational processes.

Although there is no precise definition of Artificial Intelligence, UNESCO's (2023) definition can be taken as an operational definition of AI which refers to "systems which have the capacity to process data and information in a way that resembles intelligent behaviour, and typically includes aspects of reasoning, learning, perception, prediction, planning or control" (p. 10). In other words, AI is the simulation of human intelligence that is processed by machines, in particular, computer systems. This latter can interact with the world and display intelligent behaviour resembling humans (Luckin et al., 2016). The term "artificial" denotes unreal or simulated whereas "intelligence" refers to the replacement of human intelligence that can be expressed in a number of ways such as creativity, emotional intelligence, knowledge sharing or critical thinking. Thus, AI has been designed to exhibit human-like intelligence (Fitria, 2021; Campesato, 2020; Joshi, 2019).

Recently, AI has actively been incorporated into the teaching and learning processes. It has the functionality to filter knowledge and generate appropriate content (Kostka & Toncelli, 2023). With the rapid growth of technology and globalization, AI has gained substantial influence on many educational sectors (Sok & Heng, 2023). implement innovation and promote advancement in teaching processes (Mai et al., 2024).

One of the forms of AI is ChatGPT which has largely been implemented into the teaching and learning processes recently. ChatGPT is referred to as OpenAI and has been developed by an American company. It is a web-based application that can generate context-related content as a response to the given prompts. It has the functionality to create tailored content adapted to the user's language proficiency and preferences. ChatGPT can also produce suitable content and engage in human-like conversations (Deng & Lin, 2022). Furthermore, its functions exceed beyond just exhibiting human-like intelligence. It can create short stories or novels within minutes (Fitria, 2021).

Many educators have highlighted the beneficial impact of using ChatGPT in education. It is thought that the latter has revolutionized the existing educational approaches and strengthened students' literacy skills (UNESCO, 2023). Acquisition of computer literacy skills has been significantly emphasized in the era of digital technology since they facilitate human interaction with machines (Kohnke, Moorhouse & Zou, 2023). Equipping students with digital abilities is thought to allow them to adapt to fast-developing technological advancement and prepare them for the future of digitalization (Fitria, 2021).

However, using ChatGPT has aroused controversy among educators regarding its application and use in the teaching and learning processes. Researchers argue that there is a threat of copying texts without critically analyzing an AI-generated text, leading to the potential for plagiarism (Halaweh, 2023). Educators should be concerned about students' assignments that might be produced using ChatGPT. For this reason, some schools have decided to block

ChatGPT to prevent students from plagiarizing content or applying incorrect referencing. However, researchers argue that the ban will not be an effective deterrent since ChatGPT is assumed to become an essential component in students' writing process as calculators and computers have revolutionized the field of science (Halaweh, 2023).

Despite the concerns raised, ChatGPT has paved its way in teaching by mitigating the teacher's burden of material creation. It has transformed the teaching process and made it more efficient. ChatGPT has massively dominated the teaching and learning processes and has created a potential for substitute teachers. It functions as a substantial assistant to the instructor with regard to material creation (Shin, 2018).

In light of the above-mentioned, the study aims to investigate university teachers' perspectives on utilizing ChatGPT in education. In other words, the paper draws on teachers' perceptions of using AI for materials creation. It highlights the benefits and potential challenges of using the app in the teaching process. By examining teachers' perspectives, the paper aims to assess the utilization of ChatGPT in teaching and the limitations encountered while using it. Furthermore, the paper draws on practical recommendations for using ChatGPT effectively. The paper aims to answer the following research questions: 1) What are university teachers' perspectives on using ChatGPT in their teaching processes? 2) What challenges do university teachers face while using ChatGPT in teaching?

Benefits of Utilizing ChatGPT in Teaching

Due to the rapid development of artificial intelligence, educators were exposed to digital tools at their disposal for immediate use. Despite all its benefits, a limited number of research studies were conducted on its application to teaching as it is still an undeveloped area of research. Atlas (2023) argues that ChatGPT is valuable for improving students' writing skills since it can generate texts and summarise information. It can save a considerable amount of time for teachers since ChatGPT can function as a personal tutor (Kostka & Toncelli, 2023). In other words, ChatGPT can provide personalized feedback based on students' needs. It can support one-to-one tuition tailored to students' levels, subject familiarity and pace. Furthermore, ChatGPT can give instant assistance with specific questions and topics that students may encounter in their assignment writing process. Besides, AI can explain concepts and provide step-by-step guidance to students' problems.

A research study conducted by Supiano (2023) confirms that utilizing ChatGPT in students' writing process results in improved learning outcomes. ChatGPT, functioning as a personal tutor, can mitigate the teacher's responsibility in the classroom leading to the implementation of more practical activities through collaboration. What is more, utilizing ChatGPT in the classroom can enable teachers to re-align their students' new experiences to the use of AI which is highly recommended by the U.S. Department of Education (Kostka & Toncelli, 2023). Furthermore, Rudolph et al., (2023) state that ChatGPT's functionality to generate human-like conversations can substitute teacher labour and increase the speed and efficiency of the teaching process.

Mai et al. (2024) claim that higher education can greatly benefit from implementing ChatGPT in an educational setting since it can design assignments, produce sample essays or provide translations in multiple languages. It also creates writing tasks from a single paragraph to a full research article. Atlas (2023) also suggests that ChatGPT can function as a writing aid in language acquisition processes or even administer activities. Furthermore, ChatGPT can

provide a customised learning experience for students. It can work as an editor and proof-reader providing grammar and spelling corrections to students' assignments. If teachers utilize ChatGPT for grading and assessment, it means that they will focus more on other aspects of teaching. The research study conducted by Kim, Park and Lee (2019) experimented using ChatGPT for essay grading. The findings revealed that ChatGPT can grade students' essays accurately with a correlation of 0.86 with human grades. Thus, ChatGPT can be used to provide accurate feedback similar to the instructor's.

Sharma and Yadav (2022) argue that ChatGPT can successfully be applied to teaching vocabulary by customizing wordlists for students. ChatGPT can instantly generate a list of vocabulary items, suggest synonyms and antonyms or other word relations. The app enables teachers to create quizzes where students can be asked to define words, use them correctly in sentences or choose the correct word for a given context. Moreover, ChatGPT can generate multiple-choice questions where students can select an appropriate word or the correct definition of a word.

Scholars also propose using ChatGPT to engage students in reading and critical thinking activities. ChatGPT can formulate reading passages tailored to students' levels and interests followed by a set of comprehension questions (Sharma and Yadav, 2022). Teachers can command the app to create a level-specific text with multiple-choice questions to assess students' reading skills or provide students with open questions to complete with short answers. Open questions can engage students in a conversation about a text and enhance their critical thinking skills. Thus, ChatGPT assists instructors in creating a reading resource and promotes critical thinking and a deeper understanding of reading.

The above-mentioned benefits of ChatGPT clearly suggest that the app can be utilized to create an adaptive learning environment tailored to individual learners' needs through personalized feedback and resources (Yang et al., 2013). Such an adaptive atmosphere enables teachers to base their teaching methods on students' preferences and requirements. Baidoo-Anu and Ansah (2023) claim that an adaptive learning environment can provide effective support to students leading to increased positive outcomes on their progress.

Drawbacks of Utilizing ChatGPT in Teaching

Although there has been a remarkable surge in scholarly attention to the benefits of using ChatGPT, the latter also poses some limitations. Samala et al. (2024) argue that ChatGPT has the potential for misinformation. The latter poses some risks of providing incomplete or incorrect data. Without human involvement, it may be difficult to detect or correct misinformation. This issue can present a significant challenge for teachers who may lack experience in monitoring or detect errors in ChatGPT responses. Similarly, Baidoo-Anu & Ansah (2023) claim that as ChatGPT's responses are not a product of collaboration with the teacher, the app may provide irrelevant feedback. ChatGPT may fully comprehend a student's work but might fail to give generic feedback. It is also argued that due to a lack of creativity that humans possess, feedback provided by ChatGPT may lack a deeper insight and focus on only being formulaic.

Although ChatGPT can provide quick and convenient responses, it cannot replace human interaction since it carries social and emotional benefits. Some students significantly benefit from personal attachment to the teacher. In other words, ChatGPT can generate a response but may struggle to establish emotional intelligence, missing the importance of student

frustration or excitement (Samala et al., 2024). Moreover, ChatGPT may provide insecure responses. It usually occurs when it is commanded to give responses on sensitive topics, therefore, it may often lack accuracy (Sharma & Yadav, 2022). Besides, ChatGPT's responses may present bias in its training data. If not managed appropriately, ChatGPT-generated content may lead to inappropriate and biased responses.

Methods

The present study took a quantitative approach to data collection and analysis. The data were collected through surveys that were administered online. The survey was generated by the researcher using Google Forms. The survey aimed to explore the versatile use of ChatGPT as a digital tool in the teaching process. It looked into the ways university teachers utilize ChatGPT design to create engaging and context-relevant materials. The first part of the survey focused on the demographic aspects of the participants. Part 2 of the survey investigated the reasons for using ChatGPT in education. It further dealt with the participants' perspectives on using ChatGPT for materials creation. The last part of the survey investigated the participants' overall experience using the app and its challenges. The survey questions were designed by the researcher but examined and analysed by two independent experts for content accuracy. Their invaluable feedback helped improve the content of the questionnaire.

Participants

The research sample consisted of 50 university teachers in Georgia. The majority of the participants were females (98%), whereas males constituted 2% of the research sample. The participants' teaching experiences varied from 0-5 years (12%) to over 20 years (28%). In total, 9 university teachers participated in the research, the majority of which worked at the International Black Sea University (44%). The rest of the participants were employed in other private and state universities such as Ivane Javakhishvili Tbilisi State University (18%), Ilia State University (6%), British University in Georgia (2%), Georgian Technical University (1%), Georgian National University (1%), The University of Georgia (1%) and Telavi State University (1%). The courses the participants delivered included Classroom Management, Stylistics, ICT in Education, Theories and Psychology, Academic Writing, Business English, General English, English Philology, Translation Studies, Practical English, English for Professional Purposes and Educational Technologies. The participants were asked to voluntarily participate in the study and reminded of their right to withdraw at any stage of the research. The information provided was strictly used within the scope of this research and has not been disclosed to the third party.

Procedure

The survey was administered at the end of the academic semester to reflect on teaching practices throughout the preceding semester. The questionnaire was distributed by email first, them via social media. The statements of the survey were organized using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Likert-style questionnaire allowed the participants to indicate their agreement with the statement on a metric scale. The data gleaned from the survey were analysed using Statistical Package for the Social Sciences (SPSS 24) as it is the most reliable statistical tool for all sorts of analytical data (Rahman & Muktadir, 2021).

Findings

The first part of the survey concerned the general use of ChatGPT and the creation of various types of resources. The findings revealed that the majority of the participants use ChatGPT weekly (36%), whereas 32% of the participants utilize it daily. The rest of the survey participants use ChatGPT rarely (24%) or monthly (8%). As regards the types of resources, a variety of responses were collected (see Table 1).

Types of resources	%
Quizzes and tests	74%
Educational Resources	56%
Worksheets	50%
Case studies	36%
Interactive activities (games, simulations)	32%
Tailored activities	32%
Customized learning activities	30%
Presentations	28%
Letters, emails, newsletters	22%
Special education resources	20%
Feedback and assessment	20%
Creative writing	20%
Reports/research articles	18%
Translation	12%
Differentiated instruction	12%
Multimedia content	4%
Special education resources	20%
Multimedia content	4%

Table 1: Types of resources created using ChatGPT

As seen in Table 1, most participants (74%) use ChatGPT to create quizzes and tests, and over 50% use the app to create worksheets. Little over 30% of the participants reported using ChatGPT for interactive and tailored activities in their classroom. The least used resources created by ChatGPT were revealed to be multimedia content (4%).

The second part of the survey investigated the participants' perspectives on utilizing ChatGPT for material creation in their teaching processes. The participants responded to the Likert-style statements (see Table 2).

#	ChatGPT for Material Creation	SD 1	D 2	N 3	A 4	SA 5	mean	Median	mode	St. dev
1	ChatGPT helps me create context-related resources.	4%	0%	12%	42%	42%	4.2	4.0	4.0	0.94
2	ChatGPT enables me to create personalised learning materials	0%	6%	18%	40%	36%	4.1	4.0	4.0	0.89
3	ChatGPT offers creative ideas for my classroom activities	2%	4%	20%	40%	34%	4.0	4.0	4.0	0.94
4	ChatGPT offers various classroom-engaging activities for my students.	2%	4%	20%	40%	34%	4.0	4.0	4.0	0.94
5	ChatGPT is easy and convenient to use for materials creation.	2%	4%	20%	36%	38%	4.0	4.0	5.0	0.96
6	ChatGPT helps me produce high-quality worksheets and quizzes.	0%	6%	36%	38%	20%	3.8	4.0	4.0	1.01
7	ChatGPT is helpful for generating differentiated instruction.	0%	6%	24%	40%	30%	3.9	4.0	4.0	0.89

Table 2: Utilizing ChatGPT for material creation

As can be inferred from Table 2, a significant majority of the participants (42%, m=4.2) strongly agreed that ChatGPT helps them create context-related resources for their classrooms (#1). Little under 40% of the research sample also agreed that ChatGPT enables them to create personalized learning resources (#2, m=4.1). Similarly, approximately 80% of the participants (m=4.0) agreed and strongly agreed that ChatGPT offers creative and classroom-engaging activities for their students (#4). The majority of the participants (42%, m=3.8) disagreed or remained neutral about the fact that ChatGPT produces high-quality worksheets (#6). Generally, the participants' responses were positive and consistent which can also be confirmed by mean scores ranging from 3.7 to 4.2. As regards standard deviation, it varied between 0.89 and 1.03 indicating that the participants' responses were not dramatically different across the statements.

The last part of the survey concerned university teachers' overall experience of using ChatGPT. As in part 2, the participants responded to the Likert-style statements (see Table 3).

#	Overall teaching experience	SD 1	D 2	N 3	A 4	SA 5	mean	median	mode	St.dev
1	ChatGPT helps me save a significant amount of time in creating teaching resources.	0%	4%	4%	42%	50%	4.4	5	5	0.75
2	ChatGPT always accurately creates educational resources	0%	8%	34%	42%	16%	4.3	4	5	0.87
3	ChatGPT is a reliable tool for creating teaching resources	0%	10%	28%	44%	18%	3.6	4	4	0.84
4	Using ChatGPT has improved my overall efficiency in resource creation.	2%	4%	18%	52%	24%	4.4	4	4	2.25
5	ChatGPT is easy to use for material creation.	2%	4%	20%	50%	24%	3.9	4	4	0.88
6	The content generated by ChatGPT is always relevant to my teaching objectives.	4%	6%	34%	46%	10%	3.5	4	4	0.91
7	ChatGPT has made my lectures more efficient	6%	0%	22%	48%	24%	3.8	4	4	0.99
8	ChatGPT has enhanced my overall teaching effectiveness.	6%	0%	28%	42%	24%	3.8	4	4	1.02

Table 3: Teachers' overall experience

Table 3 illustrates that over 90% of the participants agreed or strongly agreed that ChatGPT helps them save a significant amount of time. This can also be confirmed by the highest mean score (m=4.4). Various responses were observed with statement #2, 8% of the participants disagreed that ChatGPT always accurately creates educational resources, whereas 34% of them remained neutral. Similarly, the relevance of ChatGPT was questioned (#3) by 10% of the participants who disagreed with the statement, with almost 30% of them remaining neutral. Similar results were observed for question #6 to which 10% of the participants disagreed, or strongly disagreed, with 34 of them selecting neutral. This can also be confirmed by the lowest mean scores for these questions (m=3.6 for #3, m= 3.5 for #6). Notwithstanding some negative responses, the above statistics also reveal that ChatGPT improved the participants' teaching efficiency, 66% of them agreed or strongly agreed with the statement (m=4.4). Moreover, the majority of the research sample agreed or strongly agreed that ChatGPT makes their lectures more efficient and enhances their teaching effectiveness (#7; #8). The participants' responses were consistent which can be confirmed by the mean scores ranging from 3.5 to 4.4. As regards standard deviation, it varies between 0.75 and 2.25, indicating that the participants' responses were not dramatically different across the statements.

Apart from the above-mentioned questions, the participants were further asked to select the challenges they experienced while using ChatGPT for teaching purposes. Table 4 indicates the results:

Challenges	%
Fails to understand a command	54%
Limited customisation options	34%
Lack of accuracy	32%
Content containing errors	32%
Not often suitable for specific age group/level	23%
Sometimes takes time to generate context-related content	22%
Difficult to use	8%

Table 4: Challenges encountered while utilizing ChatGPT

As the above table demonstrates, most participants (54%) reported that ChatGPT fails to understand a command. The research sample also indicated limited customization options (34%) and lack of accuracy (32%) as drawbacks while using the app. An insignificant proportion of the participants (8%) reported ChatGPT as being difficult to use, indicating its easiness of use for the majority of the participants. Besides, 32% of the participants mentioned content errors (32#) as major challenges while using the platform.

As regards the last question (#*Which of the ChatGPT features would you like to see improved*), the following responses were observed: content accuracy - 54%, personalized content - 46%, creating various types of assessment - 34%, ability to easily make adjustments - 32%, generating content in multiple languages -32%, and creating differentiated activity - 26%.

Discussion

The findings of the study revealed that university teachers' perspectives of using ChatGPT were mostly positive. The participants reflected on using the app for creating various types of resources. It appeared that the most frequent use of ChatGPT was for creating teaching resources (84%), lesson planning and lecture slides (44%), whereas a small percentage of teachers used the platform for feedback and assessment (18%) and editing students' assignments (14%).

ChatGPT was also perceived as a platform for designing a variety of resources. According to the participants, the most common use of ChatGPT is for quizzes and tests (74%), followed by other educational resources and worksheets with 56% and 50% respectively. The participants also reported using ChatGPT for creating case studies (36%) or designing tailored or interactive activities (32%). The least common types of resources created by ChatGPT revealed to have been differentiated resources (12%) and multimedia content (4%). The latter can be explained by the fact that the basic ChatGPT app does not support multimedia content. ChatGPT 3.5, which comes as a free version, does not generate images.

The study also revealed that ChatGPT is useful for the creation of context-related and personalized resources. It also appeared that ChatGPT can provide creative ideas and engaging activities for the classroom (40%). However, the platform was also emerged as not always a reliable tool for creating teaching resources (10%), with some responses marked as neutral (38%). Most importantly, the survey showed that ChatGPT improves teachers' overall efficiency in material creation (52%) and makes their lectures more efficient (48%).

Despite the affordances of using ChatGPT, the research revealed a number of challenges that the participants had encountered while using the app. One of the drawbacks of ChatGPT, as it was shown, was the failure to understand a command (56%), followed by the restricted capability of customizing options (34%). It was also revealed that ChatGPT often lacks accuracy and contains content-related errors (32%). Sometimes, ChatGPT fails to create age- and level-specific resources (28%).

The findings of the study align with research conducted by Delgado et al. (2020), who assert that ChatGPT can contribute to improving class performance by providing learners with more personalized content. The researchers argue that ChatGPT helps diagnose achievement gaps by automatic grading of students' assignments. Addressing achievement gaps will increase students' involvement and develop their learning skills. Furthermore, AI will enable teachers to allocate their time in the analysis of generated insights into students' needs and personalize students' educational settings.

Another study conducted by Fitria (2021) on the use of Artificial Intelligence in teaching English suggests that AI has the potential to enhance foreign language education with the development of natural language. It creates a challenging and creative learning environment and acts as a tool to improve English language teaching. The scholar also argues that AI combines digital literacy and language literacy and is aimed at improving global competence in learning English. Personalized content provided by ChatGPT is also revealed to be a key to 21st-century digital learning.

Mukhallafi (2020) further states that utilizing AI in teaching improves the process of organizing and selecting appropriate content for learners. It diversifies sources according to students' levels and individualizes the self-study process. Wang (2019) also claims that AI promotes English language learning and changes the atmosphere in which English is taught. It provides a real simulation dialogue for the teaching enabling the better exploitation of words, spoken or written English. In other words, incorporating AI in teaching promotes the development of students' comprehension skills.

Recommendations

Most of the teachers regarded the use of ChatGPT in teaching as an ideal tool for educational resource creation and feedback provision. The participants also perceived AI as helpful for personalized and context-related sources. The findings also showed the teachers mostly use ChatGPT to create quizzes and tests, as well as lecture resources, case studies, interactive and customized learning activities. Notwithstanding some challenges that emerged, the participants' attitude towards utilizing ChatGPT was positive. For this reason, educators are recommended to experiment with using Artificial Intelligence in their teaching processes. The benefits of ChatGPT that emerged from outweigh the limitations it poses. Since there is an accelerated interest in the digitalization of educational processes, ChatGPT is recommended as a 21st-century alternative to paper-based resources. The present research has certainly highlighted its significance and the potential value in designing resources for teaching. Curriculum designers are also advised to redesign their existing curriculum by incorporating ChatGPT as an important digital platform for teaching and learning purposes.

Conclusion

The paper explored the university teachers' perspectives on using ChatGPT in teaching, highlighting its effectiveness in creating digital teaching resources. The study looked into teachers' experiences of using ChatGPT and the challenges they faced in the teaching process. The paper also reviewed AI as a significant 21st-century digital tool offering a number of benefits such as an adaptive learning environment, personalized content and a variety of resources. However, some challenges also emerged.

The present study employed a quantitative approach to investigate 50 university teachers across all universities in Georgia. The quantitative data were collected through surveys that were administered online. The results gleaned from quantitative data suggested that ChatGPT has a number of benefits in the teaching and learning processes. The majority of the participants perceived AI as an essential tool for material creation. Most of them viewed AI as ideal for lesson planning, teaching resources or creating lecture slides. The benefits also include context-related material creation and personalized content. Some participants also identified ChatGPT's feature to create engaging and various activities for the class. The participants also selected some challenges such as failure to understand a command, limited customizing options or content accuracy errors. The participants also commented on ChatGPT's features that require improvement. The majority of them mentioned content accuracy whereas creating differentiated activities ranked as less in need of enhancement.

Research Limitations

The present study has a number of limitations. One of the concerns is the small research sample which comprised 50 university teachers across Georgia. The small sample size limits the generalizability of the findings to the broader population in the education sector. Moreover, the majority of the participants belonged to the International Black Sea University which further restricts the generalizability of the results since the research had an uneven number of participants from other universities. The present paper presented a small-scale study into teaching in the era of Artificial Intelligence, aiming at assessing teachers' perspectives on utilizing ChatGPT for teaching purposes. Longitudinal research into the issue can provide a more comprehensive insight into the benefits and challenges of implementing ChatGPT in education.

References

Atlas, S. (2023). *ChatGPT for higher education and professional development: A guide to conversational AI*. https://digitalcommons.uri.edu/cba_facpubs/548

Baidoo-Anu, D., & Ansah, L. O. (2023). Education in the era of generative Artificial Intelligence (AI): Understanding the potential benefits of ChatGPT in promoting teaching and learning. *Journal of AI*, *7*(1), 52–62.

Campesato, O. (2020). *Artificial Intelligence, machine learning, and deep learning*. Stylus Publishing, LLC.

Delgado, H. O. K., Fay, A. D. A., Sebastiany, M. J., & Silva, A. D. (2020). Artificial intelligence adaptive learning tools: The teaching of English in focus. *BELT - Brazilian English Language Teaching Journal*, *11*(2), 1–19. https://doi.org/10.15448/2178-3640.2020.2.38749

Deng, J., & Lin, Y. (2022). The benefits and challenges of ChatGPT: An overview. *Frontiers in Computing and Intelligent Systems*, *2*(2), 81-83. https://doi.org/10.54097/fcis.v2i2.4465

Fitria, T. N. (2021). The use technology based on Artificial Intelligence in English teaching and learning. ELT Echo: *The Journal of English Language Teaching in Foreign Language Context*, *6*(2), 213-223.

Halaweh, M. (2023). ChatGPT in education: Strategies for responsible implementation. *Contemporary Educational Technology*, *15*(2), 1–11. https://doi.org/10.30935/cedtech/13036

Huang, S. L., & Shiu, J. H. (2012). A user-centric adaptive learning system for e-learning. *Journal of Educational Technology & Society, 15*(3), 214-225.

Joshi, A. V. (2019). *Machine learning and artificial intelligence*. Springer Nature.

Kim, S., Park, J., & Lee, H. (2019). Automated essay scoring using a deep learning model. *Journal of Educational Technology Development and Exchange*, *2*(1), 1-17.

Kohnke, L., Moorhouse, B.L., Zou, D. (2023). ChatGPT for language teaching and learning. *RELC Journal*, 1-14. https://doi.org/10.1177/003368822311628

Kostka, I., & Toncelli, R. (2023). Exploring applications of ChatGPT to English language teaching: Opportunities, challenges, and recommendations. *Teaching English as a Second or Foreign Language-TESL-EJ*, *27*(3), 1-19. https://doi.org/10.55593/ej.27107int

Luckin, R., Holmes, W., Griffiths, M. & Forcier, L. B. (2016). *Intelligence unleashed*: *An argument for AI in education*. Pearson: London.

Mai, D. T., Da, C. V., & Hanh, N. V. (2024). The use of ChatGPT in teaching and learning: A systematic review through SWOT analysis approach. *Frontiers in Education*, *9*, 1–17. https://doi.org/10.3389/feduc.2024.1328769

Mukhallafi, T. R. A. (2020). Using Artificial Intelligence for developing English language teaching/learning: An analytical study from university students' perspective. *International Journal of English Linguistics*, *10*(6), 40-53. https://doi.org/10.5539/ijel.v10n6p40

Rahman, A., & Muktadir, Md. G. (2021). SPSS: An imperative quantitative data analysis tool for social science research. *International Journal of Research and Innovation in Social Science*, *5*(10), 300–302.

Rudolph, J., Tan, S., & Tan, S. (2023). ChatGPT: Bullshit spewer or the end of traditional assessments in higher education? *Journal of Applied Learning and Teaching*, *6*(1), 1-22. https://doi.org/10.37074/jalt.2023.6.1.9

Samala, A. D., Zhai, X., Aoki, K., Bojic, L., & Zikic, S. (2024). An In-Depth Review of ChatGPT's Pros and Cons for Learning and Teaching in Education. *International Journal of Interactive Mobile Technologies*, *18*(2), 96-117.

Sharma, S., & Yadav, R. (2022). Chat GPT- a technological remedy or challenge for education system. *Global Journal of Enterprise Information System*, *14*(4), 46-51.

Shin, M.-H. (2018). How to use artificial intelligence in the English language learning classroom. *Indian Journal of Public Health Research & Development*, *9*(9), 557-561. https://doi.org/10.5958/0976-5506.2018.01058.6

Sok, S., & Heng, K. (2023). ChatGPT for Education and research: A review of benefits and risks. *SSRN Electronic Journal*, 1-12. https://doi.org/10.2139/ssrn.4378735

Supiano, B. (2023, April 5). Will ChatGPT change how professors assess learning? *The Chronicle of Higher Education.* https://www.chronicle.com/article/will-chatgpt-change-how-professors-assess-learning

United Nations Educational, Scientific, and Cultural Organization. (2023). *ChatGPT and artificial intelligence in higher education: Quick start guide.* https://unesdoc.unesco.org/ark:/48223/pf0000385146

Wang, R. (2019). Research on artificial intelligence promoting English learning change. *3rd International Conference on Economics and Management, Education, Humanities and Social Sciences* (EMEHSS 2019) (pp. 392-395). Atlantis Press.

Yang, T. C., Hwang, G. J., & Yang, S. J. H. (2013). Development of an adaptive learning system with multiple perspectives based on students' learning styles and cognitive styles. *Journal of Educational Technology & Society, 16*(4), 185-200.

Contact email: npachuashvili@ibsu.edu.ge

Attitudinal Predispositions of First Year Preservice Teachers to Technology Integration in Pedagogy

Thuthukile Jita, University of the Free State, South Africa
Alice Dhliwayo, University of the Free State, South Africa

The European Conference on Education 2024
Official Conference Proceedings

Abstract
There is growing cognizance of the potential of technology integration in pedagogy for enhanced educational experiences, though for sub-Saharan Africa, there is evident opacity of the concept due to the region's unique challenges slowing down bridging of the technological gap between developing and developed regions. However, improved technology integrated pedagogical practices heavily rely on the beliefs and attitudes of educators. It is imperative for teacher educators to understand these attitudes for teacher preparation. This paper informed by the unified theory of acceptance and use of technology (UTAUT) is the first cycle of three studies. This first cycle investigates the attitudinal predispositions of first-year preservice teachers towards the integration of technology in pedagogical practices as a case study of one university in South Africa. 400 first year students enrolled in the Bed program were purposively sampled to respond to questionnaires and a subsample of 20 responded to focus group interviews. Through descriptive statistics and thematic analysis, findings indicated that, although students acknowledged the importance of technology in education, educational backgrounds, cultural contexts, personal experiences and institutional support influenced their attitudes towards use of technology in pedagogy. The study provides insights for the development of dedicated strategies for teacher training programs such as professional development innovations to foster positive attitudes towards technology in pedagogy.

Keywords: Attitude, Predispositions, Technology Integration, Technology Gaps

iafor
The International Academic Forum
www.iafor.org

Introduction

In recent years, there has been a growing recognition of the potential of technology integration in pedagogy to enhance educational experiences. Nevertheless, its effective use at grassroots levels in the classrooms has challenged teachers in the sub-Saharan African region (Kao et al., 2020). Technology offers countless possibilities for transformative teaching and learning (Dursun, 2019), together with enhanced opportunities for interactive, active engagements and personalized pedagogical experiences (Marbán & Sintema, 2021). However, in sub-Saharan Africa, realizing these benefits is hindered by unique challenges, triggering the evident opacity around the concept at the same time slowing down concerted efforts by various governments to bridge the technological gap existent between developing and developed regions (Mammen et al., 2023). Although it is glaringly evident that technology integration for the classroom has positive results and that it provides for 21st century skills acquisition for students (Sungur-Gül & Ateş, 2021), which has created interest in educators, policymakers and teachers (Dong & Xu, 2021), actual implementation has dodged practitioners in the region.

For technology mediated pedagogical practices to be successful, the attitudes and beliefs of educators are critical in the implementation process (Sungur-Gül & Ateş, 2021). Pre-service teachers are of particular interest because they represent the next generation of educators (Marbán & Sintema, 2021), therefore, are integral to the shaping and mapping of the future of education. Consequently, teacher educators must understand the attitudinal predispositions of pre-service teachers towards technology integration for effective teacher preparation and wherever possible, re-shaping them to suit 21st century educational demands (Saleh et al., 2023). We argue that effective integration of technology in educational practice is dependent not only on availability of resources but to a large extent, on how practitioners conceive their use and what prospects the same educators have about the learning outcomes they can produce. In this sense, the purpose of study is to explore how first-year pre-service teachers perceive integration of technology in teaching and learning and that which influences their attitudes towards technology use for practice.

Review of Related Literature

Global Perspectives on Technology Integration in Teacher Education

Technology integration in teacher education has developed into a global phenomenon, influenced by a variety of factors that include economic conditions, policy initiatives and cultural attitudes towards education (Chigona et al., 2024). In most developed nations, such as Canada, the United States, and some parts of Europe, emphasis is on incorporating digital technologies into the curriculum. Such a focus is driven by national as well as regional policies advocating for modernized educational practices aimed at better preparation of students for a technology driven 21st century world (Anderson, 2016; Roumell & Salajan, 2016). For instance, the United States' National Education Technology Plan puts emphasis on the need for preservice teacher preparation programs that equip them with skills necessary for effective technology integration into their pedagogical practices (Torchia, 2024; US Department of Education, 2024). Similarly, the European Commission launched initiatives such as the Digital Education Action Plan as a way of fostering digital competencies among educators and students (Anderson, 2016; Zhan, 2022).

Asian countries have a diverse landscape of technology integration in preservice teacher training (Hong & Songan, 2011; Zhan, 2022). Nations like Singapore and South Korea are vanguards in ICT in education, incorporating advanced technologies in the form of robotics and artificial intelligence into their educational systems (Chitturu et al., 2017; Roy, 2018; UN.ESCAP, 2018). South Korea is committed to technology in education as evidenced by its "Smart Education" initiative that seeks a transformation from traditional pedagogical methods to technology enhanced learning environments (Seo, 2013; Roy, 2018; Lim & Kye, 2019; So et al., 2023). Singapore on the other hand focuses on developing "future-ready" students through comprehensive teacher training in the use of ICT as a way of fostering innovative teaching methods (Almazroa & Alotaibi, 2023). Conversely, countries like India are still trying to scale their technological infrastructure to ensure equitable access to digital tools and closing gaps across urban and rural areas (Bandyopadhyay et al., 2021; Balli & Singla, 2024). Nonetheless, India is making significant strides through programs such as the National Mission on Education through ICT that is aimed at providing quality educational content using digital platforms (Balli & Singla, 2024).

Latin America is making progress in the integration of technology into teacher education, albeit at a wide-ranging pace (Gómez-Galán, 2021). Countries such as Chile and Brazil have evolved national policies to promote use of digital technologies for the classrooms. ProInfo program is Brazil's one such initiative whose purpose is the enhancement of digital literacy among students and teachers by providing access to the internet and computers in public schools (de Souza Borges, 2021). Similarly, Chile's Enlaces program was intended for enabling the integration of digital technologies into the education system, providing necessary training for teachers and resources in schools to effectively incorporate technology in their pedagogical practices (Fowler & Vegas, 2021).

In contrast, developing countries face unique opportunities and challenges vis-à-vis technology integration in preservice teacher training (Ifinedo & Kankaanranta, 2021). Countries in sub-Saharan Africa, for instance, often wrestle with limited resources and access to technological infrastructure (Chigona et al., 2024). However, innovative approaches are emerging in different nation states to address gaps and barriers. For example, mobile technologies are being leveraged in countries where there is limited traditional computer access. There are initiatives like the "Teacher Laptop Initiative" in Kenya where teachers are provided with laptops and training enhancing their digital literacy as well as pedagogical skills (Omito, 2021). Additionally, organizations like UNESCO and others are working to support developing nations globally through programs premised on improving information and communication technology (ICT) competencies for educators (Wambugu et al., 2017).

Technology integration has emerged as perhaps the most complex and challenging aspect of designing and mapping educational systems of instruction (Almazroa & Alotaibi, 2023). The international landscape of technology use in teacher training is characterized by a variety of approaches and experiences. Developed nations are leading with advanced comprehensive policies and infrastructure (Anderson, 2016), while on the other hand, developing countries are trying to find innovative solutions towards overcoming resource constraints (Chigona et al., 2024). Regardless of context, a common thread running across all countries is the appreciation of the crucial role technology plays in the preparation of future educators who would meet 21st century demands of an emergent digital world.

Global Trends and Best Practices

Current global trends in technology integrated teacher training underscore a significant shift in favor of interactive and immersive learning environments (Trevisan & De Rossi, 2023). One of the most outstanding trends is the embracing of blended learning models, combining traditional face-to-face instruction with online digital learning components (Saleh et al., 2023). The approach provides preservice teachers with experiential first-hand challenges and benefits of integrating ICT for their future practice. For example, higher education and teacher training programs globally have increasingly reverted to Learning Management Systems (LMS) such as Moodle, blackboard and Canvas for course content delivery, student assessment and to facilitate discussions (Balli & Singla, 2024). This does not only acquaint preservice teachers with the digital tools likely to be encountered in their professional lives but also makes provision for a personalized and flexible learning experience catering to various learning needs.

The other emerging trend in teacher education globally is the use of virtual reality (VR) and augmented reality (AR) (Samala et al., 2023). These are simulated classroom environments offered to preservice teachers through technology where they can practice their teaching skills as well as classroom management without the need for the high risks of a real classroom. VR and AR applications are able to create realistic scenarios quite challenging to preservice teachers to exercise critical thinking and adaptation to diverse teaching situations (Al-Ansi et al., 2023; Alalwan et al., 2020). For instance, platforms like TeachLivE afford a mixed-reality environment in which preservice teachers are able to interact with virtual students where immediate feedback is received towards improving their instructional techniques (Ersozlu et al., 2021). Such innovative approaches help to bridge the theory and practice gap at the same time allowing future teachers to gain practical experiences in controlled and supportive environments.

Collaborative learning by way of a variety of digital platforms is gaining traction as best practices in preservice teacher training (de Souza et al., 2022). With the emerging global connectivity, preservice teacher training programs are exploiting tools such as Microsoft teams, Google Workspace, and Zoom for ease of peer learning and joint projects across differing geographical locations (Bandyopadhyay et al., 2021; Samala et al., 2023). These platforms allow preservice teachers to collaborate on shared resources, lesson planning, and be involved in professional learning communities (PLCs) outside physical distance. This collaboration tends to improve their communication and digital literacy skills at the same time exposing them to a multiplicity of educational perspectives and practices (Kao et al., 2020; Trevisan & De Rossi, 2023). As they participate in such global learning networks, they tend to develop broader appreciation of educational challenges and solutions, creating more effective and culturally sensitive future educators.

Focus on digital inclusion and equity is increasingly becoming important in technology integration for teacher education (Bailey & Nyabola, 2021; Katz et al., 2023; So et al., 2023). Recognizing that access to digital resources and technology is unevenly distributed especially in the sub-Saharan Africa region, many teacher education programs are now prioritizing strategies that ensure all preservice teachers, with their divergent socio-economic backgrounds, have equal access to technological tools and training (Deganis et al., 2021; Jules, 2023; Chigona et al.,2024). Initiatives such as ensuring robust internet access, providing affordable devices and comprehensive training on inclusive pedagogical practices have become essential components towards transformational educational practices (Deganis

et al., 2021). Programs premised on digital equity tend to prepare preservice teachers in spearheading the mitigation of the digital divide when they join the world of work promoting the global goal of inclusivity, equality and equity in learning environments that benefit all students from technology-enhanced education for a just educational landscape.

Attitude and Technology Adoption for Pedagogy

Preservice teachers' attitudes have a significant impact and influence on the adoption of technology in teaching and learning, creating entrenched perspectives for the educational experiences of future educators. Positive experiences with technology in the course of training and exposure to a variety of tools and their uses brings with it efficacy and positive attitudes for intended use (Dursun, 2019; Marbán & Sintema, 2021), a greater willingness to integrate is realized. Such openness to technology is critical in modern classrooms, as digital literacy is increasingly becoming a fundamental skill for survival in the 21st century information driven economy (Kao et al., 2020). When preservice teachers become cognizant of the potential of ICT in the enhancement of learning and students engagement, more often than not, would experiment with and become innovative adopters of trending technology supported teaching methods. This proactive approach is the basis for setting precedence for professional development, where continuous technological adaptation is the norm (Sungur-Gül & Ateş, 2021).

Preservice teachers' attitudinal dispositions towards technology Overally get shaped by the training programs they undergo as undergraduates and also the type of support they received during that critical period (Saleh, et al., 2023). While it is important that teacher preparation programs should provide hands-on experience with digital tools to significantly influence preservice teachers' attitudes, for sub-Saharan Africa, though the will might be there, challenges involving educators' efficacy and student access to tools may mitigate these anticipated outcomes (Dilling & Vogler, 2023). Attitude change through extensive experiential learning is among the practical ways of scaling the digital divide as attitude would drive technology initiatives wherever these future educators would find themselves deployed where traditional methods are still prevalent. With access to resources and surrounded by supportive mentors in the form of educators at entry point into university, attitudes are most likely to be skewed towards positivity which increases hope for the region to actively participate in the global village.

Research Questions

1. What are first-year preservice teachers' attitudes and beliefs towards integration of technology?
2. What are the first-year preservice teachers' views and experiences on the integration of technology for their own teaching?

Theoretical Framework

This study is premised on the Unified Theory of Acceptance and Use of Technology (UTAUT). UTAUT was evolved as a comprehensive model to address the inconsistences and limitations of existing earlier models (Riaz & Adnan, 2016, Vankatesh et al., 2003). It predicts and explains behaviors of users towards technology adoption and usage (Momani, 2020). Propounded by Venkatesh, Morris, Davis, and Davis in 2003, UTAUT is a blending of eight elements from other models of technology acceptance, among them Technology

Acceptance Model (TAM), Theory of Planned Behavior (TPB), and Social Cognitive Theory (SCT) (Venkatesh et al., 2003). The UTAUT framework also presents four basic determinants of intentions and practice behavior, namely, Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions (Alblooshi et al., 2021), together with four moderating factors given as gender, experience, age and voluntariness of use as influencers of the impact of the determinants on technology adoption (Momani, 2020).

In the context of studying the attitudinal predispositions of first-year preservice teachers' technology use in pedagogy in a developing country university, UTAUT is highly relevant. The framework provides multiple dimensions into factors influencing preservice teachers' willingness to embrace and integrate technology in their teaching practices, for intentional interventions (Momani, 2020). For developing countries, where common challenges are limited access, inadequate infrastructure, and prevalence of low levels of technology literacy, knowledge of these determinants is critical. The theory's emphasis on performance expectancy assists in identifying extent of preservice teachers' beliefs in technology use for teaching effectiveness and outcomes. Effort expectancy enlighten on perceived ease of use, an essential aspect in contexts where it is common for teachers to face barriers to technological skills acquisition (Venkatesh et al., 2021). Peer and institutional support in attitudes shaping towards technology is examined through the social influence construct, while facilitating conditions deals with the resource availability and support mechanisms requisite for effective integration (Alblooshi & Hamid, 2021).

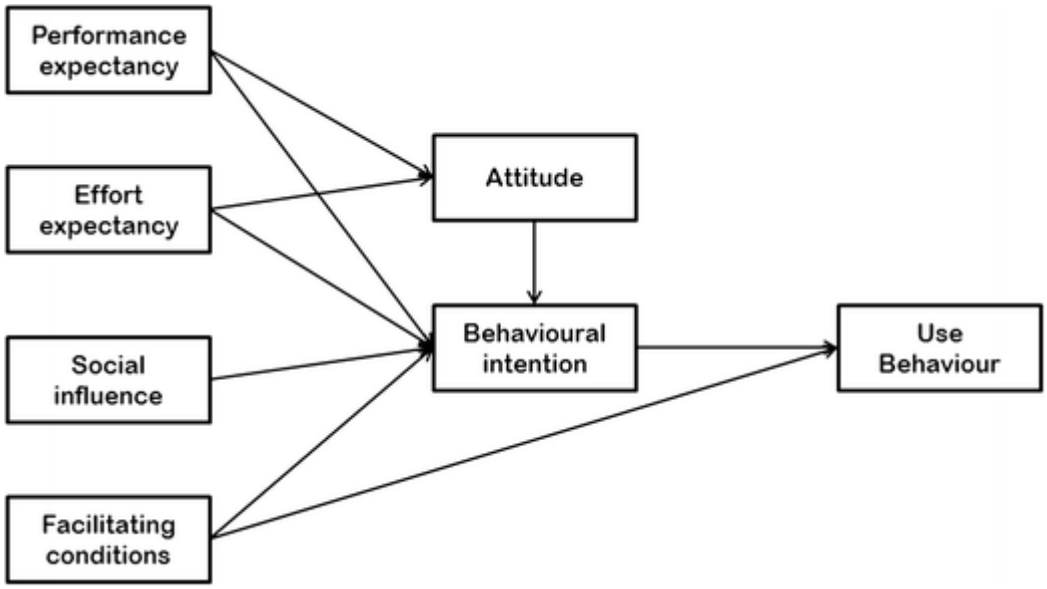


Figure 1: Proposed theoretical framework (Source: Adapted from Venkatesh et al. 2003)

Methodology

The primary purpose of this study is to understand the attitudes that preservice teachers have towards technology integration in pedagogy at their point of entry into university. A mixed methods design (Creswell, 2014) was used in tandem with the principles of the pragmatic paradigm (Thorne, 2014). This paradigm is appropriate as it seeks understanding of both subjective meanings and experiences individuals assign to their interactions with technology and also describe the attitudes in relation to educational settings. The underlying principle of this methodology is to unearth the perceptions and beliefs that have shaped the attitudes preservice teachers have towards technology in pedagogical practices. This approach was

chosen with a view to gathering data to inform the research questions and lens provision for the interpretation of participants' viewpoints (Creswell, 2014).

Sample

The research assumed a sequential explanatory design in two phases. Random and Purposive as well as convenience sampling were employed to select 400 participants who provided rich, relevant data on the topic. Phase one of the study involved random sampling for questionnaire responses. Specifically, the study targeted 400 first-year students enrolled in an education program at one selected university in South Africa. Phase two was purposive sampling for participants who had direct experiences with the integration of technology in their initial teacher education courses, while convenience sampling facilitated recruitment of participants who were readily accessible to the researcher and willing to participate in the study in the focus group discussions. Out of the 400, a sub-set of 20 took part in focus group discussions as part of phase two. The methodology provided contextualized understanding of the preservice teachers' attitudes towards technology and the factors which influenced them for data based professional development programs. Data analysis for phase one of the study used descriptive and inferential statistics as it was quantitative data while in phase two of the study, a thematic approach was used for qualitative data from focus group discussions.

The aim of the research was explained to the participating preservice teachers that it was voluntary in nature and they were free to withdraw from the study without explanation at any stage of the research. The researchers explained issues of confidentiality, consent and anonymity. For phase one of the data collection, a five-point Likert scale for the questionnaire was used where 1 represented strongly disagree, 2-disagree, 3-neutral, 4-agree and 5-strongly agree. All the students (400) 100% responded to the questionnaire, of which 32% were males, 66% females and 2% indicated as other. Participant ages were 60% under 20, 34% for 21-25 age group, 4% for the 26-30 and 6% were above 31 years old. Phase two was focus groups discussions. There were 4 groups each comprising 5 participants.

Variables of the Study

The variables for the study were grouped under five main headings according to the UTAUT model for data collection for the questionnaire in phase one as indicated in Table 1.

Variables of the research model Construct	Measure item
Performance Expectancy	i. Learning with technology enhances student engagement and motivation ii. Technology facilitates supportive environments and collaboration iii. Technology improves my confidence to teach with technology in my future classroom
Effort expectancy	i. I prefer learning with technologies than without ii I feel confident in my ability to learn new technologies iii. I feel confident in my ability to use technology in my future classroom
Social Influence	i. Technology is the needed 21st century skill for teaches. ii. My peers and lecturers think that I should use technology in my teaching iii. It is expected for teachers to use technology in their pedagogical practices.

Facilitating Condition	i. My teacher training program is adequately preparing me to integrate technology ii. I am aware of technological tools that assist in teaching my subject matter iii. The university is providing training to increase confidence and competence
Behavioral Intention	i. I intend to work hard at promoting technology use ii. I intend to learn as much as I can about technology integration in my area iii. I will use technology for learning in my future classroom

Table 1. Variables of the Study

Phase Two

Focus Group Discussion

1. What is your opinion of the integration of technology in education?
2. What can you say about the way you are being prepared by the university to teach using technology when you begin your profession?
3. Do you have suggestions for improving teacher training programs to better prepare you for technology integration?
4. Is there anything else you would like to share regarding your future technology integration intentions?

Results and Discussions

Students' attitudinal dispositions were explored using the UTAUT constructs. 77% of the students had high performance expectancy. Students agreed that their present exposure to technology integration was a motivating factor which improved engagement during learning. Ersozlu et al., (2021) concur that technology integration with pedagogy enhances student engagement and is a significant motivator in the classroom. Ease of use is a strong motivator in the adoption of technology especially in education (Sao, 2013) and the generality of students (82%), agreed under effort expectancy that learning is made easier with technology than without. This is in line with findings by Almazroa & Alotaibi (2023) that 21st century requisite skills for teachers should integrate technology in their pedagogical practice to match global everyday life practices. With regards to facilitation conditions which considerably influence adoption, 73.6% concurred that the way they were being trained as teachers was adequately preparing them to integrate technology when they join the teaching profession. This corresponds with findings by Herro (2021) that teacher educators whose technology proficiency rate was high tend to have positive beliefs, attitudes and practices about technology integration which they were most likely to pass on to their students.

Due to this high exposure to technology integrated lessons, students indicated a high awareness of technological tools and applications that can assist in teaching and learning at 65.96%. 79.71% agreed that the training offered by the university in technology integration in pedagogy was improving their confidence and competences in the use of technology in the classroom. Findings by Panakaje et al. (2024), concur with these results when they indicated that high support from institutions contribute significantly to improved teacher performance as well as students' engagements through integration of technology. In relation to future intentions in incorporating ICTs in their future classroom practices, participants indicated a high intention of 81.3%. This is consistent with Eksail and Afari, (2019) who posit that

exposure to technology use during training enhances students' intentions to adopt the same for their future classrooms.

Findings from the focus group discussions were in tandem with the findings in phase one from the questionnaire survey. Performance expectancy had students indicating highly positive attitudes towards technology use in teaching and learning. This was in line with Lim & Kye (2019) whose findings showed that the way teacher educators would use technology in their interface with the students impacts the same students' future technology adoption significantly. According to Alalwan et al. (2020), ease of use is a huge motivator for classroom practitioners in adopting certain types of technology reflecting on their attitudes towards its effectiveness in concepts transmission.

When asked for suggestions towards improving teacher training programs, the generality of students indicated that they would be better prepared if the university would provide a variety of gadgets that included tablets instead of those computers only found in computer labs so that they can learn as much as possible to increase their efficacy and confidence. Eksail & Afari, (2020) found out that the more confident and skilled the teacher is, the more they would integrate the technology in their own practice. Behavioral intentions were all positive from the students. Despite the fact that many students from the rural campus indicated lack of prior experience in technology use, they were positive that they would integrate it in their future teaching because of the training they were receiving as preservice teachers, which is an indicator of positive attitudes.

Conclusion

The study clarifies the critical role of fostering the right attitudes among preservice teachers to bridge digital gaps in schools. Pertinent to the findings were the need for an adequately trained educator to model and professionally develop preservice teachers for technology integration in their own practices. The UTAUT provided this study with a worthwhile framework for understanding the attitudinal dispositions of first-year preservice teachers towards technology integration in pedagogy. The study results showed that even though a significant number of preservice teachers had none to limited prior knowledge of computers, they were however, positive towards technology integration in the provision of relevant education. The generality of preservice teachers gave their intention to learn as much as they could of technology integration preparatory for their teaching careers, indicating a positive attitude towards technology integration with pedagogy.

Findings provided insights for professional development when participants indicated that the consistent and relevant use of technology in teacher training improve students' attitudes towards technology use in pedagogy for their own practices. This study further demonstrated how training environments influence attitudinal dispositions in first-year preservice teachers which would in turn influence their intentions for use for their future classrooms. The results indicated the need to develop dedicated strategies for teacher training programs such as professional development innovations to foster positive attitudes towards technology in pedagogy.

This study recommended focused use of technology for pedagogy by teacher educators for modelling purposes. There is also need for the provision of adequate infrastructure to support technology use in teacher training programs. Further recommendations included suggestions that teacher educators be adequately equipped to mentor preservice teachers from

backgrounds with technology gaps to provide equal opportunities to learn. This is more relevant considering that most students from under resourced backgrounds like rural and township schools enter university without prior knowledge of ICTs.

References

Alalwan, N., Cheng, L., Al-Samarraie, H., Yousef, R., Alzahrani, A. I. & Sarsam, S. M. (2020). Challenges and prospects of virtual reality and augmented reality utilization among primary school teachers: A Developing country perspective. *Studies in Educational Evaluation*, *66*, 100876. https://doi.org/10.1016/j.stueduc.2020.100876

Al-Ansi, A. M., Jaboob, M., Garad, A. & Al-Ansi, A. (2023). Analyzing augmented reality (AR) and virtual reality (VR) recent development in education. *Social Sciences & Humanities Open*, *8*(1), 100532.

Alblooshi, S. & Abdul Hamid, N. A. B. (2021). The role of unified theory of acceptance and use of technology in e-learning adoption in higher education institutions in the UAE. *IBIMA Business Review*, *1*(26), 1-22. 10.5171/2021.730690

Bailey, L. E. & Nyabola, N. (2021). Digital equity as an enabling platform for equality and inclusion. *Pathfinders for Peaceful, Just, and Inclusive Societies/NYU Center on International Cooperation, June 2021, https://cic. nyu. edu/resources/digital-equity-as-an-enabling-platform-for-equality-and-inclusion*

Balli, O. & Singla, E. (2024). Dimensions of scale: Connected learning initiative (CLIx)—a case study of educational technology initiative in India. *Educational technology research and development*, 1-23.

Bandyopadhyay, S., Bardhan, A., Dey, P. & Bhattacharyya, S. (2021). *Bridging the education divide using social technologies*. Springer.

Chigona, A., Crompton, H. & Tunjera, N. (Eds.). (2024). *Global Perspectives on Teaching with Technology: Theories, Case Studies, and Integration Strategies*. Taylor & Francis. 10.4324/9781003406631-1

Chitturu, S., Lin, D. Y., Sneader, K., Tonby, O. & Woetzel, J. (2017). Artificial intelligence and Southeast Asia's future. *Singapore Summit*.

Deganis, I., Haghian, P. Z., Tagashira, M. & Alberti, A. (2021). Leveraging digital technologies for social inclusion. *United Nations Department of Economic and Social Affairs*.

Eksail, F.A.A., Afari, E. (2020). Factors affecting trainee teachers' intention to use technology: A structural equation modeling approach. *Educ Inf Technol* **25**, 2681–2697 https://doi.org/10.1007/s10639-019-10086-2

Ersozlu, Z., Ledger, S., Ersozlu, A., Mayne, F., & Wildy, H. (2021). Mixed-reality learning environments in teacher education: An Analysis of TeachLivETM Research. Sage Open, 11(3). https://doi.org/10.1177/21582440211032155

Gómez-Galán, J., Martínez-López, J. Á., Lázaro-Pérez, C. & García-Cabrero, J. C. (2021). Open innovation during web surfing: Topics of interest and rejection by Latin American college students. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 17. https://doi.org/10.3390/joitmc7010017

Herro, D., Visser, R. & Qian, M. (2021). Teacher educators' perspectives and practices towards the Technology Education Technology Competencies (TETCs). *Technology, Pedagogy and Education*, *30*(5), 623-641.

Ifinedo, E. & Kankaanranta, M. (2021). Understanding the influence of context in technology integration from teacher educators' perspective. *Technology, Pedagogy and education*, *30*(2), 201-215. 10.1080/1475939X.2020.1867231

Katz, J. H., Miller, F. A. & Gans, R. (2023). Inclusion, diversity, and equity in the digital era. *Management Consulting in the Era of the Digital Organization*, *117*.

Lim, C. & Kye, B. (2019). Classroom revolution through SMART education in the Republic of Korea. *Case study by the UNESCO-Fazheng project on best practices in mobile learning. Recuperado de: https://unesdoc. unesco. org/ark:/48223/pf0000366729*

Marbán, J. M. & Sintema, E. J. (2021). Pre-service teachers' TPACK and attitudes toward integration of ICT in mathematics teaching. *International Journal for Technology in Mathematics Education*, *28*(1), 37-46.

Momani, A. M. (2020). The unified theory of acceptance and use of technology: A new approach in technology acceptance. *International Journal of Sociotechnology and Knowledge Development (IJSKD)*, *12*(3), 79-98. 10.4018/IJSKD.2020070105

Omito, O. (2021). ICT infrastructure for the uptake of one laptop per child project in Homa Bay County, Kenya. *Journal of Education and Practice*, *12*(32), 72-84.

Panakaje, N., Ur Rahiman, H., Parvin, S. M. R. P.S.K.M, Yatheen. & Irfana, S. (2024). Revolutionizing pedagogy: Navigating the intergration of technology in higher education for teacher learning and performance enhancement. *Cogent Education, 11(1).* https://doi.org/10.1080/2331186X.2024.2308430

Riaz, A., & Adnan, A. (2016). Acceptance of tablet apps for e-learning by senior users: A Test of unified theory of acceptance and use of technology.

Roumell, E. A. & Salajan, F. D. (2016). The Evolution of US e-learning policy: A content analysis of the national education technology plans. *Educational Policy*, *30*(2), 365-397.

Roy, M. (2018). Asia's Role in the Four Industrial Revolutions. *Education About ASIA*, *23*(1), 51-56.

Samala, A. D., Daineko, Y., Indarta, Y., Nando, Y. A., Anwar, M. & Jaya, P. (2023). Global publication trends in augmented reality and virtual reality for learning: The Last twenty-one years. *International Journal of Engineering Pedagogy*, *13*(2). 10.3991/ijep.v13i2.35965

Seo, J. (2013). Smart education initiative: Looking ahead to the schools of tomorrow. *TIC*, 243. https://cgi.br/media/docs/publicacoes/2/tic-educacao-2013.pdf#page=245

So, H. J., Jang, H. & Kim, M. (2023). Trends and Issues of Digital Learning in Korea. *Trends and Issues of Promoting Digital Learning in High-Digital-Competitiveness Countries: Country Reports and International Comparison*.

Torchia, R. (January 25, 2024). 2014 National Educational Technology Plan. https://edtechmagazine.com/k12/article/2024/01/2024-national-educational-technology-plan-addresses-three-digital-divides

Trevisan, O. & De Rossi, M. (2023). Preservice teachers' dispositions for technology integration: Common profiles in different contexts across Europe. *Technology, Pedagogy and Education*, *32*(2), 191–204. https://doi.org/10.1080/1475939X.2023.2169338

U.S. Department of Education releases 2024 National Educational Technology Plan (January 22, 2024). https://learningforward.org/2024/01/22/u-s-department-of-education-releases-2024-national-educational-technology-plan/

UN.ESCAP (2018). *Evolution of science, technology and innovation policies for sustainable development: the experience of China, Japan, the Republic of Korea and Singapore*. Retrieved from: https://hdl.handle.net/20.500.12870/3121

Venkatesh, V., Morris, M. G., Davis, G. B., Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*. 27 (3): 425–478. Doi:10.2307/30036540

Wambugu, G. M., Ogenga, S., Shikali, C. & Muliaro, J. (2017). Computer laptop project strategy for basic education schools in Kenya.

Contact email: Dhliwayo.A@ufs.ac.za

Challenges Regarding the Accessibility of Library Services in Heritage Conservation Using the Matrix of Users' Consumption Behaviors

Ioana Cornelia Cristina Crihană, The National Association of Public Librarians and Libraries in Romania, Romania

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This article seeks to explore the multifaceted challenges inherent in ensuring accessibility to library services for the preservation of cultural heritage, with a particular focus on understanding user consumption behaviors from a lifelong learning perspective. The article aims to analyze the complexity and variables surrounding the imperative to preserve cultural heritage through libraries, juxtaposed with the various behavioral patterns displayed by users who engage with cultural resources. Based on the diverse learning interests of contemporary library users - from academic pursuits to professional development and personal enrichment - the present article initiates a matrix of factors responsible in shaping various cultural consumption behaviors. These factors comprise demographic variables such as age and education level, as well as contextual influences including cultural background, technological competence and responsiveness to innovation. By capitalizing on the information analysed within the Horizon project entitled SHIFT - MetamorphoSis of cultural Heritage Into augmented hypermedia assets For enhanced accessibiliTy and inclusion, currently under implementation, the present article will illustrate how advances in AI technology can be capitalized to adapt personalized solutions in library ecosystems. These solutions are designed to increase the accessibility and the attractiveness of modern library services and favor the inclusion of different user types, especially vulnerable groups, thus strengthening the value, relevance and degree of monetization of cultural assets in library collections. For this purpose, the author will analyze relevant SHIFT project use cases and will explore how AI technology can help libraries by configuring customized technological solutions, oriented to the current users' needs.

Keywords: Smart Library, Stakeholder Matrix, Behaviour Patterns, Library Service Accesibility, Appealingness of the Library Service Offer, Library Responsiveness to Innovation, Cultural Assets Monetisation

iafor
The International Academic Forum
www.iafor.org

Introduction

In recent years, there has been a growing recognition of the critical role that libraries play in the preservation of cultural heritage. As gatekeepers of knowledge, librarians must navigate the interface between technology and cultural diversity, ensuring that libraries continue to provide wider access to a variety of information sources. This article explores the multifaceted challenges inherent in ensuring accessibility to library services for the preservation of cultural heritage, with a particular focus on understanding user consumption behaviors from a lifelong learning perspective.

The article aims to analyze the complexity and variables surrounding the imperative to preserve cultural heritage through libraries, juxtaposed with the diverse learning interests and behavioral patterns displayed by contemporary library users. Demographic variables such as age and education level, as well as contextual influences including cultural background, technological competence, and responsiveness to innovation, shape the various cultural consumption behaviors that libraries must cater to.

To address these challenges, the article explores how advances in AI technology can be capitalized to adapt personalized solutions in library ecosystems. The author analyzes relevant use cases from the SHIFT project, which aims to leverage AI to increase the accessibility and attractiveness of modern library services, and favor the inclusion of different user types, especially vulnerable groups.

In the era of digital culture, libraries play a key role in preserving and making cultural heritage accessible. This article focuses on the complex challenges faced by Library and Information Science (LIS) professionals as custodians of printed materials, records, photographs, audiovisual materials, and other minor ephemeral documents of everyday life, both in analog and digital form, in ensuring accessibility to cultural heritage conservation services in libraries. Starting from the importance of understanding users' consumption behaviors, the author focuses on how curators of cultural heritage assets in library collections can adapt their offer to the diverse needs of their audiences using the User Consumption Behavior Matrix.

The current research examines the intersection between the need to preserve cultural heritage and the behavioral variability of library users. In the light of the Horizon project SHIFT - MetamorphoSis of cultural Heritage Into augmented hypermedia assets For enhanced accessibiliTy and inclusion, this paper examines the way in which AI technology can contribute to the adaptation of personalized solutions in modern library environments. Starting from the SHIFT use case, the author surveys the main methods based on behavioral analyzes of cultural consumption to better position SHIFT technological solutions, designed to improve accessibility and increase the relevance of library services, aiming at inclusiveness and supporting different types of users, including people belonging to vulnerable groups. By providing concrete examples of how AI-based technology solutions can be applied in library ecosystems to personalize user experiences and enrich access to cultural assets, this research brings a refreshed approach to library best practices in configuring service offerings to respond challenges and opportunities in a society in continuous digital and cultural transformation.

Public Libraries– Searching an Improved User Experience

Ensuring accessibility to library services for the preservation of cultural heritage is a complex process that requires a nuanced and comprehensive approach. In a digital age, where technology is rapidly transforming the way we interact with information and culture, maintaining the relevance and usability of cultural resources becomes essential. The modern library is no longer just a repository of books and documents, but a vibrant knowledge resource center that must adapt its services to meet the demands of diverse and ever-changing audiences.

The challenges encountered in the process of ensuring accessibility are many and varied, including technological barriers, the diversity of user needs and the need to protect the integrity of cultural heritage. For example, digitizing collections is essential to facilitate access to information, but requires significant resources and can raise copyright and data protection issues. In addition, ensuring accessibility for people with disabilities or disadvantaged communities adds new challenges to inclusion and access. Therefore, there is a need for a good knowledge of the consumption profile of users and innovative technological solutions that respond to these challenges.

The Matrix of User Consumption Behaviors– A Critical Indicator for the Configuration of Library Services

Understanding user behavior is an essential aspect in the process of creating and diversifying the service offer. The consumption profile of users is a critical indicator in the configuration of library services, having a direct impact on the way in which these cultural institutions, in this case libraries, develop and diversify their offer. Deep understanding of user behavior becomes essential to effectively respond to the needs of a diverse audience. In an ever-changing world where technology and access to information play a major role, libraries must be proactive in adapting their services to remain relevant and accessible.

Libraries are constantly concerned with meeting the very varied requirements and demands of different types of audiences. This is why these info-documentary institutions are increasingly interested in involving users in the design, validation and diversification of modern library services. Investment in modern technological tools has become a sine qua non condition for the configuration of cultural products and services that meet the increasingly refined needs of different user groups, including people belonging to vulnerable groups.

Analysis of the Behavior of Users of Cultural Goods and Services

In the context of the SHIFT project, the consortium partners identified, through research and analysis based on observation, the diagnosis of the main stakeholders. This information about the stakeholders' typology is essential to develop effective strategies for interacting with audiences and implementing new technological developments. This detailed classification was included in the SHIFT Stakeholder Matrix.

No.	Stakeholder	Role	SHIFT influence on Stakeholders	Stakeholders' influence on SHIFT
	Leaders of Cultural Institutions: - Museums - Libraries - Archives - Cultural institutes - Memorial houses, etc.	Primary beneficiaries	High	High
	Specialists in Cultural Heritage: - Curators - Specialists in Heritage Conservation - Archivists - Librarians - IT Specialists from cultural institutions	Primary beneficiaries	High	High
	Digital Content creators and entertainment: - Culture Vloggers and YouTubers - VR and AR Content Creators - Cultural Podcasters and Digital Historiographers - Specialists in 3D Animation and Design - Educational Game Developers - Digital Artists and Illustrators - Experts in Translation and Digital Subtitling - Screenwriters and Digital Copywriters - Experts in Speech Recognition and Interaction - Specialists in Gamification and User Experience Design (UX) - Producers of Audio Content and Audiobooks, etc.	Secondary beneficiaries	Medium	Medium
	Haptics Industry: - Engineers in Tactile Haptics	Primary beneficiaries	High	High

Figure 1: SHIFT Stakeholder Matrix

Among the stakeholders, commercial, community, political and various other decision-makers, the SHIFT partners focused in particular on two main categories: Cultural Heritage Institutions (CHIs) and their visitors, including non-users. The focus on these two categories of stakeholders was driven by two main rationales. First of all, the functional diversity of the stakeholders' types and the need for differentiated approaches regarding the development of customized solutions were followed. Secondly, it reflects a pragmatic rationale: the general public, including visitors and non-visitors, is the ultimate target audience of the SHIFT project. These end-users, who will benefit from the technologies and cultural content proposed by SHIFT developers, often require prior mediation and adaptation by CHI professionals.

Library Professionals– Key Role in Mediating Cultural Content for Users

Library professionals act as certified implementers of the technologies introduced by the SHIFT project. They are responsible for acquiring, processing, transforming, preserving and/or mediating collections and content for their visitors and, by extension, the general public. Therefore, understanding the needs and expectations of these professionals is essential to be able to effectively reach the target audience.

Adapting to the ever-evolving demands of stakeholders is essential for libraries to remain relevant and indispensable. This adaptation requires a deep understanding and a proactive approach to meet the diverse needs of users of all age groups. The SHIFT consortium advocated a comprehensive examination of user behaviors in cultural consumption. They deeply delved into users' cultural consumption interests, examining current stakeholder influences while anticipating future strategies for SHIFT project development. At the heart of the SHIFT partners' approach were innovative technology solutions designed to directly address these evolving requirements.

According to the research results of SHIFT partners, user behavior is influenced by a number of demographic and social factors, such as age, level of education and degree of familiarity with technology. Young people, for example, are often oriented towards using digital platforms, preferring quick access to online resources and virtual interaction. This behavior is influenced by their familiarity with digital technology and expectations of instant access to information. In contrast, seniors may have a greater affinity for traditional experiences, such as direct interaction with physical objects and in-person consultation of printed materials. These preferences reflect not only habits formed over time, but also varying levels of comfort with new technologies.

Diversification of the Service Offer– A Pre-condition for the Success of Libraries

In order to respond to the diversity of user behaviors, libraries must diversify their service offering. This involves developing solutions that integrate both digital and physical components. For example, creating intuitive and accessible online services based on AI can attract young users, while workshop-type programs or traditional exhibitions can maintain the interest of older audiences. SHIFT project partners have identified this diversity of needs and are working to customize technology-based solutions to increase accessibility and improve user experience.

By adopting a perspective based on the knowledge and motivation of stakeholders, libraries improve their service offerings, but also ensure that they are well equipped to face the challenges of the future. In order to meet the specific needs of users, libraries must continuously evolve and adapt their services. Maintaining a proactive approach, SHIFT partners not only anticipated the challenges, but used the opportunity of implementing the SHIFT project to improve collaboration with end-users, but also to optimize the user experience of direct beneficiaries. This strategic approach emphasizes the commitment of the SHIFT partners to, based on a deep and rigorous analysis of the stakeholders, achieve sustainable results both during the implementation of the project and during the sustainability period.

SHIFT Stakeholder Engagement Map

Complementary to the Stakeholder Matrix, SHIFT partners have also developed a tool called the Stakeholder Engagement Map, to facilitate understanding and managing the complex dynamics of stakeholders in relation to SHIFT's goals and mission. This map provides an integrated perspective on the development of the database, which compiles relevant information about the identified stakeholders. The tool is based on the previously developed Stakeholder Matrix and aims to analyze the distribution and influence of these categories on the future development direction of the project.

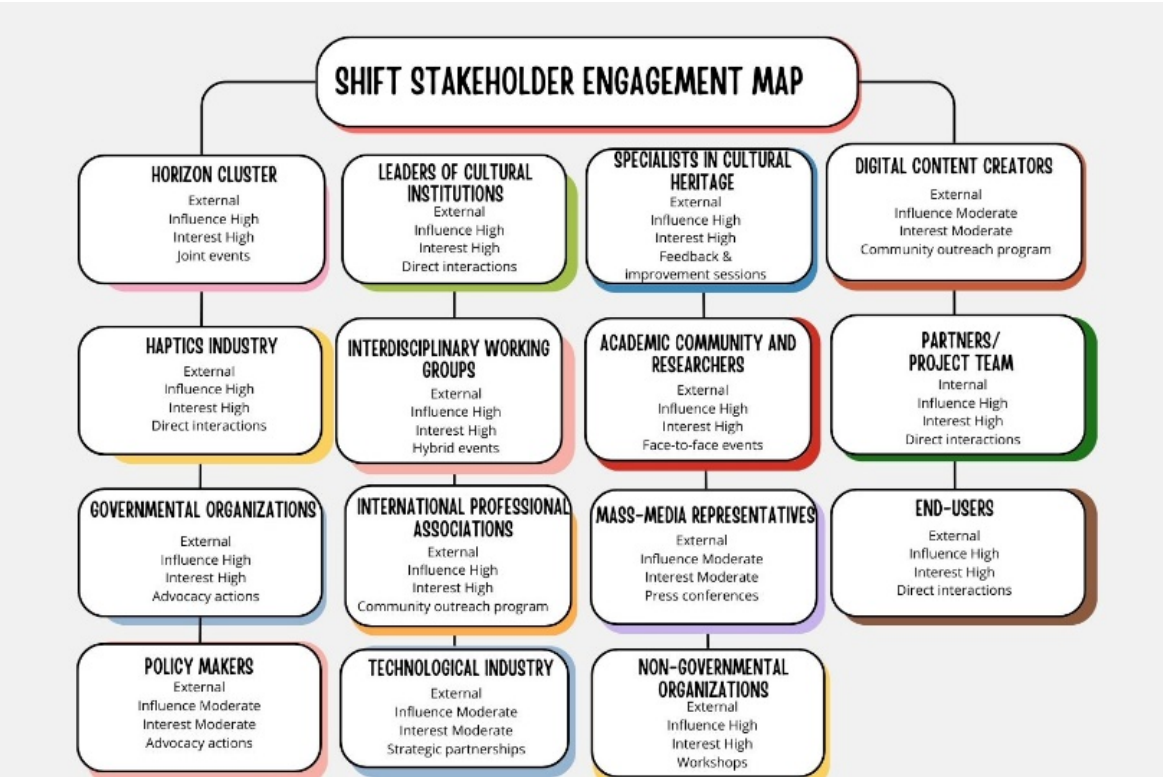


Figure 2: SHIFT Stakeholder Engagement Map

The research methodology included a systematic data collection, followed by their detailed analysis. Both office and field research methods were used, along with statistical analysis and facilitation of informal discussions. These methods enabled the aggregation of different data sets, providing a comprehensive and nuanced picture of the converging and diverging interests of the parties involved.

Detailed stakeholder review led to the identification of 16 distinct categories, each evaluated for their unique roles and contributions within the SHIFT ecosystem. The analysis highlighted the specific importance of each category and the anticipated impact on the development of the technological solutions offered by the project. The evaluation highlighted the way in which these interested parties influence not only the development trajectory of the project, but also the way in which its benefits are perceived and valued by the end users. The use of the SHIFT Stakeholder Engagement Map allowed project partners to plan and optimize the process of development, validation and exploitation of IT solutions, taking into account the particularities and specific needs of each category of stakeholders.

The project partners have identified 15 distinct categories of stakeholders, reflecting the diversity of the actors involved. These categories were selected based on their impact and influence on the SHIFT project. Stakeholder categories were divided into Primary stakeholders and Secondary stakeholders. Primary stakeholders are those who have a direct and immediate impact on the project, while secondary stakeholders have an indirect or long-term influence. This classification facilitated the prioritization of efforts and resources according to the importance of each category.

Stakeholder Identification and Classification Methodology

The identification and classification of stakeholders followed a systematic process, including:

- Selection of Categories: The choice of 15 distinct categories, representing the diversity of stakeholders.
- Detailed Analysis: Evaluation of each category according to the influence and impact on the project.
- Primary and Secondary Classification: Determining the importance of each category for the continuity of the project.

Taxonomy SHIFT Stakeholder Engagement Map

The taxonomy was developed to ensure a clear and comprehensive structuring of stakeholder categories:

- Structuring the Categories: Detailing the characteristics and particularities of each category.
- Integration of End-User Groups: Differentiating between current users and non-users of ICH services, for personalizing communication strategies.
- Mass Media Segmentation: Dividing media representatives into distinct categories to adapt communication strategies.

Scientific validation of the matrix was achieved by:

- Specialty Literature Review: Analysis of existing research and best practices.
- Validation by Experts: The involvement of SHIFT experts in the mobilization, involvement and loyalty of stakeholders to ensure the rigor and relevance of the methodology.

The Stakeholder Involvement Map developed within the SHIFT project is an essential tool for planning and optimizing interactions with stakeholders. Rigorous methodology and clearly defined taxonomy ensure an accurate representation of diversity and their influences, contributing to the success and sustainability of the project. This strategic approach can serve as a model for other initiatives that aim to effectively integrate stakeholders in their development and implementation processes.

Conclusion

Analysis of SHIFT partners revealed a varied distribution of stakeholder influence, highlighting the complexity of the SHIFT ecosystem. The SHIFT Stakeholder Engagement Map serves as a critical tool for anticipating and managing the dynamics between different categories of stakeholders. By detailing each category, the project can develop customized adaptation and implementation strategies that meet the specific needs of each stakeholder.

SHIFT partners collected and analyzed statistical data in order to identify the influence of the various stakeholders, but also to create a reference framework for the continuous evaluation of their impact on the evolution of the project. Therefore, the SHIFT Stakeholder Engagement Map has become a useful working tool for understanding and managing the complexity of multi-party audiences within the project. Through the detailed and rigorous methodological approach, the partners were able to create a dynamic tool that supports the strategic development and efficient implementation of SHIFT technological solutions, thus ensuring that the benefits of the project are optimized for all end users. This paper

emphasizes the importance of the active and continuous involvement of stakeholders in the process of development, validation and implementation of SHIFT technological solutions.

In light of the above, understanding the consumption profile of users is essential for the long-term success of libraries and research-innovation projects involving these info-documentary institutions. By analyzing the behaviors of different demographic groups, these institutions can implement customized solutions that better meet the varied needs and preferences of their audiences. This approach not only improves the user experience, but also contributes to keeping cultural institutions relevant and attractive in the digital age.

References

Besser, H. (2004). The Past, Present, and Future of Digital Libraries. In Handbook of Digital Libraries. CRC Press.

Calvert, P. J. (2014). Re-imagining the Role of Information Professionals in a World of AI and Automation. Library Review, 63(6/7), 492-507.

Candy, P. C. (2004). Linking Thinking: Self-directed Learning in the Digital Age. Australian Government, Department of Education, Science and Training.

Duderstadt, J. J., Atkins, D. E., & Van Houweling, D. (2002). Higher Education in the Digital Age: Technology Issues and Strategies for American Colleges and Universities. Greenwood Publishing Group.

Fernandez, P. (2016). Through the Looking Glass: Envisioning New Library Technologies. The Journal of Academic Librarianship, 42(1), 15-20.

Kuhlthau, C. C., Maniotes, L. K., & Caspari, A. K. (2007). Guided Inquiry: Learning in the 21st Century. Libraries Unlimited.

Nicholas, D., & Rowlands, I. (2008). Understanding Information Behaviour: How Do Students nd Faculty Find Books? The Journal of Academic Librarianship, 34(3), 243-254.

Overall, P. M. (2009). Cultural competence: A conceptual framework for library and information science professionals.

Ross, C. S., McKechnie, L., & Rothbauer, P. M. (2006). Reading Matters: What the Research Reveals about Reading, Libraries, and Community. Libraries Unlimited.

Smith, L., & Akagawa, N. (2009). Intangible Heritage. Routledge.

Autonomy-Guided Professional Development in Higher Education

Nilüfer Ülker, Istanbul Technical University, Türkiye
Pınar Kır, Istanbul Technical University, Türkiye
Esra Meşe, Istanbul Technical University, Türkiye

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Continuous Professional Development (CPD) has been one of the cornerstones of quality assurance and improvement practices as monitored by accrediting agencies. With many studies reporting inefficiency of traditional CPD methods, institutions are in pursuit of forming their new CPD agendas that are context sensitive. With this in mind, this case study reports the findings of a newly launched CPD program in an effort to integrate teacher autonomy into CPD at the School of Foreign Languages of a Turkish university. Specifically, the program offered the instructors four CPD activities to select from after analyzing previous semesters' feedback forms, conducting an extensive literature review, and consulting to the institution's CPD coordinators to determine the feasible CPD methods. Teacher trainer observation (TTO), peer observation (PO), self-reflection (SR), and teacher exchange (TE) were offered as alternative CPD activities. Data were collected from 123 instructors during the two terms when the system was implemented. Data analysis was conducted based on CPD documents of instructors' selected activities, thematic analysis of interviews regarding the implementation of the new system and the patterns found in the document analysis. The findings showcased SR was the most preferred activity during both semesters whereas TTO was not selected at all. Among those who completed a CPD activity in both semesters, about half of them tried out a new method while the other half selected the same method for both semesters. The thematic analysis provided insights into these patterns and instructors' perceptions towards the integration of autonomy into CPD activities.

Keywords: Continuous Professional Development, Accreditation, Teacher Autonomy

iafor
The International Academic Forum
www.iafor.org

Introduction

Continuing professional development (CPD) denoting organized opportunities and initiatives that teachers undertake to promote lifelong learning (Mansour et al., 2014; Sabah et al., 2014) has gained attention due to its great impact on teachers' professional growth in recent decades. With an emphasis on lifelong learning, it is conducive to an ongoing and contextually relevant process (Mansour et al., 2014). Therefore, it is regarded as vital for improving educational standards, as teachers must continuously update their knowledge and skills to enhance their teaching and students' learning experiences in educational contexts (Hargreaves & Fullan, 1992). In addition to adapting to change, teachers are expected to serve as role models for lifelong learning, demonstrating dedication and enthusiasm towards ongoing education, as their primary responsibility is to cultivate effective learning habits in their students (Day, 1999). Within this context, CPD activities are expected to provide significant opportunities for intellectual, social, and emotional engagement with concepts, resources, and peers, both within and beyond the realm of teaching for teachers (Little, 1993). These activities should take heed of the specific needs and requirements of the institution where they are carried out.

Writing self-reflections, attending to peer teaching/ observation/ supervision, having teacher trainer observations, joining in-service training/short-term courses/seminars/conferences/in-house training sessions, and providing mentoring for newly hired teachers have been some forms of CPD mentioned in the literature. With the increasing importance uttered to teaching English language owing to the profound impact of globalization in the 21st century, CPD has gained utmost vitality in the field of English language teaching. In parallel with this, institutions have required English teachers to continually update their knowledge and skills to foster their CPD and embrace lifelong learning to be able to keep up with the era. In addition to this, CPD mechanisms have been key parts of higher education institutions due to accreditation processes, which aim to enhance and maintain quality educational services. However, hitherto forms of CPD activities were not effective in every context and did not yield the best results to address teachers' needs. To illustrate, some studies showed that a significant portion of teachers were not open to having their peers visit their classrooms, and peer collaboration for staff development was seldom utilized (Lam, Yim, & Lam, 2002). What is more, other studies revealed that teachers are in need of exchanging new ideas through discussions with colleagues from their own and other schools as well as sharing best practices (ORC International, 2001). Such needs have led to a search for new forms of CPD to cater for the specific needs of institutions (e.g., Ülker & Kır, 2022).

As it has been illustrated in the literature, one size does not fit all. In other words, imposing one form of CPD may not yield desired outcomes, such as lifelong learning and keeping up with the newest pedagogies as explained above. For this reason, teacher autonomy-oriented CPD approaches might serve for varying needs of foreign language teaching staff. Gupta and Baveja (2014) defined teacher autonomy as "the ability to make their own decisions about what to do rather than being influenced by someone else or told what to do" (p. 162). Manzano Vazquez (2018) reported that the concept of teacher autonomy involves the extent to which teachers utilize their freedom for the purpose of their own professional development and their capacity to direct their professional learning processes. These definitions denote independence, self-sufficiency, self-government, and self-rule. It enables teachers to have the capability to develop professionally by engaging in self-directed professional growth, consistently improving their knowledge. Hargreaves (2003) cautioned that limited opportunities for teacher autonomy negatively influences teachers' efforts to assume

responsibility for their own work. Conversely, promoting teacher autonomy has been reported to lead to positive influences on students (Reeve & Cheon, 2016). Within an institution, teacher autonomy can be enacted through CPD activities. Such activities may focus on enhancing teachers' skills and readiness to enact changes, promoting self-awareness and accountability, encouraging active participation and collaboration, and establishing a supportive social network for professional growth in an attempt to foster teacher autonomy (Gupta & Baveja, 2014). In that sense, activities such as action research, self or peer observation, reading relevant literature, or attending conferences can be listed as some teacher autonomy fostering activities in CPD. However, the objective should not be to compel teachers into change, but rather to stimulate them to contemplate their practices through avenues such as group discussions and reflective exercises (Farrell, 2011). In addition, a key factor in achieving these goals is institutional support (Javadi, 2014; Hyslop-Margison & Sears, 2010). To put in another way, working conditions must also be conducive for autonomous professional learning activities.

Another important aspect of the context of this study is accreditation in higher education institutions. Accreditation is widely acknowledged as a crucial component of tertiary institutions, serving to uphold and sustain standards of achievement over the long run (Yüksel, 2013). Furthermore, it is a means to promote the professional development of teaching staff and assist teaching and learning (Spowart & Turner, 2021). Therefore, many programs in fields such as teacher training and intensive English education within higher education institutions worldwide, including those in Türkiye, seek accreditation to attain recognition on a global scale, aligning with the demands of globalization and contemporary standards. Accrediting bodies for intensive English programs typically emphasize instructor continuous professional development (CPD) as a key component of quality assurance. Consequently, accredited intensive English programs establish policies and employ strategies to enhance the professional growth of their instructors, thereby ensuring compliance with accreditation requirements (Kumar et al., 2020; Ülker & Bakioğlu, 2019).

Drawing from the literature on teacher autonomy and considering the quality benchmarks set forth by accrediting bodies, this study aims to investigate a newly implemented autonomy-guided CPD activity at the School of Foreign Languages of a state university in Türkiye. More specifically, the current study examined the types of CPD activities selected by the instructors and their perceptions of the new program. In this regard, the current research aims to answer the questions below:

1. How did the participation into the CPD activities change over the two semesters in terms of:
    a. the number of instructors who completed an activity; and
    b. the number of activities selected by the instructors?

2. What are the teachers' perceptions about the PD initiative based on teacher autonomy?

Methodology

Research Design

This longitudinal research followed a pure qualitative research approach for in-depth analysis of the phenomenon (Creswell, 2012). Also, the study adopted a case study methodology to yield deeper insights of the participants in a specific context.

Research Setting

This study was carried out at one of the top tier state universities of Türkiye. As this is an English medium instruction (EMI) university, the students join the English preparation school to meet eligibility criteria for English language proficiency before starting their departments. There are nearly 180 instructors employed in the School of Foreign Languages. The School of Foreign Languages holds accreditation from a respected international accrediting agency, having renewed its accreditation recently. To meet the standards set by this accrediting body and the staffing needs of the program, all CPD initiatives follow a structured analysis of instructors' needs and wants. In that sense, instructors are required to participate in at least one CPD activity throughout the term. In the previous years, instructors were offered a single type of CPD task and they were asked to complete it throughout the semester. Nonetheless, the results of instructor surveys indicated they were not satisfied with the CPD activities and could not sufficiently benefit from them in the sense of professional development. To remedy this problem and meet the accreditation CPD criteria, Professional Development Unit (PDU) launched a piloting study with analyze-apply-evaluate cycle to offer a context sensitive CPD activity for this School of Foreign Languages. The activity called Teacher Exchange was applied and found successful by the instructors (see Ülker & Kır, 2022). Following this CPD activity, PDU decided to encourage teacher autonomy among the instructors while initiating CPD activities. To that wake, the first trial of teacher autonomy on CPD activities started in the 2022-2023 Spring Term. It continued in the following 2023-2024 Fall Term. As part of the procedures, the instructors were presented with four different CPD activities to choose from, namely teacher trainer observation (TTO), peer observation (PO), self-reflection (SR) and teacher exchange (TE). The selection of the activities were in line with the contextual affordances as well as the literature as initiatives to foster teacher autonomy mostly involved reflection and making sense of their own practice (Manzano Vazquez, 2018). All the guidelines for each activity were prepared by the Professional Development Unit (PDU) and the administration under the purview of the accreditation requirements.

Data Collection and Analysis

Under the accreditation requirements, all instructors were required to participate in the CPD activities once in a term. For this reason, the data were obtained from files of English instructors teaching in the English Preparatory program under the umbrella of the School of Foreign Languages in addition to five instructors who participated in the semi-structured interviews in this study. In the first semester, 2022-2023 Spring Term, each instructor was required to choose only one CPD activity out of four activities and perform it in two months. Later, they needed to upload the files of the activity they conducted to their personal folders created by the PDU. Prior to the implementation, the process was explained in detail to all instructors with charts and documents. The same process was repeated in the 2023-2024 Fall Term. At the end of the second term when the autonomy-guided CPD circle was completed, all personal files were checked and analyzed. Later, semi-structured interviews were conducted with five instructors to evaluate the effectiveness of the application. Table 1 shows the research timeline.

Document analysis was utilized to answer the first research question. Document analysis is accepted as a qualitative research method and defined as a methodical approach to examining written materials, typically following predefined criteria or guidelines to ensure consistency and thoroughness in assessment (Bowen, 2009). In our study, the files uploaded by the

instructors were checked in order to obtain the number of activities selected in each semester. This way we were able to track the selected activities and their numbers for the first term and how these numbers changed in the following term.

Additionally, to delve into the instructors' perspectives on the utilization of four kinds of CPD activities and the chance of integrating their own autonomy in selecting their own CPD activity, semi-structured interviews were conducted with five randomly selected instructors. The interview protocol included five questions in total and the questions were prepared by the researchers and checked by an expert. For the interview data, thematic analysis was carried out by following the steps of Braun and Clarke (2006). Pseudonyms were used for interview participants to ensure anonymity.

Steps	Instrument	Time
Present situation analysis	Feedback surveys	2021-2022 Spring
Design and development of PD activities	Literature review	2022-2023 Fall
Implementation	PD activity documents	2022-2023 Spring 2023-2024 Fall
Evaluation	Document analysis Open-ended questionnaires	2023-2024 Spring

Table 1: The procedures of the autonomy-guided CPD cycle and data collection

Findings

The document analysis revealed how instructors' participation in CPD activities changed over two semesters, what kind of activities were popular among the instructors and what CPD activity was favored the most. Also, the thematic analysis of interview results reflecting the perceptions of five instructors demonstrated three main themes: a) Rationale for activity selection, b) Contribution to teacher autonomy, and c) Suggestions for future PD activities. Figure 1 shows the themes with sub themes.

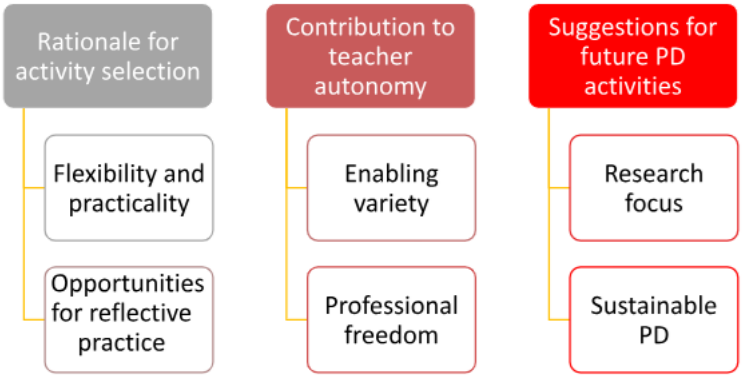


Figure 1: The qualitative findings at a glance

Tracking CPD Participation Across Two Semesters

The Number of Instructors Who Completed an Activity. In the first semester when the autonomy-guided CPD program started, a total of 69 instructors completed one CPD activity. This number increased to 76 in the second semester. Twenty-seven instructors selected the same activity in both semesters while 26 instructors had different preferences.

The Number of Activities Selected by the Instructors. During the first semester, the most popular activity became SR, which was completed by 46 instructors. It was followed by the TE with 12 instructors having completed it. The activity that came third was PO whereas TTO was not selected at all.

The second semester followed a similar trend as SR became the most-widely selected activity (43 instructors) and it was again followed by PO (26 instructors) and TE (4 instructors). TTO was not preferred in the second semester of the program either.

Instructor Perceptions

The thematic analysis revealed three broader themes regarding the perceptions of five instructors on the autonomy-guided CPD system in the institution: The rationale for the activity selection, contribution to teacher autonomy and suggestions for future PD activities.

The Rationale for Activity Selection. Semi-structured interviews conducted with five instructors revealed the rationale of selecting particular activities as flexibility, practicality and opportunities for reflective practice as four of them opted for SR and one of them chose peer observation.

Flexibility and practicality was emphasized by the selection of SR as it did not involve another colleague and paved the way for total freedom to conduct the activity. Gizem and Nil's statements illustrated this point:

> I might not find a teacher to come and observe me in the class, and I mean in terms of feedback and I can video record myself and give myself feedback on my own teaching. (Gizem)
>
> I conducted self-reflection activity first and peer observation later. I wanted to see what might have gone unnoticed in my teaching. This new system allowed me to be flexible. (Nil)

Practicality was another aspect of activity selection according to Burak and Sevinç as they explained:

> First of all, it's practical. When you reflect back, you realize any mistake you might have made. You can improve your practice. You don't get tense as you do when somebody else is watching your class. That's why I think it works. (Burak)
>
> I can easily fit it in my timetable. (Sevinç)

Opportunities to reflect on one's own teaching was also mentioned by the interview participants.

> You don't always get to stop and reflect on your own lesson. So, it was useful. (Feyza)
>
> I took my video and then wrote my reflection. I realized lots of things. (Sevinç)

> [During the peer observation] he noticed several aspects regarding the classroom dynamics, which was especially nice. He pointed out things that I hadn't previously noticed about that particular classroom and helped me improve the activity. (Nil)

Contribution to Teacher Autonomy. The participants referred to the new system's contribution to their autonomy as well. They said the CPD initiative enabled variety and promoted professional freedom. The first aspect was highlighted by all instructors as they compared the current system with the earlier PD initiatives, which heavily relied on lesson observations. Burak and Nil's statements were illustrative of this situation:

> It was not good earlier. There were no options. It was especially tough for more experienced teachers. They believed it was ridiculous for them to be observed by other teachers who were less experienced. Now everybody has something suitable for themselves. (Burak)

> Too much lately so that I can decide on my own whether I want that variety or not. Then I do. It is nice. It is nice not having to do one single type. (Nil)

Furthermore, having different options helped the instructors to exert their agency on their own PD and gave them professional freedom. Rather than top-down implementation of staff development activities in the institution, a bottom-up approach in the new CPD system, in which the instructors were driven to initiate the process, was more favorable.

> Leaving it to the teachers, what is best for them, is definitely better. (Feyza)

> We are trying to make the learners autonomous and independent. We should also have the autonomy to choose from lots of options. It is the best policy ever. (Sevinç)

> Currently, it depends on a teacher's dedication if one wants to do this properly. Let's say I might not find a teacher to come and observe me in the class to get feedback. Then I can video record myself and reflect on my own teaching or I can ask PDU to come and make some comments on my teaching. (Gizem)

> If CPD is a must, what matters is how much a teacher has learned. Has the PD activity taught the teacher anything? That's the question and it can happen through some autonomy. (Feyza)

Suggestions for Future PD Activities. Three of the interview participants also made suggestions to further diversify the pool of activities to choose from with two ideas coming to the fore: research-focused activities and other CPD activities that are more sustainable and span over a longer period of time. Nil suggested conducting research would be challenging to achieve, yet it could provide further opportunities for professional learning.

> We do have a lot of instructors who work on their PhD or MA so they would maybe be willing to participate in such a thing, why not? They can submit their studies as proof of their PD activities. If the other teachers are not interested in doing that, don't make them do that. (Nil)

In addition, more sustainable forms of CPD were suggested by two other instructors. Their suggestions contrasted with shorter-lasting activities such as observations or writing self-

reflection reports. While Sevinç suggested keeping journals, Gizem offered it would be beneficial to do some follow-up work following teacher training events. She also explained in-house events could be held during which instructors can prepare and present useful teaching methods they have applied in their own classrooms. She further proposed that the institution can seek discounts from other teacher training institutions so that she and her colleagues can earn credentials as part of their CPD activities.

Discussion and Conclusion

The findings of this research contributed to the understanding of promoting practitioner autonomy in higher education institutions. Reporting on the CPD activity selection of 69 instructors during the first semester and 76 instructors during the second semester of the implementation, the current study found that writing SR reports was the most popular activity for CPD. The semi-structured interviews revealed it was due to the flexibility SR provided. The qualitative data analysis also indicated that the autonomy-guided program promoted teacher agency as it facilitated a bottom-up approach to CPD and enabled a variety of activities. Suggestions from two interview participants demonstrated more activities could be added to the program. Arguably these activities would be suitable for those instructors who sought more sustainable and challenging forms of CPD as the suggestions were conducting action research or obtaining credentials from recognized teacher training organizations (e.g. CELTA, DELTA certificates). The fact that TTO's were not selected in either semester may deserve attention, too. In the context, this traditional form of CPD was the most familiar, however, the analysis of two semester's data as well as the semi-structured interviews attested to its inefficiency and negative appraisal by the instructors. Therefore, it could be proposed that the higher education institution needed more flexible varieties that suit the needs and preferences such as self-observation and writing self-reflection reports or writing journals (as suggested by one of the interview participants).

This study had several limitations, too. First of all, the selections were tracked through the documents uploaded by each instructor and the trends were reported in this study. In order to complete the CPD cycle, a more thorough tracking system could be established to help instructors exploit the system in the most beneficial way possible. Similarly, additional data collection from administration and the PD unit could have yielded further practical implications about how the new system impacted overall quality processes of the school. Finally, comparative studies could be conducted to provide more insight into various aspects of this CPD system. Such studies would also allow to fine-tune the idea of autonomy-guided CPD in higher education institutions.

References

Borg, S. (Ed.) (2015). *Professional development for English language teachers: Perspectives from higher education in Turkey*. British Council.

Bowen, G. A. (2009). Document Analysis as a Qualitative Research Method. Qualitative Research Journal, 9(2), 27 - 40. http://dx.doi.org/10.3316/QRJ0902027

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101.

Day, C. (1999). Developing teachers: The challenges of lifelong learning. London: Falmer Press.

Farrell, T. S. (2011). Exploring the professional role identities of experienced ESL teachers through reflective practice. System, 39(1), 54-62.

Gupta, N. K., & Baveja, B. (2014). Basics in education: Textbook for B. course. NCERT.

Hargreaves, A., & Fullan, M. G. (Eds.). (1992). Understanding teacher development. New York: Teachers College Press, Columbia University.

Hargreaves A. (2003). Teaching in the knowledge society: Education in the age of insecurity. Teachers College Press, New York.

Hyslop-Margison, E. J., & Sears, A. M. (2010). Enhancing teacher performance: The role of professional autonomy. Interchange, 41, 1-15.

Javadi, F. (2014). On the relationship between teacher autonomy and feeling of burnout among Iranian EFL teachers. Procedia-Social and Behavioral Sciences, 98, 770-774.

Kumar, P., Shukla, B., & Passey, D. (2020). Impact of accreditation on quality and excellence of higher education institutions. Investigación Operacional, 41(2), 151-167.

Lam, S., Yim, P., and Lam, T. W. (2002). Transforming school culture: Can true collaboration be initiated? Educational Research, 44(2), 181-195).

Little, J. W. (1993). Teachers' professional development in a climate of educational reform. Educational Evaluation and Policy Analysis, 15(2), 129-151.

Mansour, N., Albalawi A., & Macleod, F. (2014). Mathematics teachers' views on CPD provision and the impact on their professional practice. Eurasia Journal of Mathematics, Science and Technology Education, 10(2), 101-114.

Manzano Vázquez, B. (2018). Teacher development for autonomy: An exploratory review of language teacher education for learner and teacher autonomy. Innovation in Language Learning and Teaching, 12(4), 387-398.

ORC International (2001). Time Well Spent: Work that teachers value. London: Association of Teachers and Lecturers.

Reeve, J., & Cheon, S. H. (2016). Teachers become more autonomy supportive after they believe it is easy to do. Psychology of Sport and Exercise, 22, 178-189.

Sabah, S. A., Fayez, M., & Alsharami, S. M. (2014). Continuous professional development (CPD) provision for science and mathematics teachers in Saudi Arabia: Perceptions and experiences of CPD providers. Journal of Baltic Science Education, 14(3), 91-104.

Spowart, L., & Turner, R. (2021). Institutional accreditation and the professionalisation of teaching in the HE Sector. Higher Education - New Approaches to Globalization, Digitalization, and Accreditation [Working Title]. https://doi.org/10.5772/intechopen.99805

Ülker, N., & Bakioğlu, A. (2019). An international research on the influence of accreditation on academic quality. Studies in Higher Education, 44(9), 1507-1518.

Ülker, N., & Kır P. (2022). Instructor Exchange as a Continuous Professional Development Activity: Are we Ready to Change? ISSN: 2188-1162 The European Conference on Education 2022: Official Conference Proceedings https://doi.org/10.22492/issn.2188-1162.2022.48

Yüksel, İ. (2013). Graduate students' perception of standards and accreditation in higher education in Turkey: A qualitative analysis. The Qualitative Report, 18(75), 1-14.

Contact email: esramese@itu.edu.tr

Visual Memory Deficits in Children With ADHD

Chalmpe Maria, University of Thessaly, Greece
Agapitou Paraskevi, University of Thessaly, Greece
Bonoti Fotini, University of Thessaly, Greece
Vlachos Filippos, University of Thessaly, Greece

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Attention Deficit Hyperactivity Disorder (ADHD) is a common developmental disorder that occurs in childhood and is characterized by attention deficit, with or without high levels of hyperactivity-impulsivity. ADHD in children is accompanied by a variety of difficulties and problems related to language, higher executive functions such as working memory and emotion self-regulation, behavior and socialization. The purpose of this study was to investigate possible differences in visuomotor organization and visual memory between children with ADHD and typically developing children. The experimental group consisted of 54 children with ADHD symptoms (36 boys and 18 girls, mean age 9.2 years, range 6-11 years), who were matched in age, gender and handedness with an equal number of typically developing children who formed the control group. To assess visuomotor organization and visual memory, both groups were administered the Rey-Osterrieth complex figure and tested on its replication and mnemonic reproduction. The analysis revealed no significant differences in the performance of the two groups in copying the complex figure, but the ADHD students showed significantly lower performance than typically developing children in its mnemonic reproduction. This lower performance was observed regardless of whether the children of the ADHD group belong to the inattentive, hyperactivity-impulsivity, or the combined subtype. These results suggest that children with ADHD are likely to experience cognitive deficits that affect the visual memory system much more than that of visuomotor organization.

Keywords: ADHD, Children, Visual Memory, Visuomotor Skills

iafor
The International Academic Forum
www.iafor.org

Introduction

Attention-deficit/hyperactivity disorder (ADHD) is one of the most common neuro-developmental disorders in school age children (Doernberg & Hollander, 2016; Price & Raffelsbauer, 2012). The core symptoms relate to inattention and/or hyperactivity/ impulsivity. Therefore, diagnosis is classified into three potential subtypes: inattentive, hyperactive-impulsive, and combined (American Psychiatric Association, 2013). The disorder can cause considerable impairment in essential domains of social, academic, and behavioral functioning (Beljan, Reuter, Ganas, & Hoover, 2012). More specifically, associated features of the disorder commonly include academic underachievement and language/learning disabilities (Carames, Irwin, & Kofler, 2022; Carruthers, Taylor, Sadiq, & Tripp, 2022), behavioral and social problems (Classi, Milton, Ward, Sarsour, & Johnston 2012; Modesto-Lowe, Chaplin, & Godsay, 2014), diminished fine/gross motor skills (Fliers et al., 2008) and perceptual skills (Racine, Majnemer, Shevell & Snider, 2008; Rosa Neto et al., 2015). ADHD also affects a range of cognitive functions, including visual memory (Barnett, Maruff, & Vance, 2005; Cortese et al., 2012; Shang & Gau, 2011) and visuomotor skills (Carames et al., 2022; Fabio, Andricciola, & Caprì, 2022).

Visual memory refers to the ability to store, retain, and recall visual information (Luck & Vogel, 2013). Children with ADHD often experience difficulties in maintaining and recalling visual information, which can affect their academic performance and social interactions (Alloway, Gathercole, Kirkwood, & Elliot, 2008). Visual memory deficits were also demonstrated in the study of Shang and Gau (2011), which involved 279 adolescents, their siblings who did not display the disorder, and typically developing peers. The ADHD group performed significantly lower on all visual memory tests compared to the other two groups. Barnett et al. (2005) examined children with ADHD of the combined type and found deficits in their visuospatial memory. Additionally, deficits in visual memory in children with ADHD appear to be confirmed by studies using fMRI. Cortese et al. (2012) in a meta-analysis of 55 studies examining the structure and function of the brain in children with ADHD, supported the presence of dysfunctions in brain areas related to visual memory.

In recent decades, scientific interest has also focused on the connection between visual-motor skills and ADHD. Studies have shown that children with ADHD experience difficulties in controlling visual stimuli (Jung, Woo, Kang, Choi & Kim, 2014) and in adapting their movements to these stimuli (Farhangnia, Hassanzadeh, & Ghorbani, 2020). Deficits in visual-motor skills were also indicated in a very recent study (Carames et al., 2022). Specifically, children with ADHD appear to have lower visual-motor cohesion and possibly issues with motor coordination, but they do not differ from typically developing children in terms of visual perception. Another very recent study (Şahan, Atasavun, & Çak, 2023) evaluated visual-motor skills in children with ADHD who had comorbidity with learning or psychiatric disorders and found deficits in motor skills and visual perception. These deficits were observed both in children with ADHD with comorbidity and in those with ADHD without comorbidity. The study by Mayes, Breaux, Calhoun, and Frye (2019) reports a high rate of dysgraphia in students with ADHD and autism, which could be attributed to deficits in visual-motor integration.

Based on these findings, the current study designed to compare the performance of children diagnosed with ADHD to that of their typically developing peers in areas such as visual memory and visuomotor skills. This comparison was made using the Rey-Osterrieth Complex Figure (ROCF) test, a tool originally crafted in 1941 by Rey for evaluating visual-

spatial construction skills and visual memory. Over the years, the ROCF test has become a preferred method in neuropsychological evaluations for both adults and children due to its complexity and efficacy in drawing upon visual-motor skills and memory (Lezak, 1983). The test requires children to copy and then recall from memory a complex design, serving as a multifaceted measure of various cognitive processes including perceptual and spatial skills, as well as metacognitive and memory functions. The ROCF test is particularly valued for its ability to generate detailed data and has been used extensively to investigate both typical (Vlachos & Karapetsas, 1994; Waber & Holmes, 1985) and atypical developmental patterns in children (Brandys & Rourke, 1991). Research has shown that while the ROCF test poses significant challenges to younger primary school children, older children and adults find it increasingly manageable, illustrating its developmental sensitivity (Karapetsas & Vlachos, 1997; Vlachos, Gaillard, Vaitsis & Karapetsas, 2013).

The purpose of this study was to investigate potential differences in visual memory and visuomotor skills between children with ADHD and typically developing children. Specifically, based on the results of previous research (Barnett et al., 2005; Cortese et al., 2012; Shang & Gau, 2011) we expected that children with ADHD would exhibit deficits in visual memory *(1st hypothesis)*. Additionally, according to other studies (Carames et al., 2022; Mayes et al., 2019; Şahan, Atasavun, & Çak, 2023) we hypothesized that children with ADHD would show deficits in visuomotor skills *(2nd hypothesis)*.

Method

Participants

In the experimental group, there were 54 children exhibiting symptoms of ADHD (36 boys and 18 girls, mean age 9.2 years, SD 1.7, age range 6-11 years) who met the diagnostic criteria according to the DSM-V (American Psychiatric Association, 2013). Of these, 24 children ($N = 24$) belonged to the Inattentive subtype, which meets the criterion of inattention but not hyperactivity/impulsivity, 9 children ($N = 9$) to the Hyperactive-Impulsive subtype, which meets the criterion of hyperactivity/impulsivity but not inattention, and 21 children ($N = 21$) displayed the Combined subtype, meeting both the criteria of inattention and hyperactivity-impulsivity.

The children in the experimental group were matched by age and gender with an equal number of typically developing children who formed the control group (36 boys and 18 girls, mean age 9.1 years, SD 1.8, age range 6-11 years). The participants of the control group were selected from the same schools attended by children with ADHD.

Materials and Procedure

To assess visual-motor skills and visual memory, the Rey-Osterrieth Complex Figure (ROCF) was administered using guidelines set forth by Osterrieth (1944) and Rey (1941, 1959). The figure was presented on a 30cm x 21cm white sheet of paper, with the base rectangle of the figure measuring 8.0cm x 5.5cm. Each child tested received an identical piece of paper to ensure uniformity.

Testing was conducted on an individual basis. After presenting the ROCF, the children were instructed to replicate the figure as accurately as possible, paying close attention to its intricate details. There were no time limits imposed. After the completions of the copying, the

paper was taken away. Subsequently, children were provided with a new sheet and asked to recreate the figure from memory.

Scoring

To analyze the data as outlined by Osterrieth (1944), the complex figure was segmented into 18 individual parts, each valued equally. The analysis involved counting the parts that children managed to reproduce, noting their locations relative to the overall figure, and assessing how accurately they were replicated. The scoring approach used was as follows: If a part was reproduced precisely and positioned correctly, it received a score of 2. A score of 1 was given if the part was correct but misplaced or if it was distorted or incomplete yet still recognizable and correctly positioned. A score of 0.5 was assigned if a part, though distorted or incomplete, was misplaced. A part that was unrecognizable or missing received a score of zero. The maximum score for each reproduced figure was 36 points. The duration taken to complete the figure was not considered in the scoring. Two judges independently evaluated all the drawings using these criteria, achieving an interrater reliability of 96%.

Results

In Table 1, the means, and standard deviations of the performances of children with ADHD and their typically developing peers during the copying and recall of the ROCF are presented. The statistical analysis revealed no significant differences in performance between typically developing children and the three subtypes of the ADHD children, in copying the complex figure ($F_{3,104} = 2.39$, $p > .05$). However, the students with ADHD showed statistically lower performance than their typically developing peers during the recall of the ROCF ($F_{3,104} = 14.18$, $p < .001$).

Group	Copy		Recall		Recall/Copy ratio
	M	*SD*	*M*	*SD*	%
ADHD-Inattentive subtype	22.46	8.65	12.67**	8.13	56.4%
ADHD- Hyperactive-Impulsive subtype	26.23	9.80	14.44**	8.21	55.1%
ADHD- Compined sybtype	23.48	8.16	11.50**	8.70	48.9%
Control	26.63	4.69	21.53**	5.57	80.8%

**$p < .001$

Table 1. Means and Standard Deviations of ROCF Copying and Recall Performance by Children With ADHD and Typically Developing Children.

Table 1 also displays the recall score relative to the copy score, expressed as a percentage. The ratio was significantly lower in all three subtypes of ADHD compared to typically developing children, indicating that children with ADHD faced more difficulties in the mnemonic reproduction of the ROCF than their controls. Specifically, the ratio shows that children with ADHD who exhibit the Inattentive subtype recall 56.4% of the information they have already copied, children of the Hyperactive-Impulsive subtype recall 55.1%, and children with the Combined subtype recall 48.9%, whereas children in the control group recall 80.8%.

Conclusions

The aim of the current research was to investigate potential differences in visual memory and visuomotor skills between children with ADHD and typically developing children. The results of our study showed that students with ADHD exhibited significantly lower performance than typically developing children in the mnemonic reproduction of the complex figure, confirming our first hypothesis. This lower performance was observed regardless of the predominant subtype of disorder the students with ADHD had.

Our findings align with those of recent studies (Andersen et al., 2012; Barnett et al., 2005; Shang & Gau, 2011) which report the presence of deficits in visual memory among children with ADHD. As argued by Swanson and Alloway (2012), these deficits manifest as difficulties in recognizing, storing, and recalling visual information, often affecting the students' ability to perform academic skills, such as reading and solving mathematical problems.

According to our second research hypothesis, we expected that children with ADHD would exhibit deficits in visuomotor skills. Although children with ADHD did perform slightly lower than typically developing children during the copying of the complex figure, the analysis did not reveal a statistically significant difference between the two groups, and thus did not confirm our second hypothesis. Our results do not align with those of recent studies (Carames et al., 2022; Mayes et al., 2019; Şahan, Atasavun, & Çak, 2023) that report the existence of visuomotor deficits in individuals with ADHD.

This discrepancy may indicate that while visuomotor deficits can be a characteristic of ADHD, they may not be consistently observable in every context. Specifically, the variations between our results and those of other studies could be attributed to differences in the age of the sample. In the study by Mayes et al. (2019), the sample included both children and adolescents, whereas our study exclusively involved children with an average age of 9.2 years. Another reason for the differences in our results might be the diagnoses received by the participants. For example, all children in our study met the criteria for ADHD diagnosis, while the study by Mayes et al. (2019) also included children with autism.

These factors highlight the complexity of ADHD as a disorder and suggest that its manifestations, particularly in visuomotor skills, may vary as a function of individuals' developmental stage and the specific methodologies used for assessment. This underscores the importance of considering these variables when designing studies and interpreting results in ADHD research. Additionally, it suggests the need for more nuanced approaches to understand the full scope of visuomotor impairments across different ages and settings.

The deficits in visual memory observed in our study, along with the visuomotor organization deficits highlighted in the literature review, may suggest that children with ADHD experience cognitive difficulties that predominantly affect visual memory more than visuomotor skills. This interpretation could be related to the role of working memory and processing speed. Children with ADHD appear to have limited capacity in working memory, which is crucial for the temporary storage and processing of information (Alloway & Alloway, 2010; Baddeley, 2012). This limitation may hinder their ability to retain and efficiently process visual information, thereby affecting visual memory and visuomotor skills.

Furthermore, the behavioral inhibition deficit theory suggests that individuals with ADHD struggle to inhibit irrelevant or unwanted information, which might explain the difficulties in visual memory and visual processing (Barkley, 1997). This inability to "filter out" extraneous visual information could make it difficult for them to focus on specific visual tasks and impact their visual memory.

It is important to note that our study has two limitations that prevent us from drawing more definitive conclusions. First, we should have matched the children with ADHD and the typically developing peers for their intellectual potential and general abilities. Second, the strategies used during the drawing tasks were not studied, although the copying and recall performances of the children with ADHD and the control subjects may have been influenced by these strategies. Despite these limitations, the results support the view that the two tests (copy and recall) of the Rey-Osterrieth Complex Figure test can contribute significantly and independently to the neuropsychological assessment of children with developmental disabilities (Vlachos & Karapetsas, 2003; Waber & Bernstein, 1995).

In summary, the results of our study suggest that children with ADHD might face cognitive deficits that affect the visual memory system more profoundly than the visuomotor organization system and reflect the organizational difficulties encountered by children with ADHD, confirming previous studies on deficits in higher executive functions, particularly in working memory (Barkley, 1997). Given the different aspects of visual memory, such as implicit versus explicit memory, which can both be assessed, it is recommended that further research with various mnemonic tasks should explore in depth the relationship between neurodevelopmental disorders like ADHD and the visual memory system. Understanding the relationships between visuomotor skills, visual memory, and ADHD in children could provide critical information for developing educational approaches. Integrating strategies that enhance visual memory and visuomotor skills, such as visualized instructions, organized visual materials, and specialized educational programs, could improve the academic performance and daily functioning of children with ADHD. This holistic approach underscores the importance of targeted interventions that respond to the specific cognitive profiles of these children, potentially leading to better educational outcomes and improved quality of life.

References

Alloway, T. P. & Alloway, R. G. (2010). Investigating the predictive roles of working memory and IQ in academic attainment, *Journal of Experimental Child Psychology, 106*(1), 20-29.

Alloway, T. P., Gathercole, S. E., Kirkwood, H., & Elliott, J. (2008). Evaluating the validity of the Automated Working Memory Assessment. *Educational Psychology, 28*(7), 725-734.

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Andersen, N., Egeland, J., & Merete, Ø. (2012). Learning and Memory Impairments in Children and Adolescents with Attention-Deficit/Hyperactivity Disorder. *Journal of learning disabilities, 46,* 453-460.

Baddeley, A. (2012). Working Memory: Theories, Models, and Controversies, *Annual Review of Psychology, 63*, 1-29.

Barkley, R. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD, *Psychological Bulletin, 121*(1), 65-94.

Barnett, R., Maruff, P. & Vance, A. (2005). An investigation of visuospatial memory impairment in children with attention deficit hyperactivity disorder (ADHD), combined type. *Psychological Medicine, 35*, 433-1443.

Beljan, P, Reuter, A.E., Ganas, K., & Hoover, M. (2012). Medication efficacy: the impact of variability in defining and measuring ADHD and executive functioning. *Applied Neuropsychology Child, 1*(2), 152-8.

Brandys, C. F., & Rourke, B. P. (1991). Differential memory abilities in reading- and arithmetic-disabled children. In B. P. Rourke (Ed.), *Neuropsychological validation of learning disability subtypes* (pp. 73–96). New York: The Guilford Press.

Carames, C. N., Irwin, L. N., & Kofler, M. J. (2022). Is there a relation between visual motor integration and academic achievement in school-aged children with and without ADHD? *Child Neuropsychology*, *28*(2), 224–243.

Carruthers, S., Taylor, L., Sadiq, H., & Tripp, G. (2022). The profile of pragmatic language impairments in children with ADHD: A systematic review. *Development and Psychopathology*, *34*(5), 1938-1960.

Classi, P., Milton, D., Ward, S., Sarsour, K. & Johnston, J. (2012). Social and emotional difficulties in children with ADHD and the impact on school attendance and healthcare utilization. *Child Adolescent Psychiatry and Mental Health, 6*(33).

Cortese, S., Kelly, C., Chabernaud, C., Proal, E., Di Martino, A., Milham, M. P., & Castellanos, F. X. (2012). Toward Systems Neuroscience of ADHD: A Meta-Analysis of 55 fMRI Studies. *American Journal of Psychiatry, 169*(10), 1038-1055.

Doernberg, E., & Hollander, E. (2016). Neurodevelopmental Disorders (ASD and ADHD): DSM-5, ICD-10, and ICD-11. *CNS Spectrums, 21*(4), 295-299.

Farhangnia, S., Hassanzadeh, R., & Ghorbani, S. (2020). Handwriting Performance of Children with Attention Deficit Hyperactivity Disorder: The Role of Visual-Motor Integration, *International Journal of Pediatrics, 8*(11), 12317-12326.

Fliers, E., Rommelse, N., Vermeulen, S., Altink, M., Buschgens, C. J. M. et al. (2008). Motor coordination problems in children and adolescents with ADHD rated by parents and teachers: Effects of age and gender, *Journal of Neural Transmission, 115*(2), 211-220.

Jung, H., Woo, Y.J., Kang, J. W., Choi, Y. W., & Kim, K. M. (2014). Visual perception of ADHD children with sensory processing disorder. *Psychiatry Investigation*, *11*(2), 119-23.

Karapetsas, A. & Vlachos, F. (1997). Sex and handedness in development of visual-motor skills. *Perceptual and Motor Skills, 85*, 131-140.

Lezak, M. (1983). *Neuropsychological assessment*. Oxford, UK: Oxford Univer Press.

Luck, S. & Vogel, E. (2013). Visual working memory capacity: from psychophysics and neurobiology to individual differences, *Trends in Cognitive Sciences, 17*(8), 391-400.

Mayes, S. D., Breaux, R. P., Calhoun, S. L., & Frye, S. S. (2019). High Prevalence of Dysgraphia in Elementary Through High School Students with ADHD and Autism. *Journal of Attentional Disorders*, *23*(8), 787-796.

Modesto-Lowe, V. M., Chaplin, M., & Godsay, V. (2014). Parenting teens with attention-deficit/hyperactivity disorder: Challenges and opportunities. *Clinical Pediatrics, 53*, 943–948.

Osterrieth, P. A. (1944). Le teste de copie d'une figure complexe: contribution a l'etude de la perception et de la memoire, *Archieves de Psychologique, 30*, 206-256.

Price, M., & Raffelsbauer, D. (2012). ADHD: A true neurodevelopmental disorder? *Medical Writing*, *21*(2), 114–122.

Racine, M.B., Majnemer, A., Shevell, M., & Snider L. (2008). Handwriting Performance in Children with Attention Deficit Hyperactivity Disorder (ADHD). *Journal of Child Neurology*, *23*(4), 399-406.

Rey, A. (1941). L'examen psychologique dans les cas d'encéphalopathie traumatique. *Archives de Psychologie, 28*, 286-340.

Rey, A. (1959). *Manuel: test de copie d' une figure complexe.* Paris: Centre de Psychologie Apliquee.

Rosa Neto, F., Goulardins, J. B., Rigoli, D., et al. (2015). Motor development of children with attention deficit hyperactivity disorder. *Brazilian Journal of Psychiatry, 37*, 228–234.

Şahan, N., Atasavun, U., & Çak, H. (2023). Motor Proficiency, Manual Dexterity, and Visual Perception in School-age Children With ADHD: Contribution of Different Comorbidities. *Journal of Psychiatric Practice 29*(2), 122-136.

Shang, C. Y., & Gau, S. S. (2011). Visual memory as a potential cognitive endophenotype of attention deficit hyperactivity disorder. *Psychological Medicine, 41*(12), 2603–2614.

Swanson, H. L., & Alloway, T. P. (2012). Working memory, learning, and academic achievement. In K. R. Harris, S. Graham, T. Urdan, C. B. McCormick, G. M. Sinatra, & J. Sweller (Eds.), *APA educational psychology handbook, Vol. 1. Theories, constructs, and critical issues* (pp. 327–366). American Psychological Association.

Vlachos, F., Gaillard, F., Vaitsis, K., & Karapetsas, A. (2013). Developmental risk: evidence from large non-right-handed samples. *Child Development Research*, Article ID 169509, 10p.

Vlachos, F. & Karapetsas, A. (1994). Visuomotor organization in the right-handed and left-handed child: A comparative neuropsychological approach. *Applied Neuropsychology, 1*, 33-37.

Vlachos, F. & Karapetsas, A. (2003). Visual memory deficits in children with dysgraphia. *Perceptual & Motor Skills, 97*, 1281-1288.

Waber, D., & Bernstein, J. (1995). Performance of learning-disabled children on the ROCF: validation of the developmental scoring system. *Developmental Neuropsychology, 11*(2), 237-252.

A Comparative Study on the Implementation of Merdeka Belajar (Freedom of Learning) Curriculum at Secondary Level: Flexibilities, Complexities, and Implications

Renda Lestari, Universitas Muhammadiyah Muara Bungo, Indonesia
Mutia Rahmadani, Universitas Muhammadiyah Muara Bungo, Indonesia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Merdeka Belajar (Freedom of Learning) curriculum is the newest on-going curriculum applied in Indonesia which aims to improve the quality of education. This curriculum reformation has earned excessive attention and there has been adequate number of studies attempted to evaluate the early stage of implementation of *Merdeka Belajar* curriculum. Yet, there is still paucity on the holistic overview on flexibilities and complexities of *Merdeka Belajar* curriculum especially at secondary level. In relation to that, this present study intended to bridge the gap by providing the comparation of *Merdeka Belajar* curriculum implementation at junior and senior secondary schools in one of regions in Indonesia. Through qualitative research design and descriptive comparison approach, data from focus group discussion (FGD) with 16 transformational teachers (*Guru Penggerak*) in Tebo regency were analyzed. The results underlined major distinction on the execution of *Merdeka Belajar* curriculum at these two settings. One striking finding relating to the adjustment of pedagogical to andragogy paradigm which is reported to be very challenging for teachers at junior level compared to senior level since students' reliance on teachers is still notably high. However, there is more flexibility found at these two settings regarding to the simplification of the lesson plan which include three main components (objectives, activities, and assessment). Through this, teachers proclaimed that this new policy helps to reduce teachers' loads to do the administration task. This study also draws some implications on *Merdeka Belajar* implementation at secondary education to provide best practices for forthcomings.

Keywords: *Merdeka Belajar* Curriculum, Comparative Study, Flexibilities, Complexities, Implications

iafor
The International Academic Forum
www.iafor.org

Introduction

Intending on the improvement of education quality in Indonesia, the Ministry of Education and Culture of Indonesia reform the prior 2013 Curriculum by implementing the newest curriculum called *Merdeka Belajar* (Freedom of Learning) Curriculum. The *Merdeka Belajar* curriculum captivate the curriculum designers, educators, and practitioners to redesign the teaching and learning more freely, creatively, and innovatively in regard to varying classroom needs and situations. As the name implied, *Merdeka Belajar* curriculum encouraged the student to be an independent learner and attempted to shed heavy weight on the teachers who are in demand to allocate learning and teaching by taking into account more simplicity in lesson plan, creative design on learning activities, and holistic view on assessment for and of learning.

The *Merdeka Belajar* curriculum launched firstly in 2020 and proclaimed by the Minister of Education and Culture of the Republic of Indonesia, Mr. Nadiem Makarim, to be applied in each level of education. Underlying freedom and independence in learning, the *Merdeka Belajar* curriculum shed heavy spotlight on student-centered learning, encourages the use of modern technology for educational purposes and gives students more flexibility in learning that suits their interests and career goals (Yuhastina et al., 2000; Aryati, 2023). To achieve the goal of freedom in learning, education institutions in Indonesia were given authority to customize their school curriculum. This flexibility enables the stakeholders to adjust learning contents that are relevant to their student backgrounds and needs. Learning contents that has high relevance made it possible to boost students' motivation and understanding in learning because it became applicable for them in real-life settings. Moreover, this situation also be beneficial in the long run as it provides the capacity for students to self-direct their own learning.

The breakthrough of *Merdeka Belajar* curriculum leading up to some alarming challenges for teachers to accommodate new curriculum and adapt into a new practice. For instance, a study by Tricahyati and Zaim (2023) investigated English teachers' readiness which focusing on their knowledge and skills, motivation, self-efficacy, and commitment in implementing the new curriculum. The authors underlined fairly satisfied result on teachers' readiness which showed that these teachers are in level 3 out of 4 level which means these teachers are ready to implement the *Merdeka Belajar* curriculum with notably little improvement needed. However, this research also revealed that these teachers facing some obstacles in implementation of *Merdeka Belajar* curriculum in terms of developing lesson plan particularly in formulating the learning outcomes which informed to be too general. Another leading challenge found in classroom implementation which the teachers are struggled to provide differentiated learning for each and every student. Followingly, school facilities and infrastructure are also in need to support teachers accommodate the new curriculum and avoid up-coming challenges in its practices (Tricahyati & Zaim, 2023).

Adequate research in the field has attempted to provide overview of *Merdeka Belajar* implementation and underlined several prominent findings. Previous study indicated that some challenges in implementing *Merdeka Belajar* curriculum occurs due to the fact that teachers have lack of preparation to accommodate new curriculum in a relatively short amount of time (Tricahyati & Zaim, 2023). Besides the unreadiness from teachers' side, Yuhastina et al. (2020) stated that there is still insufficient socialization or directive from the government on how to put into practice the concepts and properly implement *Merdeka Belajar* curriculum. Similar findings found by Wahyuni et al. (2023) which pointed out that

the operational standard of implementation (SOP) is required to help prevent some barriers in adapting and implementing the new curriculum.

To facilitate the shift to the new curriculum, there a need to fill the gap between common practice and new concepts. Corresponding to this, this present study was conducted to answer this particular concern regarding to the implementation of *Merdeka Belajar* curriculum and provide evaluation on its practices by providing more comprehensive overview on some flexibilities, complexities, and implications of the new curriculum. The existing studies on *Merdeka Belajar* curriculum tend to explore the implementation on a particular subject, thus there is still paucity on the evaluation in broader context. As a result, this study represented the evaluation by comparing the implementation of *Merdeka Belajar* curriculum at secondary level, particularly in junior and senior secondary school.

Methods

This present study applied qualitative research design and descriptive comparison approach to answer the central inquiry of the study regarding to the implementation of *Merdeka Belajar* curriculum at secondary school. Qualitative data collection techniques were applied by referring to some researchers in the (Dörnyei, 2007; Creswell, 2012; Hammersley, 2013; Cohen et al., 2017; Lai et al., 2017; Manion et al., 2018). The data obtained through Focus Group Discussion (FGD) with transformational teachers (*Guru Penggerak*) from junior and senior secondary schools in Tebo Regency, Jambi, Indonesia. This research design was determined purposefully to collect shared understanding from several individuals as well as to get vivid views and experiences from a group of people regarding to the implementation of *Merdeka Belajar* curriculum (Creswell, 2012).

The data collected through Focus Group Discussion was obtained with 16 transformational teachers (*Guru Penggerak*) from Tebo Regency. *Guru Penggerak* or transformational teachers is a group of pioneer teachers who are selected to follow leadership education program to become leaders in teaching and learning. This program is held by Ministry of Education and Culture of the Republic of Indonesia to train teachers within the purpose for encouraging student growth and development holistically. As the name implied, transformational teachers expected to transform and move ahead the current of educational circumstances to a better direction.

Before conducted the FGD, participants of the research were asked to fill out a consent form to participate in this study. Data were then collected by carrying out an intensive discussion with an open-ended question given to best voice participants' experiences regarding flexibilities, complexities, and implications for *Merdeka Belajar* implementation. During the FGD session, all participants are encouraged to talk and take their turn talking to ensure that everyone involved actively in the discussion. Proceed to the next step, the recorded FGD results were transcribed, and member-checking was also employed with the research participants to confirm that there is no additional or decrement of the FGD contents. Followingly, to ensure trustworthiness in this research, the researcher took several steps by member checking, careful recording techniques, and addressing potential bias, the researcher ensured the integrity and thoroughness of the research. Lastly, several stages were also carried out to analyze the data resulting from this present research. It involved understanding the data, data coding, data interpretation, and structural synthesis to capture the essence of individual textual descriptions and answer research questions.

Result and Discussion

The central inquiry of this research aims to evaluate the implementation of *Merdeka Belajar* curriculum particularly on its practices at junior and senior secondary level. This study identified two main themes that emerged from data collected through focus group discussion. These themes shed light on the flexibilities, complexities and implications associated with implementation of *Merdeka Belajar* curriculum in both settings. The results are discussed comprehensively in the following.

1. Flexibilities on Teachers' Role, Authority, and Approaches in Teaching

One of apparent findings from the discussion employed with the participants is regarding to teachers' role in students' learning role. Both teachers from junior and senior secondary level shared mutual understanding in regard to their in becoming the leaders in teaching and learning for students. It is worth to note that the students-centered learning is the preferred approach, however, teachers' role in leading teaching and learning is still prominent. In addition, teachers also carried the role to improve the existing programs in schools. The teachers admitted that their title as transformational teachers packed with moral responsibility they should carry. As one of the teachers said in the following excerpt:

> "The mindset of transformational teachers is a scary thing, we received the acknowledgement that transformational teachers is the greatest teacher and everyone sees it. It turns out that there is a moral responsibility there. Indeed, we have to show our colleagues how to be a role model in our footsteps."

Although, these transformational teachers are in demand to not only become leaders for their students, but also for their colleagues. In fact, this situation allowed the teachers to enhance the collaboration among one another. This collaboration occurred not only on the school level, but also happened to be accomplished in across-school. As stated in turn:

> "…collaborating will bring our insight even wider, collaboration with transformational teachers bring our perspective and understanding in a wider scope. There is a learning group which known as KomBel (*Kelompok Belajar*) within the school, through this we can interact with various teachers, not just the teachers at our school."

In regard to the shift of teaching paradigm from teacher-centered to students-centered learning, teachers are learning to facilitate teaching and learning based on students' need. Thus, crafting the learning that take a side on students has encourages these teachers to enhance collaboration and eager to facilitate high quality teaching and learning. One concern expressed regarding the shift was whether the teachers are prepared to face and embrace the challenges that comes in. Thus, collaboration play crucial role in bridging the teachers to seek for help if needed. Both teachers from junior and senior secondary school believe that the support from fellow teachers is significant to provide teaching and learning according to the needs of the students. As mentioned by one of the participants in the FGD session:

> "The transformational teacher's education is not just about learning… but how the teacher invites their friends in the group to create or support learning that is in accordance with what the students want and need, so that their interests and talents develop."

In order to comprehend the students' needs, interests, and their style in learning, the teachers uttered that they conduct assessment diagnostic to help them understanding their students better. Through this assessment, teachers are knowledgeable about the level of competency, strengths, weaknesses, and interest of their students. This assessment is vital to help teacher allocating teaching and learning that is suitable for their students. The comment below illustrates the diagnostic assessment employed by one of the teachers:

> "A diagnostic assessment is carried out at the beginning to find out the student's language skills and IQ, then their class will be separated according to that. Later, here is our opportunity to become teachers who master all the competencies that these children have. As mentioned above, learning refers to differentiation need to be carried out firstly through conducting the diagnostic test and mapping it."

As expressed above, the diagnostic assessment is encouraged to be employed within the purpose to accelerate the mapping process for teaching. Teachers themselves are in demand to not only mastering the subjects, but also requested to have adequate competencies in teaching and managing different types of students. This practice refers to differentiated learning, where the teachers are expected to welcome the diversity in learning. Differentiated learning makes it possible for everyone to participate, takes down obstacles, and takes into account various learning needs and preferences of the students.

Another issue that formed central focus of on the data findings is relating to differentiated learning. In *Merdeka Belajar* curriculum, facilitating differentiated learning is highly encouraged by the government and teachers are in charge to pilot the learning in accordance with every student's needs and interest. However, this become complicated for teacher as they are revealed that organizing teaching and learning that suits to each and every student is nearly impossible due to their load tasks pile up. To consider a solution to this issue, this current curriculum attempted to reduce teachers' load tasks by announcing one of programs called 'a page of lesson plan' that allowed the shortened form which includes three core components including, learning objectives, activities, and assessments. Previous studies (Yuhastina et al., 2020; Tricahyati and Zaim, 2023) stated that this simple administrative model has yield positive results to teachers' productivity since they can focus to the prepare the pre-teaching at ease with the new form of lesson plan.

2. Complexities on Adjustment of Merdeka Belajar Curriculum Implementation

Concerns were expressed about the implementation of *Merdeka Belajar* curriculum, particularly eliciting some complexities on the adjustment found in the field. One striking finding relating to the shift of pedagogical to andragogy paradigm which is reported to be very challenging for teachers at junior level compared to senior level since students' reliance on teachers is still notably high. The majority of participants agreed with the statement that the biggest challenge exist is relating to facilitating learning for adults and embrace self-directed learning for students. Whereas the current state is mainly centered on teacher-led learning which formed the students to be more dependent. This finding is consistent with the data obtained by Yuhastina et al. (2020) which stated that the reason why there is difficulty to fit into the andragogy is because students' lack of independence in learning and their high reliance on the teachers. This pedagogy paradigm contrast with *Merdeka Belajar* curriculum which encourages the student to be dominant for their own learning, this also means that they are the one who decide to plan the direction of learning and the teachers' role is to complementary the materials which relevant to their needs as well as to discuss the best way

to accomplish it (Yuhastina, Parahita, Astutik, Ghufronudin, & Purwanto, 2020). Conversely, in this case, teachers' role did not become less dominant. Instead, teachers are the pioneers to accelerate this shift at ease. Unfortunately, previous study has reported that teachers are oblivious to the essence of learning paradigm in *Merdeka Belajar* curriculum, and harsly, it is stated that either junior and senior teachers are unable to comprehend the meaning of *Merdeka Belajar* comprehensively which leads to incoherent practice applied in the field (Yuhastina, Parahita, Astutik, Ghufronudin, & Purwanto, 2020, p. 741).

Issues related the adjustment of *Merdeka Belajar* implementation were particularly prominent in the data findings. A common view amongst participants was that they were not entirely ready to the implementation of the new curriculum. In its implementation, the teachers were obligated to go through three phases namely: 1) Independent learning (*Mandiri Belajar*), 2) Independent changing (*Mandiri Berubah*), and 3) Independent sharing (*Mandiri Berbagi*). In the first phase, the teachers are in demand to learn about *Merdeka Belajar* curriculum independently. This phase should be accomplished by discovering and understanding the idea of *Merdeka Belajar* through official platform called PMM (*Platform of Merdeka Mengajar*). This platform is a form of support from the government, so teachers were provided with an assistance in obtaining references, inspirations, and understanding about how to implement *Merdeka Belajar* curriculum. In the next phase, teachers are encouraged to be independently changing. This indicates that the new curriculum needs to be implemented. At the end, the teachers are requested to independently sharing about their knowledges by enduring their work to inspire colleagues. These phases should be passed by the teachers so they could implement *Merdeka Belajar* thoroughly. However, the practices in the field were differed as to whether these teachers have successfully completed each and every phase. As one teacher from junior secondary level put it:

> "In the independent learning phase, many of the teachers had not yet studied. So, in the next phase, which is the independent change, we were actually still in the independent learning stage because we were not studying yet in the first phase through PMM (Platform of *Merdeka Mengajar*) at that time, right?"

From the teachers' utterances above, they recognized the initial barriers to the shift of the *Merdeka Belajar* curriculum. The regulations of the new curriculum obligated the teachers to be able to learn independently in the very first phase, instead, it is found that the majority of teachers did not go through learning phase. Thus, it becomes difficult for them to keep up with the pace when they are proceeded to the next phase. This view was echoed by teachers in senior secondary school who faced the same situation. As clarified in the following excerpts:

> "So there our school was obliged to immediately implement independent sharing, even though we had not yet gone through the stages of learning and changing. So, it is a bit difficult to implement it in schools."

Concerns regarding the implementation of *Merdeka Belajar* were more widespread. Particularly debating on the government involvement in adjustment of the new curriculum. Closer inspection on this topic was exposed, the participants were unanimous in the view that there is still inadequate socialization or directive from the government regarding to the *Merdeka Belajar* curriculum. Whilst a minority mentioned that the existence of online platform were helpful for guiding the teachers in implementing the curriculum, other

participants were all agreed that allocating socializations or directive given for the teachers are needed. The excerpt given in turn:

> "…yes a lack of socialization, such as meetings or training so that stakeholders in school or curriculum representatives and operators still have difficulty implementing the curriculum. They really have to learn independently."

This finding echoes with studies conducted by Yuhastina et al. (2020) and Wahyuni et al. (2023). These studies underlined that one remain obstacle to tackle in *Merdeka Belajar* implementation are relating with insufficient resources and a need for socialization given by the government to effectively assist the teachers in comprehending the values and implementing *Merdeka Belajar* curriculum accordingly. Yuhastina et al. (2020) stated that this shift is a difficult phase, especially for teachers as they must interpret the command to implement *Merdeka Belajar* curriculum. The implementation continue to occurred in the adaptation phase due to lack direct guidance given.

In this case, the maneuver was taken by the teachers. As represented by teachers from junior secondary level, they attempted ATM method in implementing the *Merdeka Belajar* curriculum. Particularly in designing lessons, the first thing is observing other schools implemented the new curriculum, then write down and modify it to the way they would prefer. This is completed by considering several factors including set goals of school, students' preferences in learning, availability of school facilities, etc.

> "Beforehand, my fellow teachers and I were implemented the ATM method which stands for *Amati*, *Tulis*, and *Modifikasi* (Observe, Write, Modify) to apply how *Merdeka Belajar* curriculum implemented at school."

In addition, further analysis showed that there is another leading up challenge regarding the struggle to obtain financial support. In *Merdeka Belajar* curriculum, project-based learning is encouraged to be implemented in the classroom settings. Teachers revealed that they are in force ask the students to contributing to running the project. There is a high expectation that the school can cover the expenses of the project since it is part of curriculum. The teacher uttered:

> "…the project, that is also a problem. The money for the project is the students' personal money. It is still tough."

> "Unfortunately, there is a few that is offered, whereas this is part of the curriculum. So, it should be budgeted, and the school can provide that, maybe it should be submitted in School Activity Plan and Budgeting."

Conclusion

This present study unraveled the implementation of *Merdeka Belajar* curriculum at secondary level. Major findings underlying the flexibilities on the *Merdeka Belajar* curriculum found in its practices. Both teachers from junior and senior secondary level shared mutual understanding in regard to their roles in becoming the leaders in teaching and learning for students. This study also found that teachers have the freedom to customize the teaching and learning in accordance with students' needs and interest. To support the implementation of differentiated learning crafting for students, simple administrative model has adapted to

reduce teachers' load tasks so they can focus in accommodating high quality teaching for students.

Revealing some complexities on the implementation, it is found that the shift of andragogy paradigm in *Merdeka Belajar* curriculum has been identified as the prominent challenges for teachers to cope with. Especially for junior secondary teachers since students' reliance on teachers is still notably high. The current state is mainly centered on teacher-led learning which formed the students to be more dependent. The shift of *Merdeka Belajar* curriculum has undergone difficult transition especially when the teachers are not fully ready to implement it, this is due to the fact that they are unable to pass through some phases required which are 1) Independent learning (*Mandiri Belajar*), 2) Independent changing (*Mandiri Berubah*), and 3) Independent sharing (*Mandiri Berbagi*). Moreover, it is found that there is still inadequate socialization or directive from the government regarding to the *Merdeka Belajar* curriculum. Thus, teachers now carry out orders and convert the *Merdeka Belajar* curriculum without obtaining guidance for the implementation holistically.

Taken together, these results showed that there is equitable portion of similarities found regarding of flexibility and complexity of *Merdeka Belajar* curriculum implementation in both settings. With the conjunction of previous issue, these findings suggest a role of transformational teachers in promoting and become the role model for teachers to implement *Merdeka Belajar* curriculum at school level. The essence of freedom of learning would not be able to be achieved if only relying on students to independently grasp the idea, thus the role of teachers to navigate the learning as well as embracing students-centered learning is inevitably required. The findings of this present study complement those of earlier studies. What is now needed is a cross-group study involving transformational teachers and examining their involvement on transitioning *Merdeka Belajar* curriculum implementation.

Acknowledgements

The authors express their sincere gratitude to all transformational teachers (*Guru Penggerak*) who have contributed to this study, as well as to the Department of Education and Culture in Tebo regency for their cooperation. Additionally, this study would be impossible to complete without support from Universitas Muhammadiyah Muara Bungo, thus great appreciation praised to the parties involved in completing this study.

References

Amiruddin, Nurmasyitah, P., Salim, A., Fransiska, I., Daris, K., & Suryani, K. (2023). Implementation Merdeka Curriculum of Learning to Students' Learning Activities. Jurnal Nasional Holistic Science, 3(1), 39-44.

Aryati, K. F. (2023). The Impact of Merdeka Belajar Curriculum on English Language Teaching in International Institute of Business and Tourism. EDUKASIA: Jurnal Pendidikan dan Pembelajaran, 4(2), 1805-1810.

Cohen, L., Manion, L., & Morrison, K. (2017). Research Methods in Education. Taylor & Francis Group.

Creswell, J. W. (2012). Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research. Boston: Pearson Education.

Dörnyei, Z. (2007). Research Methods in Applied Linguistics: Quantitative, Qualitative, and Mixed Methodologies. Oxford: Oxford University Press.

Dudeney, G., & Hockly, N. (2016). The Routledge Handbook Of Language Learning And Technology: Literacies, Technology And Language Teaching. London: Routledge.

Hammersley, M. (2013). What is Qualitative Research? Boomsbury Academic.

Juita, D., & Yusmaridi, M. (2021). The Concept of "Merdek Belajar" in the Pespective of Humanistic Learning Theory. Jurnal Pendidikan Luar Sekolah (PLS), 20-30.

Lai, Y.-J., May, S., & King, K. A. (Penyunt.). (2017). Research Methods in Language and Education. Springer International Publishing.

Lembong, J. M., Lumapow, H. R., & Rotty, V. N. (2023). Implementasi Merdeka Belajar Sebagai Transformasi Kebijakan Pendidikan. Jurnal Educatio, 9(2), 765-777.

Manion, L., Morrison, K., & Cohen, L. (2018). Research Methods in Education. Routledge.

Marshall, C., & Rossman, G. B. (2015). Designing Qualitative Research. London: SAGE Publication.

Maulana, I., Mortini, A. V., & Jaya, A. (2024). Merdeka Belajar Curriculum and Its Implementation in Junior High School Level. Journal of English Study Programme, 97-108.

Moriarty, J. (2011). Qualitative Methods Overview. London, UK: School for Social Care Research.

Mostafa, A.-E., & Mohammed, A.-S. A. (2022). Revolutionizing Education with Industry 5.0: Challenges and Future Research Agendas. International Journal of Information Technology and Language Studies, 6(3), 1-5.

Phillippi, J., & Lauderdale, J. (2018). A Guide to Field Notes for Qualitative Research: Context and Conversation. Qualitative Health Research, 28(3), 381–388. Diambil kembali dari https://journals.sagepub.com/

Susanto, T. T., Gumilang, S. R., Umair, Z., Adilah, K., Sawal, M. R., & Kosam, F. A. (2024). Pelaksanaan Program Merdeka Belajar Kampus Merdeka dalam Meningkatkan Kualitas Pendidikan di Indonesia. Jurnal Ilmiah Visi, 9(1), 10-22.

Tricahyati, S., & Zaim, M. (2023). English Teachers' Readiness in Implementing of 'Merdeka Belajar" Curriculum in Teaching English at Junior High School in Padang. Journal of English Language Teaching, 12(1), 97-105.

Wahyuni, S., Fitriyah, I., & Hasanah, I. (2023). The Implementation of Medeka Belajar Curriculum at English Department of Indonesian Universities. Journal of English Education and Linguistics Studies, 307-332.

Yuhastina, Parahita, B. N., Astutik, D., Ghufronudin, & Purwanto, D. (2020). Sociology Teachers' Opportunities and Challenges in Facing "Merdeka Belajar" Curriculum in the Fourth Industrial Revolution (Industry 4.0). Society, 8(2), 732-753.

Zacharias, N. T. (2012). Qualitative Research Methods for Second Language Education: A Coursebook. Cambridge Scholars Pub.

Contact email: Renda_nofriza@yahoo.com

Analysis of Factors Influencing Dropout Among Adult Learners in Korea: A Study Utilizing the Nontraditional Undergraduate Student Attrition Model

Inseo Lee, Halla University, South Korea

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This research aims to investigate the relationship among factors affecting dropout of adult college students in Korea. Nowadays, with a decline in the traditional aged students (age range of 19 to 24), there has been a significant rise in the proportion of nontraditional, older, part-time adult university students in Korea. Many of these non-traditional learners pursue higher education for career development, re-skilling or reemployment purposes. Nevertheless, a number of adult college students choose dropout due to insufficient motivation or barriers to sustain academic commitments. Despite the growing prevalence of adult learners in Korean universities, there is a limited amount of research analyzing the factors influencing dropout considering the context of Korean adult learners. Therefore, this study aims to utilize Bean & Metzer's (1985) Nontraditional Undergraduate Student Attrition Model to analyze the factors influencing student departure (stop-out and dropout) among adult learners in Korea. For the analysis, this study utilized Korean Educational Longitudinal Study (KELS) which is one of the most representative national longitudinal panel data collected by Korean Educational Development Institute. According to Bean & Metzer' (1985) and previous studies about student attrition, the influence of background characteristics, academic variables, environmental variables and academic and psychological outcomes were analyzed. The results showed that the influence of academic variables had significant influence on the dropout intention. However, the influence of student engagement or social integration had no significant effect on the dropout intention. Based on these results, theoretical and practical implications were discussed.

Keywords: Adult Learners, Dropout, Student Departure, Nontraditional Student

iafor
The International Academic Forum
www.iafor.org

Introduction

Traditionally, university students in East Asian countries such as Korea and Japan were predominantly composed of students within the traditional age range of 19 to 24. However, these days, new student population is rising in higher education: adult learners. Adult learners are also called non-traditional students, which means that students who are older than 24, or are the part-time students, or have regular jobs or dependents to take care, or some combination of these factors (Bean & Metzner, 1985). The rising demand for higher education among adult learners is caused by various reasons. As the introduction of new technologies, the industrial structure is changing, too. In addition, the flexibility in the labor market has been increased. Also, the life expectancy is increasing. Therefore, some people trying to get higher education degree for higher pay and promotion or changing their career. Some people purely pursue higher education for their personal development (Bowers & Bergman, 2016; Choi, 2006; Sogunro, 2015).

The increase of adult learners is a global phenomenon. For example, in fall 2022, approximately 2.9 million students over the age of 25 were enrolled in an undergraduate degree program in the U.S. (U.S. Department of Commerce, Census Bureau, Current Population Survey (CPS), October 2022.). In 2021, the adult participation rate in lifelong learning was 11% in the EU (Eurostat, 2024. 6.). In the case of Korea, the number of adult learners is increasing with the effort of government policies and the demand of adult learners. Recently, most of the universities in Korea are struggling to fill their admission quota. Because of low birth rate in Korea, the population around school-aged is getting declined, and now Korea is expected to be a world's oldest population in near future. Figure 1 shows that the admission quota of higher education institutions exceeds the 18-year-old population in 2020. In 2024, 169 universities in Korea failed to fill their admission quotas, which are the amount of 85% of whole 4-year institutions in Korea (Seo & Kim, 2024).

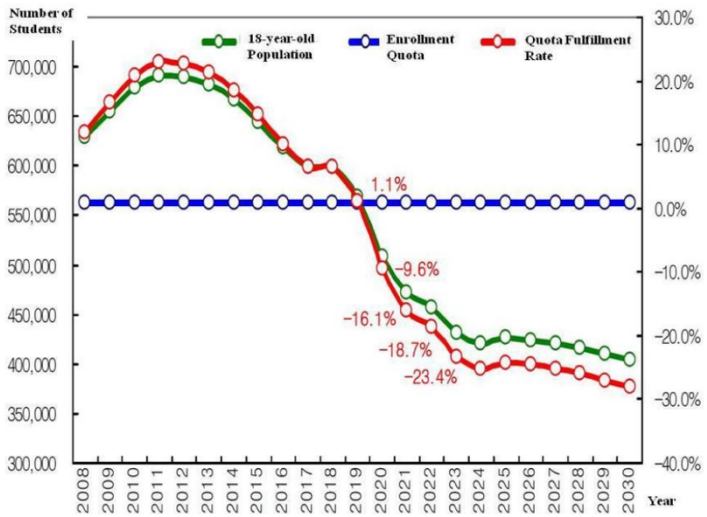


Figure 1: The Estimated Trend of University Enrolment Quota and 18-Year-Old Population.
Source: Kwon. (2013). pp. 40.

In these circumstances, reforming university curriculum and learning environment for adult learners has been discussed as an option for universities to fill admission quota. The Korean government has been promoted establishing degree program for adult learners under the policy named "Lifelong education at universities for the Future of Education (LiFE)" since early 2010s (Na, Park & Kim, 2024). In 2023, officially 49 universities (about ¼ of

universities in Korea) participated in this project (https://univ.nile.or.kr/nile/), and there are many other universities operating degree program for adult learners. Among researchers there is a consent on that now establishing a learning system to meet the demand of adult learners is the major task for most of Korean universities (Choi & Park 2018, Lee, 208; Rhee, 2021).

Although many universities are trying to provide degree program for adult learners, large number of adult learners choose dropout due to many reasons. However, to date, there has been limited research on adult learners enrolled in regular degree program in Korean context. There have been some studies about adult learners, but most studies focusing on learners enrolled in distance education institutions (Kwon et al., 2020; Kim, 2017; Yang & Jung, 2019; Shin et al., 2020; Jung et al., 2018). There is even less research on the topic of student retention of adult learners. Considering this situation, the purpose of this study is the analyze the factors influencing dropout intention among adult learners in Korea, especially focusing on Bean & Metzer's nontraditional undergraduate student attrition model.

Theoretical Backgrounds

Characteristics of Adult Learners

According to previous research, it is known that adult learners have different characteristics with traditional-aged students. Usually, adult learners have clear purpose for entering degree program than traditional aged students (Ku et al., 2015). Also, adult learners are more likely to be employed full or part time, and more likely to be parents or have dependents (Kim & Han, 2012). Because of these characteristics, usually adult learners have trouble to secure study hours (Choi, 2006; Jeong, 2019). Moreover, since the adult learners often resume 'learning' and 'studying' activities for a while, they are more likely to have difficulty with learning skills and need assistant for learning (Kim, 2022).

Student Attrition Theories and Models

For a long decade, student attrition has been one of the major concerns for researchers. Therefore, there are various kinds of theories and models that explain student attrition in higher education in various perspectives (Bean & Eaton, 2000; Cabrera, Nora & Castaneda, 1993; Pascarella & Terenzini, 1980; Tinto, 1993; Kerby, 2015). For example, Tinto's student dropout model (1993) is one of the most well-known student attrition models, with strengths in explaining student stop-out and dropout. However, including Tinto's model, most of student attrition models were developed focusing on traditional-aged students, who are recently graduated high school, under age 25, enrolled full time, and residing at or near their college.

However, considering the characteristics of adult learners, traditional student retention models, which emphasize influence of social and academic integration, student involvement, student engagement, or the influence of peer groups may not appropriate for adult learners. In other words, these factors may not important when we consider the characteristics of adult learners. In this perspective, it is required to analyze the dropout factors of adult learners, with theoretical backgrounds focusing on adult learners.

There is research that develop student attrition model for adult learners. Bean & Metzner (1986) developed student attrition model in 1986 based on the combination of turnover theories of industrial workers and student attrition models. The model is consisted of 6

categories of factors: personal backgrounds, academic variables, environmental variables, social integration variables, academic outcome, psychological outcomes, intent to leave, and dropout (see Figure 2). This model considers that environmental variables such as finance and hors of employment and academic variables such as study hours have direct and most important effect on dropout intention and dropout decision. On the other hand, this model considers that social integration variables have "possible effects" on the dropout intention and decision.

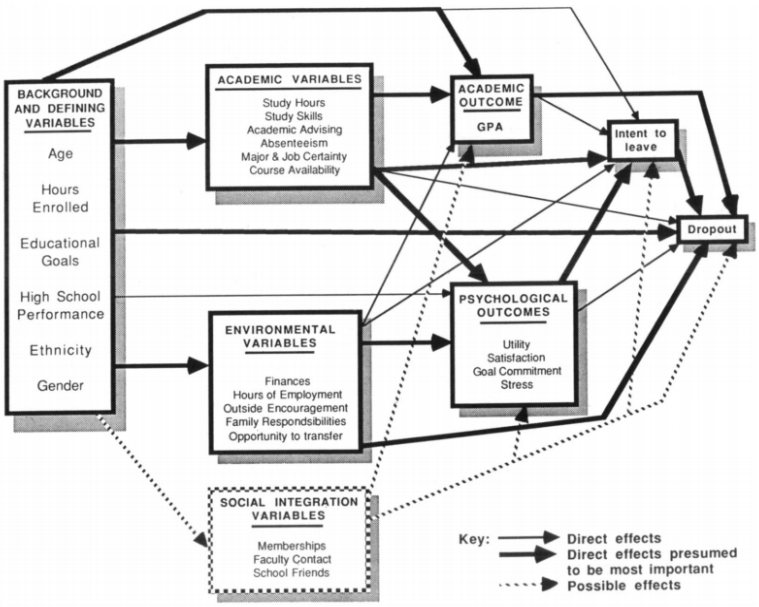


Figure 2: Analysis framework.
Source: Metzner & Bean. (1987). pp. 17.

Based on Bean & Metzner's research and other research on student attrition or student retention in and outside of Korea, this study suggested an analysis framework (see Figure 3). The framework includes institutional characteristics, student engagement, scholarship, and attend period in addition to Bean & Metzner's model, based on the literature review.

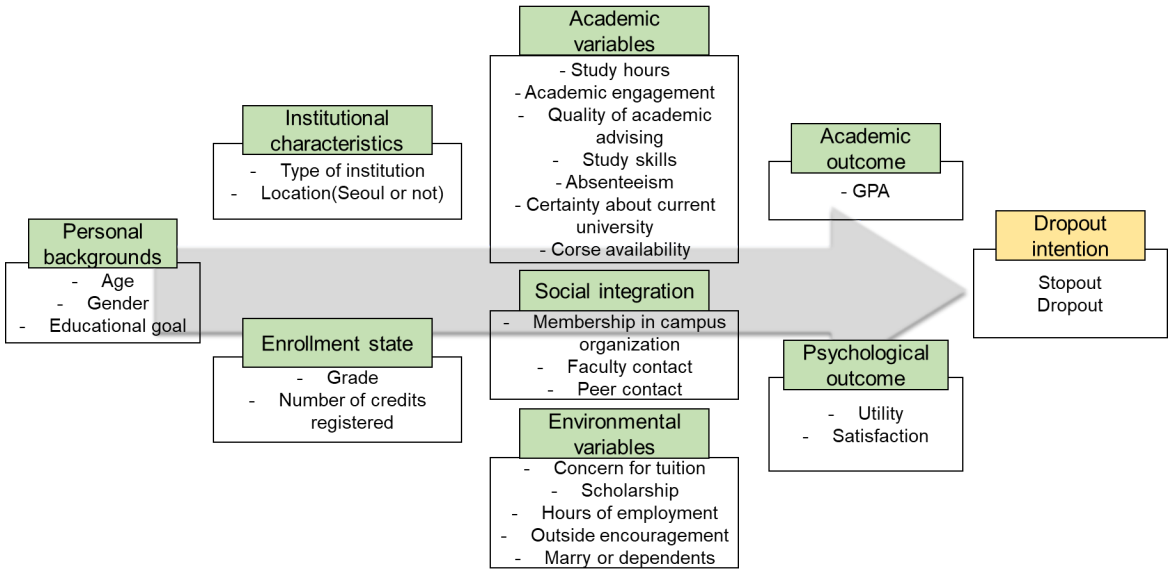


Figure 3: Analysis framework.

Methods

Data Source

The data utilized for the analysis was from KELS. KELS is one of the most representative large scale, longitudinal national survey designed for making educational policy. In 2005, 6,908 7th graders were sampled from the whole middle schools in Korea, and follow-up surveys were conducted every interval years until 2020. For this study, 9th follow-up (2018) and 10th follow-up (2020) were utilized. The samples were selected along with following steps. First, university students or university students / employees were selected. Then, students who entered their current university after 24 years old were selected. In other words, some students who entered university right after high school graduation in 2011 to 2015 and attend university until 2018 were excluded. Then the samples who attend at university outside of Korea and have too many missing values in variables were excluded. After final steps, 295 samples were included for the analysis. The sample statistics are shown in Table 1.

		N	%
Institution type	Community college	64	21.7
	4-year University	231	78.3
Age	27	210	71.2
	29	85	28.8
Attending periods	1 year	74	25.1
	2 years	112	38.0
	3 years	68	23.1
	4 years	41	13.9
Employ status	Employed	146	49.5
	Not employed	149	50.5
Marital status	Married / living with partner	17	5.8
	Not married	278	94.2
Total		295	100.0

Table 1: Sample statistics

Measurements and Analysis

The variables were measured based on the literature reviews. The list of the variables and measurements are shown in Table 2. For the analysis, validity and reliability were tested for each variable. The range of reliability was α=.702 ~ .962. Then the stepwise regression analysis was conducted for each dependent variable.

Variable name	Measurement	Mean	SD
Dependent variables			
Dropout intentions			
Stop-out intention	5 Likert scale: "I am thinking about leave college for a while and finish degree program later"	2.31	1.162
Dropout intention	5 Likert scale: "I want to dropout"	2.16	1.070

Variable name	Measurement	Mean	SD
Independent variables			
Personal backgrounds			
Age	Birth age, 0= age 27, 1= age 29	0.29	0.454
Gender	0=female, 1=male	0.42	0.495
Educational goal	Desired degree: 0=undecided, 1=high school ~ 5=PhD	2.57	1.602
Institutional characteristics			
Type of institution	0=community college, 1=4-year institution	0.78	0.413
Location	0=not Seoul province, 1= Seoul province	0.53	0.500
Enrollment state			
Grade	Number of years attending current institution	2.26	0.987
Number of credits registered	Number of credits registered in is semester	2.77	1.940
Academic variables			
Study hours	8 Likert scale for: Use time for Study, 1=never ~ 9: more than 21 hours per week	3.58	1.969
Academic engagement	Mean of 6 questions such as “asking questions in the class”	2.98	0.720
Quality of academic advising	Mean of 2 questions such as “Professors are enthusiastic about the education of students”	3.43	0.728
Study skills	Mean of 2 recoded questions such as “Classes and assignments felt difficult”	1.70	0.728
Absenteeism	Mean of 3 questions such as “skip classes for no reason”	2.79	0.823
Certainty about current university	Mean of 2 questions such as “I am satisfied with the decision to attend my current university”	3.32	0.766
Course availability	5 Likert scale: “There are various courses that students want”	3.16	0.929
Social integration			
Membership in campus organization	Use time for campus organization, 1=never ~ 9: more than 21 hours per week	1.42	0.948
Faculty contact	Mean of 6 questions such as “How often do you exchange greeting with professors?”	2.69	1.400
Friend contact	Mean of 6 questions such as “How often do you have conversation about personal matters with friends?”	2.63	1.459
Environmental variables			
Concern for tuition	5 Likert scale: “anxiety over tuition fees”	0.27	0.444
Scholarship	0=no scholarship in the previous semester, 1=earn scholarship in the previous semester	2.03	0.951
Hours of employment	working hours per week	2.19	2.332
Outside encouragement	Mean of 4 questions such as “Parental involvement in course selection”	2.04	0.943
marry	0=not married, 1=married	0.03	0.181
Academic outcome			
GPA	Average grade level	3.20	0.992
Psychological outcomes			
Utility	Mean of 2 questions such as “I found out why I am attending college and what I want to get”	3.38	0.718
satisfaction	Mean of 5 questions such as “satisfaction about the quality of class”	3.28	0.720

Table 2: List of the variables and measurements.

Results

The results of the analysis were shown in Table 3 and Table 4. The adjusted R squares were .283 and .356 for each dependent variables, which were decent level of goodness-of-fit.

Category	Variables	DV: Stop-out		
		B	s.e	β
	(constant)	3.376***	.989	
Personal backgrounds	age	.095	.204	.037
	Gender	- .313	.167	-.129
	Educational goal	.001	.053	.002
Institutional characteristics	Type of institution	.351	.208	.119
	location	- .056	.176	-.023
Enrollment state	Grade	.008	.091	.006
	Number of credits registered	- .210***	.057	-.253
Academic variables	Study hours	- .090	.048	-.147
	Academic engagement	.070	.138	.042
	Quality of academic advising	- .336*	.148	-.206
	Absenteeism	.020	.113	.013
	Study skills	- .334**	.108	-.225
	Certainty about current university	.329*	.143	.215
	Course availability	.171	.099	.140
Social integration	Membership in campus organization	- .035	.086	- .030
	Faculty contact	.167	.100	.184
	Friend contact	.007	.093	.009
Environmental variables	Scholarship	- .177	.170	- .072
	Concern for tuition	.144	.088	.115
	Hours of employment	.066	.043	.128
	Outside Encouragement (parent's care)	.149	.090	.119
	marry	.662	.449	.097
Academic outcome	GPA	- .081	.100	- .071
Psychological outcome	Utility	- .112	.156	- .069
	satisfaction	- .092	.174	- .059
R^2=.379, adjusted R^2=.283				

Table 3: Factors Affecting Stop-out intention of Adult Learners.

Category	Variables	DV: Dropout		
		B	s.e	β
	(constant)	3.981***	.816	
Personal backgrounds	age	.222	.168	.098
	Gender	.006	.138	.003
	Educational goal	.008	.043	.011
Institutional characteristics	Type of institution	.063	.172	.024
	location	- .212	.145	-.102
Enrollment state	Grade	.029	.075	.028
	Number of credits registered	- .103*	.047	-.143
Academic variables	Study hours	- .128**	.039	-.239
	Academic engagement	.108	.113	.075
	Quality of academic advising	- .184	.122	-.129
	Absenteeism	.060	.093	.044
	Study skills	- .272**	.089	-.210
	Certainty about current university	.010	.118	.007
	Course availability	.036	.081	.034
Social integration	Membership in campus organization	- .064	.071	- .063
	Faculty contact	.117	.082	.147
	Friend contact	.062	.077	.085
Environmental variables	Scholarship	- .260	.140	- .122
	Concern for tuition	.055	.072	.050
	Hours of employment	.008	.035	.018
	Outside Encouragement (parent's care)	.194**	.074	.179
	marry	.257	.371	.043
Academic outcome	GPA	- .201*	.083	- .201
Psychological outcome	Utility	- .129	.129	- .092
	satisfaction	.053	.144	.039
R2=.442, Adjusted R2=.356				

Table 4: Factors Affecting Dropout intention of Adult Learners.

For stop-out intention, number of credits registered in previous semester had negative effect on stop-out intention. Quality of academic advising and Study skills had negative effect, too. However, certainty about current university had positive effect on stop-out intention. For dropout intention, number of credits registered previous semester decreased dropout intention. Study skills also decreased dropout intention. From these results, it is possible to conclude

that adult learners who have enough time for taking many credits and have time and energy to commit on study does not have intention to leave college.

Social integration and environmental variables, academic and psychological outcomes had no significant effect on stop-out intention. Social integration was also not significant for dropout intention, and among environmental variables, outside encouragement, especially parent's care about college life had significant effect on dropout intention. In the previous research, if there's someone who cares about adult learner's study, it is more likely to continue their degree program. However, in this case, parent's care for 30-around-aged adult learner could be a burden. Lastly, high GPA had significant effect to decrease dropout intention.

Conclusion

Based on the results, some implications could be discussed. First, for the adult learner's retention, academic commitment is the most important factors. The level of difficulty about understanding the class contents and academic commitment had significant influence on both stop-out and dropout intention. Also, the time for taking courses and study, and academic performance were the significant predictor of student attrition. It is possible to conclude that the academic commitment is the most important factors for adult learner's retention. In addition, for adult learners, academic advising of professors is critical for retention. The results showed that the quality of academic advising (professors' care and interest about students, emphasizing class and student learning) significantly decreased the level of stop-out intention.

However, for adult learners, academic engagement and social integration had no significant influence on stop-out and dropout intention. The psychological outcomes such as satisfaction and utility had no significant effect on both stop-out or dropout intention. Academic and social engagement, and satisfaction is one of the most powerful predictors for traditional-aged student retention. However, since adult learners have more practical and clear purposes for attending college (Kim et al., 2013), it could be inferred that engagement and psychological status are not important standards for dropout decision (Bean & Metzner, 1987).

Some theoretical and practical implications could be suggested based on the results of this study. First, it is required to develop student attrition model for adult learners in college, considering their characteristics. In most cases, adult learners go to college for practical and clear purposes compared to traditionally aged students. Therefore, it could be referred to that the quality of curriculum and the lectures, the quality of academic advising are more important than social integration on campus. In addition, adult learners usually taking courses while they have a regular job or take care of dependents, so they have limited time and interest for socializing on campus. More research is required to figure out how to increase adult learners' retention, considering the characteristics of adult learners and their motivation.

Second, future studies need to measure 'dropout decision', rather dropout intention. It is well known that dropout intention is the most powerful predictor of dropout decision (Metzner & Bean, 1987; Tinto, 1993). Therefore, it is meaningful to measure dropout intention, because it is possible to prevent dropout behaviours before the students decide to leave college. However, for developing more precise student attrition model, future studies need to include actual dropout decision.

For practical implication, the universities which operating curriculum for adult learners should provide support for their learning. Most of adult learners are having trouble with learning, because usually they left official education for a while. Usually, student service programs such as learning community or peer mentoring requires additional time commitment and makes students to stay on campus longer. However, adult learners had not enough time to participate those programs. It is required to develop and provide learning assistant program especially designed for adult learners. Considering this situation, it is essential to develop and provide appropriate learning assistant program for adult learners. For example, learning assistant programs such as “how to use time efficiently for reading materials while you take care of your dependents” could be helpful for adult learners.

References

Astin, A. W. *Preventing. students from dropping out*. San Francisco: Jossey-Bass, 1975.

Bean, J. P., & Eaton, S. B. (2000). A psychological model of college student retention. *Reworking the student departure puzzle*, *1*(48-61), 12.

Bean, J. P., & Metzner, B. S. (1985). A conceptual model of nontraditional undergraduate student attrition. *Review of educational Research*, *55*(4), 485-540.

Bowers A., Bergman M. (2016). Affordability and the return on investment of college completion: unique challenges and opportunities for adult learners. *The Journal of Continuing Higher Education*, *64(3),* 144-151.

Cabrera, A. F., Nora, A., & Castaneda, M. B. (1993). College persistence: Structural equations modeling test of an integrated model of student retention. *The journal of higher education*, *64*(2), 123-139.

Choi, Un-Shil (2006). An Analytical Study on Conditions and Nature of Adult Learners' Participation for Lifelong Education. *Journal of Lifelong Learning Society*, *2(1),* 1-35, 10.26857/JLLS.2006.05.2.1.1.

Choi, Y. J., & Park, G. J. (2018). The Study on the Satisfaction of the Education programs: Focus on Adult Learner at the Lifelong Education Institutes of University. *Journal of the Korea Academia-Industrial cooperation Society*, *19(10)*, 361-367.

Jeong Chan-gil, Bae Eul Kyoo, & Park Sang O. (2018). Mediating effects of self-directed learning ability on the relationship between types of learning participation motivation and level of learning flow of adult learners in a distance university. *Journal of Education & Culture*, *24(5)*, 155-177.

Jeong, H. (2019). Exploring the Factors Affecting Participation Intention of Work-Learning Parallel Adult Learners in Continuing Education: Focusing on the Structural Relationship between Normative Beliefs, Motivation to Comply, and Attitudes. *Journal of Lifelong Learning Society*, *15(2)*, 85-108, 10.26857/JLLS.2019.5.15.2.85.

Kerby, M. B. (2015). Toward a new predictive model of student retention in higher education: An application of classical sociological theory. *Journal of College Student Retention: Research, Theory & Practice*, *17*(2), 138-161.

Kim, Insook (2022). Competency of Adult Learners at Lifelong Education System of University. *The Journal of Education Consulting & Coaching*, *6(2)*, 5-26.

Kim, Young Min. (2017). Phenomenological Approach to the Meaning of Learning Experience on Adult Learner in Distance University. *The Journal of Educational Research, 15(1)*, 55-76.

Kim, Young Mi. & Han, Sang Hoon. (2012). A Structural Analysis of Adult Learner`s Self-concept, Participation Motivation and Degree of Participation in Learning on Lifelong Learning Outcomes. *CNU journal of educational studies, 33(2)*, 123-143.

Ku, Ju-Hyeong, Han, Sang-Hun, & Kang, Hun. (2015). A Structural Analysis of Adult Learners' Lifelong Education Consciousness, Participation Motivation, Learning Outcome. *Journal of the Korea Academia-Industrial cooperation Society, 16(7)*, 4537-4548.

Kwon, Ki-Seok. (2013). Government Policy and Internationalisation of Universities: The Case of International Student Mobility in South Korea. *Journal of Contemporary Eastern Asia, 12*. 35-47.

Kwon, S. A., Kim, M. J., Seo, H. J., & Kim, M. J. (2020). A logistic regression analysis on dropout of adult learners in distance higher education. *Lifelong Learning Society, 16*(4), 149-169.

Lee, H. (2008). University continuing education for lifelong learning in Korea. *Journal of Adult and Continuing Education, 14(2)*, 190-202.

Pascarella, E. T., & Terenzini, P. T. (1980). Predicting freshman persistence and voluntary dropout decisions from a theoretical model. *The journal of higher education*, *51*(1), 60-75.

Rhee, Byung Shik. (2021). Linking Higher Education with Lifelong Education: Problems and Solutions. *The Education Research for Tomorrow, 34(3)*, 1-25.

SEO, Ji-Won & KIM. Ji-Ye. (2024, February 26). University spots left open as Korea's young population diminishes. *Korea JoongAng Daily*.

Shin, Mijung, Jung, Chilhwa & Woo, Heuijeong. (2020). A Study on Effect of Learner Characteristics for Adult Learners in Distance University on Learning Outcome: Centered on Mediating Effect of Motivation and Impeding Factors in Learning Participation. *Journal of Lifelong Learning Society, 16(3)*, 177-204, 10.26857/JLLS.2020.8.16.3.177.

Sogunro, O. A. (2015). Motivating factors for adult learners in higher education. *International Journal of Higher Education*, *4*(1), 22-37.

Metzner, B. S., & Bean, J. P. (1987). The estimation of a conceptual model of nontraditional undergraduate student attrition. *Research in higher education*, *27*, 15-38.

Na, Eun-chang, Park, Sang-woo, & Kim, Ga-yeon. (2024). A Keyword Network Analysis of University Lifelong Education Systems: Focusing on the Promising Practices of Lifelong Education for the Future Education (LiFE). *CNU journal of educational studies, 45(2)*, 141-165.

Yang, Youjung, & Jung, Jiyoung. (2019). Development of Learning Process and Learning Outcomes Scale for Adult Learner in Distance University. *Journal of Education & Culture, 25(1),* 179-201.

Contact email: inseol373@gmail.com

Enhancing Traditional Textbooks Using the Task-Based Approach: The Case of Teaching Turkish to Greek L1 in Cyprus

Katerina Antoniou Karantoki, University of Cyprus, Cyprus

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study examines the challenges faced by teachers of Turkish in Cyprus due to the mandatory use of traditional textbooks and explores the potential impact of integrating Task-Based Language Teaching (TBLT) with the prescribed textbooks. Literature suggests that Turkish language textbooks often lack the integration of current foreign language acquisition studies and methodological advancements (Aygen, 2012; Özyürek, 2009), with a need for more comprehensive resources that address all four language skills (Chmielowska & Dikici, 2013). Despite these shortcomings and challenges, traditional textbooks remain compulsory for teaching Turkish as a foreign language in State Institutes in Cyprus. This study investigates how combining the TBLT approach with prescribed textbooks can enhance speaking skills and foster active participation of Greek L1 learners of Turkish in Cyprus. The instructor altered traditional activities, such as filling in the blanks, reading, writing, and listening exercises, into tasks that encouraged authentic communication and language use. Utilizing a mixed-methods approach, the research involved pre- and post-course questionnaires and observational assessments. The findings indicate that students exhibited increased engagement, improved speaking skills, and greater communicative participation when tasks were introduced. This research provides valuable insights for educators seeking to implement task-based approach within the constraints of traditional textbooks, adding to the literature on the effective integration of innovative methodologies in traditional educational settings and ultimately aiming to achieve better learning outcomes.

Keywords: Foreign Language Teaching (FLT), Traditional Textbook, Teaching Turkish as a Foreign Language (TTFL), Task-Based Language Teaching (TBLT)

iafor
The International Academic Forum
www.iafor.org

Introduction

In Cyprus, teachers of Turkish at the State Institute of Further Education are required to use the "Gökkuşağı Türkçe" set of textbooks, which are characterized by a traditional approach to language teaching. These textbooks primarily focus on grammar and lack comprehensive material that effectively balances all language skills or promotes authentic language use. A teacher questionnaire conducted before the study revealed that one of the significant challenges educators face is the traditional nature of these prescribed textbooks, which are often inadequate for teaching the four essential language skills: reading, writing, listening, and speaking.

Despite the growing interest in teaching Turkish as a foreign language (Ipek & Egilmez, 2023), Turkish is less widely spoken globally than English, resulting in fewer available teaching materials (Tosun, 2013a). Additionally, there is a shortage of studies focused on developing teaching methods and materials that cater to the unique structure and characteristics of the Turkish language (Demir & Açık, 2011). Research indicates that Turkish textbooks often do not incorporate recent advancements in foreign language acquisition and methodological developments (Aygen, 2012; Özyürek, 2009). Furthermore, many available resources are inadequate and do not meet the specific needs of language programs, forcing teachers to spend significant time creating supplementary materials (Kuruoglu et al., 1996). The limited availability of authentic online language content for less commonly taught languages like Turkish further highlights the need for more focused efforts to develop effective online materials (Pala, 2005).

Given Turkish's status as an official language in the Republic of Cyprus along with Greek, and the growing interest in learning it, research on TTFL in Cyprus remains limited. Existing studies focus on students' motivation, their negative attitudes towards Turkish due to historical factors, and the use of intercultural education to address these attitudes (Rampton et al., 2014). Recent literature also explores students' attitudes towards technology in Turkish language teaching (Pelekani, 2016) and the application of technological tools in low-tech contexts (Antoniou et al., 2016). However, research on TTFL methods is limited and does not sufficiently address the challenges posed by traditional prescribed textbooks and the lack of materials and practical solutions.

The gap identified in this research is the challenge faced by Turkish language teachers in Cyprus who are required to use traditional textbooks that do not adequately address learners' needs, particularly in developing speaking competence. The study emphasizes the lack of research and practical solutions for integrating modern teaching methods, such as TBLT, with traditional materials to improve language learning outcomes. To address this gap, the researcher, who also served as the instructor, designed and delivered task-based lesson units over six months, following concepts proposed by Ellis (2003; 2018), Long (2015), and Willis (1996) under the project TBLT-Turkish L2 for Greek L1. This dual role allowed for the direct implementation of TBLT, providing valuable insights and a hands-on approach crucial for evaluating the effectiveness of this method in overcoming specific teaching challenges. By exploring the impact of this blended approach, the research aims to offer practical guidance for educators working within the constraints of prescribed materials.

Problem Statement

This study identifies the challenges that teachers of Turkish in Cyprus face due to the mandated use of prescribed textbooks. Given that educators must follow the Ministry of Education's guidelines, the study suggests and examines the TBLT approach to address these challenges. Two research questions guide the study:

1. What are the potential benefits of integrating TBLT with traditional Turkish language textbooks?
2. How does the combination of TBLT and traditional textbooks impact the communicative competencies of Greek L1 learners of Turkish?

To explore these questions, this research delves into the existing literature on foreign language teaching textbooks, TBLT, and the challenges of teaching speaking skills, laying the groundwork for understanding the potential of this blended approach.

Literature Review

Foreign Language Teaching Textbooks

This study aims to explore the current literature on traditional textbooks in FLT, TBLT, and the development of speaking competence in teaching Turkish as a foreign language to Greek L1 speakers. The goal is to raise awareness of the challenges teachers of Turkish face in Cyprus and suggest adopting the TBLT approach to meet students' needs and learning objectives.

Textbooks are vital to most language programs (Richards, 2001), as their content and design significantly influence classroom instruction (Waltermann & Forel, 2015). They are crucial in meeting classroom needs and objectives (Hutchinson & Torres, 1994). Despite technological advancements, Garinger (2002) noted that the use of textbooks continues to grow due to their ability to facilitate teaching in various ways. A textbook can serve multiple roles, such as a core resource, a source of supplemental material, an inspiration for classroom activities, and even the curriculum itself (Garinger, 2002). Even though there is no perfect textbook (Grant, 1987), they can provide direction and support to teachers, particularly those who are inexperienced or who need more confidence, creativity, or imagination (Cabrera, 2014). Prescribed textbooks, on the other hand, can limit a teacher's creativity and autonomy in designing course content (Lau et al., 2018), and they can encourage strict adherence to the suggested content, discouraging teachers from modifying materials (ibid).

To avoid that, textbooks must undergo thorough evaluation as they guide teachers in achieving learning objectives (Papajani, 2015) and help them understand the purpose and value of their teaching materials (Robinson, 1991). According to Panday-Shukla (2024), traditional textbooks can be standardised, which means they offer a one-size-fits-all approach to teaching. They are often expensive, infrequently updated, and inflexible for individual class needs, and these limitations drive many teachers to seek additional authentic materials to support their course objectives effectively. Jin and Cortazzi (2011) note that traditional approaches to teaching second or foreign languages have existed for many years, and they include explicit grammar explanations, bilingual vocabulary lists, translation exercises, and a focus on reading literary texts while being widely criticised for not effectively developing learners' communication skills.

Textbooks for Teaching Turkish as a Foreign Language

Limitations in the field of TTFL include challenges with textbook materials (Er et al., 2012; Alyılmaz, 2010; Arslan & Adem, 2010; Demir & Açık, 2011; Derman, 2010; Doğan, 1989). However, efforts to create and analyse textbooks have emerged with the institutionalisation of teaching Turkish as a foreign language (Ipek & Eğilmez, 2023). Research on the "Gökküşağı Türkçe" textbooks by Göçer (2007) has found that they include a variety of unconventional question types, such as crosswords, hidden words, dialogues, classification, sentence usage, rearrangement, concept maps, answering questions, providing reasons, creating questions for given answers, and interpreting pictures and graphs. These questions target all basic language skills in comprehension and expression areas. The questions' variety, appropriateness, and comprehensibility are suitable for the target audience's level, with a focus on application and evaluation levels. While the activities and questions cover all cognitive levels, they mainly concentrate on the application and evaluation levels.

Analysis of the Prescribed Textbook

By analysing the textbook, teachers can gain valuable insights into the underlying approach used in the learning process (Firiady, 2018). The textbook "Gökkuşağı Türkçe," prescribed by the State Institutes of Further Education in Cyprus and used in this study, follows a structured chapter format with six sections: the first focuses on vocabulary, the following four on basic language skills, and the final section concludes with an assessment.

In the "Words" section, students must listen to audio and write the corresponding word and sentence under each picture. The "Reading and Comprehension" section asks students to read a text, determine whether statements are true or false, and answer comprehension questions. Listening activities involve listening to audio, answering questions, or identifying true or false statements. For speaking, students engage in activities that involve repeating a dialogue and creating a new one based on the given example. The writing section includes answering questions related to the topics. The final section, "Evaluation/Assessment," includes exercises such as matching correct answers, true or false questions, filling in blanks, arranging words in the correct order, translation tasks, and repetition drills.

Overall, the textbook contains mechanical, form-based exercises that do not encourage independent language usage or the development of language skills. The provided dialogues are limited and too contrived to be used in real-life situations. The topics and pictures do not align with today's reality and are outdated. Furthermore, learners are not provided with decision-making opportunities, and the textbook lacks the interactive and communicative tasks necessary for real-life language use and active student engagement.

Defining a "traditional language textbook" proved challenging, as the term is not clearly defined in the literature. However, the researcher described the textbook in this study as "traditional" because it primarily employs conventional language teaching methods. These methods focus on the explicit instruction of grammar, vocabulary, and language rules, typically following a linear progression that emphasises reading and writing over speaking, listening, or interactive elements. The activities, such as fill-in-the-blank, translation and repetition, do not encourage interaction or authentic language use, further supporting this classification.

This textbook analysis serves as an exploration by the teacher and researcher to identify the methods, approaches, and potential contributions this book can offer to the learning process. The focus is on how the textbook can be integrated into teaching, particularly enhancing oral communicative skills, while considering its strengths and limitations. It is also crucial to note, as Simu (2019) highlights, that textbooks can quickly become outdated due to evolving teaching methods and curriculum changes, necessitating regular updates or adjustments. This emphasises the importance of teachers being able to evaluate and adapt their textbooks to align with current curricula and effectively meet students' needs.

Speaking Competence

The primary goal of language teaching and learning is to enable effective communication in another language (Liddicoat, 2008). Consequently, the main focus of language teachers is to develop learners' ability to use the language for communicative purposes (Dumančić, 2011). The communicative approach in language teaching emphasizes language as a crucial tool for communication, aiming to build communicative competence (Maryslessor et al., 2014). Suban (2021) defines speaking as an interactive process that involves creating and sharing meaning through verbal and non-verbal symbols, encompassing the production, reception, and processing of information across various contexts. Speaking skills hold significant importance in language education, as highlighted by Stepani (2016), Egan (1999), and Fazio & Cremasco (2021). Proficiency in speaking is particularly complex and challenging for second language learners, especially in conversation (Inayah, 2015). Teaching speaking in a FL context is even more challenging than in Second Language (SL) or native language settings due to the limited opportunities learners have to practice the language effectively, as noted by Suban (2021). The classroom often lacks sufficient opportunities for speaking compared to natural communication environments, further complicating the achievement of proficiency (Aleksandrzak, 2011).

In traditional language teaching methods, speaking skills were often overlooked in favour of grammar rules and translation (Alonso, 2014). However, teaching speaking is crucial in second language acquisition, and teachers play a vital role in fostering meaningful communication within the classroom (Alonso, 2014). Given that speaking is the most challenging skill to master for various reasons (Bahadorfar & Omidvar, 2014; Leong & Ahmadi, 2017), textbooks must incorporate authentic speaking tasks reflecting real-life scenarios and include spoken interaction activities, as outlined by the CEFR criteria, to enhance their effectiveness and realism (Ipek & Eğilmez, 2023). Textbooks often need adaptation to fit the specific needs of a learning group, which can be challenging for teachers already managing tight schedules (Simu, 2019) but still, the teacher is responsible for modifying, adapting, and aligning these activities with student needs.

TBLT Approach and Speaking Competence

TBLT emerged as a response to the limitations of traditional language teaching methods (Hismanoglu & Hismanoglu, 2011). It can be seen as a variant of Communicative Language Teaching (CLT), which emphasizes purposeful activities and tasks to facilitate communication and meaning (Yildiz, 2020). TBLT incorporates educational and psychological elements derived from Second Language Acquisition (SLA) theories, emphasizing the importance of experience, relevance, and engagement with authentic problems (Lai & Li, 2011). Numerous studies have explored the effectiveness of TBLT and its impact on language acquisition (Abrams, 2019; Ellis, 2009b; Hawkes, 2011; Shintani,

2011, 2015). While scholars share a common interest in TBLT's communicative and learner-centred nature, variations exist in perspectives and approaches to its implementation (Ellis, 2017; Long, 2015; Skehan, 1996). However, a consistent aspect of TBLT is its emphasis on students utilizing natural language and promoting language acquisition through meaningful tasks.

Izadpanah's study (2010), presents TBLT as an approach, rather than a method, that offers students real-world tasks to create a purposeful and natural context for language study. It recognizes the importance of student-centred learning environments by considering motivation, attitudes, beliefs, anxiety, and learning styles. Richards et al. (2003) discuss TBLT as an instructional approach that organizes the curriculum and syllabi around activities and tasks rather than solely focusing on grammar or vocabulary.

The central element of TBLT is the task, a concept refined over the past twenty years through empirical research in classroom settings. Definitions of tasks vary, reflecting perspectives ranging from real-world applications to pedagogical approaches (Izadpanah, 2010). Willis (1996) defined a task as an activity in which learners use the target language for a communicative purpose to achieve a specific outcome. These tasks involve productive and receptive skills and aim to generate real-world language usage (Ellis, 2003).

TBLT framework, introduced by Willis (1996), integrates a three-phase process: pre-task, task cycle, and post-task (language focus). The pre-task phase introduces the topic and activates relevant language. The task cycle involves performing tasks, planning, and reporting, focusing on improving language accuracy. The final phase, language focus, emphasizes form-focused work, analyzing and practising language features. This framework shifts the emphasis from fluency to accuracy, challenging traditional accuracy-to-fluency approaches.

According to Ellis (2017), task-based pedagogy and task-based research are deeply interconnected. He explained that the close relationship between these two fields is unique in language teaching, as implementing TBLT in real classroom settings has generated valuable questions for educators and researchers. These practical classroom experiences inform and drive research, making the connection between pedagogy and research powerful in this area.

The teacher, who also served as the researcher, identified a gap between the students' need to develop speaking competence and the textbook's lack of opportunities for authentic language use. Drawing from the literature, the teacher chose to implement TBLT to address the student's needs and generate practical insights for other educators facing similar challenges with traditional textbooks, offering them strategies to create authentic language use opportunities in their classrooms.

Evaluating Speaking Competence

Assessing speaking skills presents challenges due to the need to evaluate interactive and fleeting behaviours, which vary across cultural and situational contexts, complicating standardized assessment (Mead, 1980). Students face various speaking tasks, and the Massachusetts speaking test evaluates Delivery, Organization, Content, and Language on a four-point scale. Raters assess how well speakers meet task requirements objectively.

Speaking skills are often regarded as the most crucial component of a foreign language course. However, the challenges in assessing oral abilities often lead teachers to use inadequate oral tests or, in some cases, to refrain from testing speaking skills (Knight, 1992). Bachman (1990) suggested that to ensure test scores are reliable and the use of tests is valid, it is essential to clearly define the abilities intended to be measured and precisely outline the conditions and procedures for eliciting and observing performance. In this context, rubrics are essential for validating speaking skills, as they offer a structured and systematic method for assessing and evaluating performance, ensuring that the assessment process remains fair, consistent, and objective (Kalmuratova, 2023).

Methodology

For the research purposes the researcher adhered to the prescribed curriculum for the B1 level course, using the "Gökkuşağı Türkçe" textbooks as the primary instructional material. However, the chapters were modified by following concepts proposed by Ellis (2003; 2018), Long (2015), and Willis (1996) leading to the design and implementation of task-based lesson units.

Research Design and Data Collection

The study utilized an action research approach with a mixed-methods design, incorporating open-ended questionnaires, observations, semi-structured focus groups, and discussions. Data collection spanned six months, with two 90-minute lessons per week.

To answer the research questions, both qualitative and quantitative data were gathered. Primary data were collected through first-hand experiences, which were deemed more reliable and authentic (Kabir, 2016). To understand the challenges they face in their teaching practices, a Google Form questionnaire was administered to 22 teachers of Turkish working in the Republic of Cyprus. The data collected from this questionnaire included both quantitative and qualitative insights.

Additionally, qualitative data were collected from questionnaires distributed to seven Greek-speaking students enrolled in a B1 Turkish course at the State Institute of Further Education. These students participated in the study over six months. The questionnaires were distributed before, mid-phase, and after the study's completion. The data were complemented by classroom observations and rubric evaluations, which were conducted throughout the course to assess learners' participation, use of the target language, speaking skill and overall engagement. Rubrics were used to evaluate learners' speaking abilities during classroom activities, focusing on their ability to use the language in real-life scenarios, fluency, and willingness to communicate.

The instructor-researcher followed the prescribed curriculum set by the Ministry of Education for B1 (Level 3) Greek-speaking adults learning Turkish in Cyprus, redesigning the prescribed chapters using the task-TBLT approach, which aligned with the concepts proposed by Ellis (2003; 2018), Long (2015), and Willis (1996). The task-based lessons were designed to align with the textbook content while incorporating scenarios that reflected authentic language use and scenarios, such as going to the market, eating at a restaurant, taking a taxi, and going to the airport, while still adhering to the prescribed guidelines and content of the "Gökkuşağı Türkçe Ders Kitabı 2 and 3," chapters 9-16 and 1-4 respectively.

Criteria	1 - Needs Improvement	2 - Fair	3 - Satisfactory	4 - Good	5 - Excellent
Fluency	Struggles to express ideas; frequent pauses and hesitation.	Expresses ideas with some pauses; limited flow in speech.	Expresses ideas with occasional pauses; speech is generally smooth.	Expresses ideas smoothly with minor hesitations.	Speaks fluently with minimal to no hesitation; speech flows naturally.
Accuracy	Frequent errors in grammar and vocabulary that hinder understanding.	Several errors in grammar and vocabulary, some of which may impede understanding.	Some errors in grammar and vocabulary, but they do not significantly affect understanding.	Minor errors in grammar and vocabulary that do not affect overall communication.	Accurate use of grammar and vocabulary with very few or no errors.
Pronunciation	Pronunciation often makes it difficult to understand the speaker.	Pronunciation is occasionally unclear, affecting understanding.	Pronunciation is generally clear, though some words may be difficult to understand.	Pronunciation is clear with only a few minor issues.	Pronunciation is clear and accurate; the speaker is easily understood.
Interaction	Rarely engages in conversation; limited responses to others; avoids interaction.	Engages in conversation but with limited ability to respond appropriately; relies heavily on others to keep it going.	Participates in conversation with occasional prompting; responds to others with some hesitation but generally engages.	Actively participates in conversation, responds to others with minimal hesitation, and helps maintain the discussion.	Fully engages in conversation, responds confidently and appropriately, and helps to lead and maintain the discussion.
Grammar Objectives	Rarely uses the target grammar structure correctly; frequent mistakes.	Uses the target grammar structure occasionally, but with many mistakes.	Uses the target grammar structure correctly sometimes, with noticeable mistakes.	Mostly uses the target grammar structure correctly, with minor mistakes.	Consistently uses the target grammar structure correctly and effectively in conversation.

Table 1: Rubric for Speaking Skill Assesment

Setting and Participants

The study involved seven Greek L1 adult learners of Turkish enrolled in the B1 level (Level 3) at the State Institute of Further Education in Cyprus. Participants were selected based on their enrollment in the B1 level Turkish course and their willingness to participate in the study. Lessons were held twice a week, with each session lasting 90 minutes. The group consisted of five learners over the age of 47 and two in their mid-30s. Although the participants were motivated by various reasons, they all stated that they were learning Turkish for daily communication and use.

Example of Lesson

An example of this approach can be seen in how the instructor adapted Chapter 14 of Textbook 2, titled "What Are Bad Habits." The original chapter included activities such as listening and matching words to pictures, reading comprehension with true or false questions, answering questions based on example answers, fill-in-the-blank exercises for listening, repeating dialogues for speaking, and constructing similar sentences. The grammar focus of this chapter was conditional tenses. The instructor retained the topic, key expressions,

vocabulary, and grammar objectives but redesigned the lesson using TBLT principles, which will be detailed in the subsequent sections.

Pre-Task	Task Cycle	Post-task
Classroom Preparation for the Teacher: Set up an exhibition with pictures and signs illustrating various bad habits (smoking, gambling, eating junk food, fighting, gossiping, alkohol etc.) along with symbols related to these habits and warnings or prohibition signs (e.g., "No Smoking," "No Littering," etc.) **Task:** In groups go around and discuss if you have any bad habits. Identify whether their habits match those shown in the pictures	**Task 1:** Each group selects a card with a bad habit and discusses the consequences of that habit. Then present your findings to the class. Feel free to write them in points, take notes or create a presentation. **Task 2:** (example of a scenario) Your friend loves smoking but you want to convince them to quit. Share with them the consequences and then present them in the classroom.	**Task:** You are a parent with a child who has just started college and want to warn them about the dangers of bad habits. You have word cards and pictures illustrating good habits. Use these materials to create a short presentation or discussion. Explain how adopting good habits, such as regular exercise, healthy eating, time management, and honesty, can protect them from falling into harmful habits like smoking, procrastination, and unhealthy eating. Emphasize the benefits of maintaining these positive habits for their overall well-being and success in college. Present your discussion in the classroom.

Table 2: Example of a TBLT Lesson Unit Applied in the Classroom

Classroom Observations

During the initial lessons, the instructor observed that students were uncomfortable, particularly with the exclusive use of the target language, Turkish. Despite being at the B1 level, students struggled to express themselves and often responded in Greek, questioning the effectiveness of the approach. Initially, the learning environment felt insecure for them. However, as the instructor established a routine of informal conversation at the beginning of each lesson, students gradually became more comfortable. By the fourth lesson, they began preparing notes to share in Turkish and showed increased willingness to participate, even if their responses were imperfect. Although some students continued to express a preference for traditional methods like translation or fill-in-the-blank exercises, they increasingly focused on communication over accuracy. By the sixth lesson, a noticeable shift occurred, with students becoming more relaxed, engaging in conversations with each other, and prioritizing meaningful communication. The instructor observed that while collaborative tasks remained a challenge, students began initiating conversations in Turkish, demonstrating a positive change in attitude and greater active involvement in the learning process. Over time, their comfort with making mistakes grew, and their expressions in Turkish became more confident and fluid.

Results

In the results section, data addressing the research questions will be presented. Additionally, responses from the seven participants to the open-ended questions will be included, offering insights into their perspectives and experiences. These responses will then be analyzed to provide answers to the research questions.

All seven students reported feeling more confident in expressing themselves in the target language and stated that they had equal opportunities in the classroom. They all expressed improvement in speaking Turkish and a better understanding of the language. They enjoyed the tasks and felt a sense of accomplishment each time. They also felt more prepared to use the language outside the classroom, particularly for daily communication, and expressed that the lessons were enjoyable. Here are some of the open-ended questions and selected responses from the student questionnaires, designed to assess their attitudes, thoughts, and improvements after six months. The questionnaire was originally in Greek, and the participants' (p) responses were translated for the purposes of this study. The most relevant questions and answers that contribute to addressing the research questions have been included.

1. How Has Your Confidence in Speaking Turkish Changed After Completing the Course? Please Describe Your Experience.

P1: "I felt more confident expressing myself in Turkish and realized that communicating my thoughts was more important than being perfectly correct."

P2: "I feel more confident today compared to months ago. I have a better understanding, and I can answer questions easier. I also learned new expressions that I could use in daily life."

P3: "Definitely, I feel that I have improved my speaking. Speaking in Turkish is very challenging, but I feel improved and more confident today. I want to try all the expressions and dialogues we learned in real life."

2. In What Ways Did You Feel the Tasks in the Course Helped You Improve Your Speaking Skills?

P4: "I feel that the tasks we did in the classroom allowed me to use Turkish the way I would use it outside the classroom. It wasn't easy all the time, but it was fun because I managed to discuss it in Turkish."

P5: "I had to communicate, and I was forced to use the language even if I didn't feel I could, but that was very helpful in the end."

3. How Did the Classroom Environment and Teaching Approach Impact Your Ability to Express Yourself in Turkish?

P1: "I felt comfortable making mistakes. I realized that even if I make mistakes, the important thing is for others to understand what I am trying to say at this stage. Improvement takes time."

4. Were There Any Specific Activities or Tasks That You Found Particularly Helpful or Challenging? Please Explain.

P6: "I found the lesson on booking appointments and making reservations, or going to the restaurant, helpful. I have a plan to travel to Turkey in the summer, and that helps me prepare myself and try what I have learned this year. Collaboration with classmates sometimes can be challenging, or trying to express everything in Turkish can be challenging as well."

P3: "Learning or remembering new vocabulary at my age is not easy. However, speaking in the classroom helped me learn new words."

5. What Aspects of the Course Did You Find Most Beneficial for Your Language Learning, and What Could Be Improved?

P5: "The fact that we had to speak in Turkish at all times was something I experienced for the first time in a classroom. Even though it was challenging, I saw that gradually, it helped me a lot."

P3: "I would like to have more activities in the lesson such as fill-in-the-blanks or translations sometimes because I can memorize better."

The Findings Are Presented Below, Organized According to the Research Questions:

What Are the Potential Benefits of Integrating TBLT With Traditional Turkish Language Textbooks?

The integration of TBLT with traditional Turkish language textbooks brought several key benefits. It promoted active participation and the use of authentic language, leading to greater engagement and willingness among learners to use the target language. It also allowed for customized lessons that aligned with prescribed textbooks while enriching the content with current topics, real-life expressions, and proverbs. The tasks encouraged interaction and practical language use, which helped develop balanced skills, particularly in speaking and listening, by increasing students' exposure to the target language. Despite the limitations of the traditional textbook, the instructor effectively adapted the content to meet students' interests and needs, enhancing their preparedness for daily communication and sustaining their motivation throughout the course.

How Does the Combination of TBLT and Traditional Textbooks Impact the Communicative Competencies of Greek L1 Learners of Turkish?

The combination of TBLT and traditional textbooks resulted in significant improvements in the communicative competencies of Greek L1 learners of Turkish. The task-based activities provided more opportunities for authentic speaking and engagement in real-life situations—areas that the traditional textbook alone neglected. This led to noticeable progress in learners' ability to express themselves, with increased comfort in making mistakes and prioritizing communication over grammatical accuracy.

This blended approach also allowed for the customization of lessons to better meet the needs of adult learners by incorporating topics related to their interests, making the learning process more engaging and meaningful. The balance between traditional textbook activities and

TBLT tasks helped learners build on their existing knowledge while developing new skills, providing greater exposure to the target language, which is crucial for developing communicative competence.

Initially, students' speaking competency was evaluated as A1 on the CEFR scale, despite being enrolled at the B1 level. However, over six months, they progressed to the A2 level in speaking, indicating a slow yet positive and evident improvement in their communicative abilities.

Conclusion

This study explored the integration of a TBLT approach aligning with the prescribed curriculum and using traditional Turkish language textbooks in a B1-level course for Greek L1 learners of Turkish in Cyprus. The findings suggest that implementing TBLT using traditional textbooks can significantly enhance learners' speaking competence. Despite the challenges, the approach offers a promising way to improve language learning outcomes within the constraints of the prescribed textbooks.

Challenges and Limitations

While the integration of TBLT with traditional textbooks showed promising results, it also presented several challenges. One of the primary challenges was the initial resistance from learners, who were more accustomed to traditional language learning methods. Some learners were uncomfortable with the new approach and questioned its effectiveness, particularly in the early stages of the course. This resistance was largely due to their preference for traditional activities, such as fill-in-the-blank exercises, which they found easier and more familiar.

Another challenge was the time-consuming nature of designing and implementing task-based activities. The researcher had to invest significant time and effort into adapting the textbook content to align with the TBLT approach, which required creativity and ongoing inspiration. This was particularly difficult given the constraints of the prescribed curriculum and the need to cover all required content. Additionally, some lesson plans were difficult to implement, requiring ongoing evaluation to determine what worked and what did not.

Implications for Future Research and Practice

The findings of this study have important implications for both language teachers and curriculum developers. For teachers, the study highlights the potential benefits of incorporating task-based activities into their lessons, even when using traditional textbooks. By doing so, teachers can create a more engaging and communicative classroom environment that better meets the needs of their learners.

For curriculum developers, the study suggests considering more flexible and communicative approaches when designing language textbooks. While traditional textbooks provide a valuable structure and content, they should also include opportunities for learners to engage in authentic language use. This could involve incorporating more task-based activities into the textbooks or providing teachers with supplementary materials supporting TBLT.

Future research could build on this study by exploring the impact of TBLT on other language skills, such as writing and reading, or by investigating the long-term effects of this approach on language proficiency. Additionally, research could examine how TBLT can be integrated into other less commonly taught languages, where teaching materials may be similarly limited.

Finally, the research aimed to determine whether the TBLT approach positively influenced communicative competency. However, assessing speaking skills and producing valid, objective results can be challenging, especially when the researcher also serves as the instructor. This dual role may introduce biases or difficulties in maintaining objectivity, which is a crucial consideration when interpreting the study's findings. To mitigate these challenges, future research could involve third-party evaluators to ensure impartial assessment.

Acknowledgements

I would like to express my sincere gratitude to the students who participated in this research and to the 22 colleagues who took part in the questionnaire. My heartfelt thanks also go to my PhD advisor and the principal investigator of the start-up TBLT-Turkish L2 for Greek L1 project, professor Gulshen Sakhatova, whose guidance and inspiration have been invaluable throughout this journey. Her support and encouragement have been essential to the completion of this work.

References

Aleksandrzak, M. (2011). Problems and challenges in teaching and learning speaking at advanced level. *Glottodidactica*, 37-48.

Alonso, R. A. (2014). Teaching Speaking: an Exploratory Study in Two Academic Contexts. *Porta Linguram*, 145-160.

Alyılmaz, C. (2010). Türkçe Öğretiminin Sorunları. *Turkish Studies*, *5*(3), 728-749. http://dx.doi.org/10.7827/TurkishStudies.1629

Antoniou, K., Mbah, E., & Parmaxi, A. (2016). Teaching Turkish in low tech contexts: Opportunities and challenges. Paper presented at the *Eurocall, 2016* 32.

Arslan, M., & Adem, E. (2010). Yabancılara Türkçe Öğretiminde Görsel Ve İşitsel Araçların Etkin Kullanımı. *Dil Dergisi*, 063-086. DOI:10.1501/Dilder_0000000126

Bachman, L. F. (1990). *Fundamental considerations in language testing*. Oxford university press.

Cabrera, M. d. P. M. (2014). Textbook use training in EFL teacher education. *Utrecht Studies in Language and Communication*, (27), 267-286.

Chmielowska, D., & Dikici, İ Z. (2013). The difficulties in the teaching of Turkish as a foreign Language. *Procedia-Social and Behavioral Sciences, 70*, 1609–1613.

Darancık, Y. (2018). Students' Views on Language Skills in Foreign Language Teaching. *International Education Studies*, *11*(7), 166-178. 10.5539/ies.v11n7p166

Demir, A., & Açık, F. (2011). Türkçenin Yabancı Dil Olarak Öğretiminde Kültürlerarası Yaklaşım ve Seçilecek Metinlerde Bulunması Gereken Özellikler. *TÜBAR*, *30*, 51-72.

Derman, S. (2010). Yabancı Uyruklu Öğrencilerin Türkiye Türkçesi Öğreniminde Karşılaştıkları Sorunlar. *Selçuk Üniversitesi İlahiyat Fakültesi Dergisi*, *29*, 227-247.

Doğan, A. (1989). Yabancıların Türkçe'yi Öğrenirken Karşılaştıkları Güçlükler ve Yaptıkları Bazı Hatalar. *Hacettepe Üniversitesi Edebiyat Fakültesi Dergisi*, *6*(1-2), 259-261.

Dumančić, L. (2011). No title. *The Development of the Speaking Skill: A Textbook Analysis,*

Egan, K. B. (1999). A Critical Skill and a Challenge. *CALICO Journal*, *16*(3), 277-293. https://www.jstor.org/stable/24147844

Ellis, R. (2003). Designing a task-based syllabus. *RELC Journal, 34*(1), 64-81.

Ellis, R. (2018). Task-based language teaching. *The Routledge handbook of instructed second language acquisition* (pp. 108–125). Routledge.

Ellis, R., & Shintani, N. (2013). *Exploring language pedagogy through second language acquisition research*. Routledge.

Er, O, Biçer, N, Bozkırlı, K. (2012). Yabancılara Türkçe Öğretiminde Karşılaşılan Sorunların İlgili Alan Yazını Işığında Değerlendirilmesi. *Uluslararası Türkçe Edebiyat Kültür Eğitim (TEKE) Dergisi,* 1 (2), 51-69. DOI:10.7884/teke.51

Fazio, A., & Cremasco, C. (2021). Distance learning and the development of speaking skills: Challenges and opportunities. *E-JournALL, EuroAmerican Journal of Applied Linguistics and Languages*, *8*(2), 70-86. http://doi.org/10.21283/2376905X.14.251

Garinger, D. (2002). Textbook Selection for the ESL Classroom. *Clearinghouse On Languages And Linguistics*.

Göçer, A. (2007). Analysis of textbooks in measuring and evaluating used in teaching Turkish as a foreign language. *Dil Dergisi,* (137), 30–48.

Grant, N. (1987). Making the most of your textbook. London: Longman.

Hawkes, M. L. (2011). An analysis of interaction in task-based oral assessment. *KOTESOL Proceedings 2011*, 39.

Hismanoglu, M., & Hismanoglu, S. (2011). Task-based language teaching: What every EFL teacher should do. *Procedia-Social and Behavioral Sciences, 15*, 46–52.

Hutchinson, T., & Torres, E. (1994). The textbook as agent of change. *ELT Journal*, *48*(4), 315-328. DOI:10.1.1.476.1187&rep=rep1&type=pdf

Inayah, R. (2015). Improving Students' Speaking Skill Through Storytelling Technique. *ELTIN Journal*, *3*(1), 25-37.

İpek, Ö F., & Eğilmez, N. İ. (2023). Evaluation of English and Turkish language teaching textbooks according to CEFR criteria. *Uludağ Üniversitesi Eğitim Fakültesi Dergisi, 36*(1), 372–390.

Izadpanah, S. (2010). A study on task-based language teaching: From theory to practice. *US-China Foreign Language, 8*(3), 47–56.

Jin, L., & Cortazzi, M. (2011). Re-evaluating traditional approaches to second language teaching and learning. *Handbook of research in second language teaching and learning* (pp. 558–575). Routledge.

Kabir, S. M. S. (2016). Methods of Data Collection. In *Basic Guidelines for Research: An Introductory Approach for All Disciplines* (1st ed., pp. 201-275). Book Zone.

Knight, B. (1992). Assessing speaking skills: a workshop for teacher development. *ELT Journal, 46*(3), 294–302.

Lau, C., Kam, B. H., Lam, T., & Nkhoma, M. Z. (2018). The role of textbook learning resources in e-learning: A taxonomic study. *Computers & Education*, *118*, 10-24. 10.1016/j.compedu.2017.11.005

Liddicoat, A. J. (2008). Pedagogical Practice for Integrating the Intercultural in Language Teaching and Learning. *Japanese Studies*, *28*(3), 277-290. 10.1080/10371390802446844

Long, M. (1985). A role for instruction in second language acquisition: task-based language teaching. In K. Hyltenstam & M. Pienemann (Eds.), Modelling and assessing second language acquisition. Clevedon: Multilingual Matters.

Maryslessor, A. O., Barasa, P. L., & Omulando, C. A. (2014). Challenges Teachers Face in the Use of the Communicative Language Teaching Approach in the Teaching Listening and Speaking Lessons in Lugrari District, Kenya. *International Journal of Science and Research*, *3*(9), 83-92.

Mead, N. A. (1980). Assessing Speaking Skills: Issues of Feasibility, Reliability. Validity and Bias.

Özyürek, R. (2009). Türk Devlet Ve Topluluklarindantürkiye Üniversitelerine Gelen Türk Soylu Yabanci Uyruklu Öğrencilerin Türkçe Öğrenimlerinde Karşilaştiklari Sorunlar. *Electronic Turkish Studies, 4*(3).

Panday−Shukla, P. (2024). Comparing an open educational resource and a traditional textbook: Learner outcomes and engagement. *Foreign Language Annals, 57*(2), 425–449.

Papajani, J. (2015). The Evaluation of the EFL Textbooks Used in the High Schools of Elbasan, Albania. *European Journal of Language and Literature Studies*, *1*(1), 7-15.

Pelekani, C. (2016). Students' attitudes and motivation towards technology in a Turkish language classroom. *CALL Communities and Culture*, 113-118. https://doi.org/10.14705/rpnet.2016.eurocall2016.547

Rampton, B., Charalambous, P., & Charalambous, C. (2014). Desecuritising Turkish: Teaching the language of a former enemy, and intercultural language education. *Urban Language & Literacies*, 1-21.

Richards, J. C. (2001). The Role of Textbooks in a Language Program. 1-6.

Robinson, P.C. (1991). ESP Today. A Practioners' Guide. London, Prentice Hall.

Shintani, N. (2011). A comparative study of the effects of input-based and production-based instruction on vocabulary acquisition by young EFL learners. *Language Teaching Research, 15*(2), 137–158.

Shintani, N. (2015). The effectiveness of processing instruction and production-based instruction on L2 grammar acquisition: A meta-analysis. *Applied Linguistics, 36*(3), 306–325.

Simu, A. (2019). Textbooks-An Outdated Tradition?: A Study of the Greatest and Most Common Problems with English Textbooks for Upper Secondary School in Sweden.

Stepani, M. (2016). The Implementation Of Task-Based Instruction In Teaching Speaking. *Indonesian EFL Journal*, *2*(1), 43-52.

Suban, T. S. (2021). Teaching speaking: activities to promote speaking skills in EFL classrooms. *Lectio: Journal of Language and Language Teaching, 1*(1), 41–50.

Tosun, S. (2012). A comparative study on evaluation of Turkish and English foreign language textbooks. *Procedia - Social and Behavioral Sciences*, *70*, 1374-1380. DOI:10.1016/j.sbspro.2013.01.199

Waltermann, E., & Forel, C. (2015). Why and how to include textbook analysis in language teacher education programs. *English Language Teacher Education and Development Journal, 18*, 43–48.

Willis, J. (1996). A framework for task-based learning. Harlow: Longman.

Yildiz, Y. (2020). Task-Based language teaching: An approach in the spotlight to propel language learning forward. *International Journal of Social Sciences & Educational Studies, 7*(1), 72–77.

Yücel, A. S. (2006). E-Learning Approach in Teacher Training. *Turkish Online Journal of Distance Education*, *7*(4), 123-131.

Калмуратова, И. (2023). The role of rubrics and checklists in validation of speaking skill. *Ренессанс В Парадигме Новаций Образования И Технологий В XXI Веке, 1*(1), 384–386.

A Review of Shortcomings That Impact Primary and Secondary Education in South Africa

Mogoshadi Lynah Msiza, University of South Africa, South Africa

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The structure of South African primary and secondary education by department of Basic education encompasses primary and secondary education. Primary education lasts for 8 years and is split up into 4 phases Foundation, Intermediate, Senior phase and Further Education and Training Phase. After completion of the primary education, students are awarded the General Education and Training Certificate. After completing the secondary education, students are awarded Senior Certificate. South Africa post-apartheid has changed primary and secondary education pass rates of poor quality that is setting primary and secondary leaners into failure compared to government regime and other countries. That leads to most matriculants with standard and lower grade symbols were not accepted in many universities. The challenge began when current education structure of Basic education allowing learners to at least have, at least 40% pass in Home Language, at least 30% pass in the Language of Learning and Teaching (LOLT). This paper presents an argument and report that the current basic education system and the grading standard produce poor quality of learners who mostly do not qualify to study at a university level and overpopulated in public schools' classes. This paper applied secondary research methodology and the findings are based on existing literature, empirical and theoretical studies. The paper concludes that a pass rate in primary and secondary education needs change for the best quality, remove Life Orientation subjects in secondary schools and compare South African basic education pass rate with other countries to propose an alternative basic education system for South Arica.

Keywords: Basic Education, Employment, Equality, Acceptable, Compare

iafor
The International Academic Forum
www.iafor.org

Introduction

South African primary and secondary education quality has been declining after the down of democracy. Education in South Africa is governed by two national departments, namely the Department of Basic Education (DBE), which is responsible for primary and secondary schools, and the Department of Higher Education and Training (DHET), which is responsible for tertiary education and vocational training. Prior to 2009, both departments were represented in a single Department of Education (Budget speech, 2022). Therefore, this paper focuses on Department of Basic Education as it offers Primary and secondary education in South Africa. The DBE department deals with public schools, private schools (also referred to by the department as independent schools), early childhood development (ECD) centers, and special needs schools. The public schools and private schools are collectively known as ordinary schools, which are roughly 97% of schools in South Africa. Unlike in most countries, many public schools charge tuition (referred to as fees). No-fee schools were introduced on a limited basis in 2007 (Education Policy, 2017). In South Africa hereafter to call it (SA), education system performs extremely poorly along unlimited dimensions. These are school which used to perform better and managed better during apartheid government system, which is a system that used to discriminate black and colored races and reduced to Bantu education. The apartheid government Minister of Native Affairs and Prime Minister Hendrik Verwoerd designed Bantu education to teach African culture and educate Africans in accordance with their opportunities in life Bantu Education Act (No. 47) of 1953 (Ocampo, 2004). That contributed to the test scores at every level exhibit sharp dualism between the smaller part of the school system, mainly schools that historically served whites and Indians, which perform similarly to schools in developed countries mainly competing with the first world countries, and the bigger parts of the system, historically serving majority black and colored children, which performs extremely weakly, also in comparison to the third world countries. There is a fundamental concern in thus the learning that transpires in schools is highly unequal with respect to the socio-economic status of children and their race group.

Although these performance differentials are evident throughout the school system, an important feature is that these inequalities in performance manifest early, so that by the foundation phase which from Grade R, Grade1 to Grade 3. The intermediate phase consists of Grade 4 to Grade 6. The Senior phase is from Grade 7 to Grade 9 and the Further Training Phase is from Grade 10 to Grade 12 (Macha & Kadakia, 2017). That is a whole Primary and Secondary education in South African education preparing for Tertiary education. The shortcomings have impacted all races post-apartheid where black, whites, Indians and colored are all allowed to attend same schools or schools of their own interest being public or private education in SA. That Bantu education have affected youth of between since apartheid regime years until 1974 (Clark & Worger, 2016). These were dark days where black and colored races cannot eloquently communicate in English mostly and acquire skills and be admitted in the universities to study and compete with the rest of races to the rest of the world. These challenges are continuing persist in the democracy of South Africa after 1994 (Ocampo, 2004). It is relatively clear which children have fallen so far behind that they would probably not be able to reach and pass matric with good enough marks to go on to university studies after the South Africa government introduced the thirty percent (30%) minimum pass rate in designated subjects in South African education system. This problem has raised a lot of noises amongst South Africans and neighboring states competitors that gives a picture of South African youth deemed as weakling learners. The noises were further raised by political leaders likes of Mmusi Maimane leader of opposition party Building One South Africa (BOSA). Mmusi Maimane have publicly criticized the minister of basic

education Mrs. Angie Motshekga who is the member of cabinet and agreed to this questionable resolution that led to decline quality of education in South Africa (Mashego, 2022). Consequently, the large returns on obtaining a university degree, this early failure of the education system has massive implications for labour market outcomes, and thus for social mobility also a regressive generation that cannot compete with other learners to the rest of the world. These low-quality education sets many children a poverty trap. It is evident that productivity improvements that can drive economic progress have to be built on this foundation (Van der Berg, 2007).

Research Methodology

This paper applied qualitative research methodology. The paper used secondary data collection method. Books, Government documents, journals, magazines and newspapers were used to accomplish the paper.

South African Education Policy Post-apartheid

The new down of democracy of South Africa post-apartheid government was facing school system that was highly fragmented, segregated by race, and with greatly discriminatory funding for teachers, learning materials and schools' spaces for learners beginning of every academic year especially Grade 1 and Grade 8 the entries of both primary and secondary education (Department of Education 2009: 12). Most challenges were arising from urban areas in the big cities that consists of rainbow nation races and challenges of migrant's children searching for school spaces in primary and education in big cities like Cape town, Pretoria, Johannesburg, and Durban. All races are now allowed to any school in the city private or public depending on affordability. Black, white, Chinese, Indian and black are all acceptable in all schools which embraces diversity. The challenges of school spaces in the beginning of the was the tantamount problem that impacted black and colored leaners discriminated systematically on certain schools with higher quintile and used be named model Cs (South African Institute of Race Relation, 2011).

The schools such as The Glen high school, Willow Ridge high school, Girls High, and Boys High schools etc., also those schools specializing with Afrikaans as the medium of instructions have been discriminating black and colored learners from being admitted into their education. These have resulted into the then MEC of education Mr. Panyaza Lesufi to review the policy of primary and secondary entry level to put the applications of admissions on the internet for every leaner going for Grade1 and Garde 8 entries levels (Curriculum Reform in South Africa, 2017). This calculated move has created a great deal of peace and harmony in the cities schools when spaces were concerned. Learners are now accepted and admitted into primary and secondary education according to who applied and within the spectrum of deadlines. This has limited the challenges and complains of schools' space even if other minor challenges persist that migrants' leaners are dominating the urban schools where only less than 5% is supposed to be the maximum admitted foreign leaners in South African Primary and Secondary schools.

This tendency of admitting more than 5% foreign leaners has caused a lot of havoc in the societies and citizens had formed movement such as Dudula Operation Movement and Put South African first to visit township and urban schools to show their concerns regarding the matter at hand. Unfortunately, both these South African Patriotic movements were named Xenophobic for taking strides in forcing the South African schools to implement the policy of

registering only maximum of 5% foreign leaners (Pongweni, 2023). These are parents who are concerned about many children staying back at home while foreign leaners exceeding the number stated on the policy in South African schools. Certainly, this South African Primary and Secondary education system had little legitimacy, given its role under apartheid in perpetuating racial inequalities and now 30% pass rate, scarcity of space which is a problem of minimal infrastructure, the burning of corporal punishment that led leaners misbehaving in schools to a point where teachers are tormented, some killed by leaners in township schools (Alistair, 2017). All these shortcomings are impacting Primary and Secondary education in South Africa worse negatively compared to the rest third world countries schools. Even though the Bantu Education Act of 1953 was repealed in 1979, it was replaced by the Education and Training Act, which essentially created an 'independent' education system for each of the four apartheid racial groupings (Ocampo, 2004). These tendencies of leaners fighting each other and their insular being out of proportion is fueled by the religious subject being removed from South African public schools across the country post 1994.

Politics at Play Within Education System Reform

Disregard important symbolic role of educational discrimination, Bantu education and segregations under apartheid regime, the democratic transition brought about strong pressures and more challenges in South African primary and secondary educational structure that impacted the quality education (Department of Education 2009). The influence comes from political leaders of the ruling party named African National Congress (ANC) to put people under their consistence control and made 60% of the South African population to rely on social grants. South Africa has four different kinds of social grants which are Pension grants, Orphans grants, disabled grants, and covid-19 social grants to anyone unemployed above the age of 18 to 59 years. When people are not educated in numbers, is difficult to be employable. Also, when people lack education, they keep on relying on grants that encourage them to vote for the same ANC led government. This is a strategy to keep majority of youth unemployable and lacking knowledge to keep ANC in power. These policies are made deliberately to collapse the whole educational structure because primary and secondary education is the most important school foundation (Gustafsson, 2016). The whole scenario is politics at play to keep majority of leaners unqualified for tertiary education.

The major political challenges regarding the functioning of the school system revolves around the role of teacher unions. One of the oldest known majority unions for teachers, South African Teachers Union (SADTU), is very strong and according to a recent Ministerial report 'the Volmink report" this union effectively controls six of the nine provincial education departments. Clashes between government and the unions have had major impacts, even though SADTU is a member of Congress of South African Teachers Union (Cosatu), an alliance partner of the led government ANC. The clashes happened in 2008 with strikes about teacher pay, which led to the closing of many schools for an extended period. After 2015 SADTU and other unions' objections led to a refusal to implement the Annual National Assessment in schools nationally, one of the few potential accountability systems that government has tried to put in place. These are other political shortcomings contributed to negatively impact the improvement of public primary and secondary educational (Department of Education, 2013).

The Significance of South African Early Childhood Development

South African basic education has extended primary education with the Early Child development classes. The National Development Plan (NDP) drawn up by the National Planning Commission (NPC) describes early childhood development as a priority and significant among the measures to improve the quality of education and long-term prospects of future generations" (NPC 2013:71). Furthermore, the NDP proposed that an additional year of pre-school should be added to schools before the current reception year or admission to Grade R. There is now strong agreement across disciplines that early development of children is both cost effective and inequality reducing (Heckman, 2013). It is evident that in South Africa there is belief that inequality in education already manifests early in the school system. These calls for the reduction of inequalities as one of the main reasons why the NDP and the education authorities put such emphasis on the reception year (for children aged 5), but also on even earlier learning in ECD centers (ages 1 to 4). The issues with quality and inequality in the school system are not improved by the current weak, fragmented and poorly resourced ECD sector. This contributes for children to be prepared for a strong foundation phase excellence.

The South African Education Digital and Technological Usage

The information and communication technology (ICT) use in South African education ICTs can be defined as a shorthand for the computers, software, networks, satellite links, and related systems that allow people to access, analyze, create, exchange, and use data, information, and knowledge in ways that were almost imaginable (Barakabitze, et al. 2019). The South African country has worked to include information and communication technology (ICT) within the education system. Limitedly, since South Africa is a developing nation, factors that hampers educational technology adoption and implementation exist. That including lack of resources such as tablets and computers, lack of internet infrastructure, and a large gap between the wealthy and the missing middle or the disadvantaged when it comes to access to personal devices which can be used for education (Lembani, et al., 2019).

The Introduction of ICT Utilization in South African Education

The South African education early years of ICT adoption occurred from 1996 to 2000. Since those periods, some South African education institutions began using computers and many institutions-built computer labs (Ng'ambi et al, 2016). These computers were used mainly by staff, but some institutions also implemented computer-based education or computer-aided instruction for learners as well. Such learning reflected behavioral philosophy and focused on drilling and practicing. The second phase of ICT adoption, was between 2001 and 2005, saw a focus on creating more access for learners in South African schools, including basic connectivity, wired schools and educator development. The utilization of Computers for learners expanded, while staff were introduced to email and the internet. In those time, ICTs were most often used to find information and for word processing tasks. Following 2005-2006, ICT use within the South African student population began to include mobile phones (Jantjies, 2023). The South African students began using their mobile phones for educational purposes, institutions lagged behind and did not generally implement learning opportunities via mobile-based teaching. The emerging of social media used exploded with the advent of Facebook, launched in 2005, and other sites. Most Primary and Secondary teachers also mentioned referring students to Mindset, a government-developed program which enables learners to access on-line videos related to mathematics. Eventually, as the decade

progressed, education continued to embrace varying educational technologies, and with the arrival of the COVID-19 global pandemic in 2020, educational ICTs were pushed even more to the forefront of education across the world, including in South African Schools (Ng'ambi et al, 2016).

Factors Hampering Implementing ICT by South African Educational Structures

South African education system was keen to and pushed to fully go for digital education during covid-19 pandemic national lockdown. Teachers were compelled to teach online, and leaners had to swiftly adapt for fully online education. The enormous shortcomings that negatively impacted ICT utilization in South Africa, even prior to the COVID-19 pandemic, was the lack of a solid infrastructure and internet access throughout the entire country (Lembani, et al. 2019). South Africa is facing national electricity cuts named loadshedding. When in 2017, only about 22% of the population had access to the internet. Public internet access, at places such as internet cafes, existed for learners in urban areas, but rural areas sometimes lacked the infrastructure needed for consistent internet access. The learners from rural areas primary and secondary schools lack of internet causing them to fall behind in their studies, indicating that internet access did indeed is a major barrier for education in South Africa prior to the COVID-19 pandemic even during national lockdown of Covid-19 period. Consequently, in rural areas, less personal resources, such as personal computers and tablets, were available, often due to low socioeconomic status and being unable to afford such luxuries (Chisango, et al, 2020).

Within the schools, additional factors that negatively affected ICT usage continues to persist. Some of such shortcomings was a lack of teachers who were competent and comfortable with ICTs. The technical support assists in bridging that gap of ICT competency in teachers, but other barriers persist (Chigona & Chigona, 2010). Teachers sometimes resisted ICT adoption, believing ICTs were not a priority or even a hindrance to learning. These lack of resources and overcrowding of leaners in classes were also major shortcoming negatively impacting within schools to ICT use prior to the COVID-19 pandemic. Chigona and Chigona, (2010), stated that on average the class sizes are 40 plus learners, the lab has capacity to support 25 learners only. There are only 25 computers in the lab. It is evident that if you got 2000 kids in a school and you have 25 or 30 computers, it is not enough. These thus illustrate the difficulty with implementing ICTs for education when resources are limited, and schools are overcrowded. The final barrier faced by schools that is worth mentioning is the lack of a solid equipment's, electricity, and network access (Chisango, et al, 2020). The major factor that discourages learning even in schools where learning equipment's, internet and infrastructure are available, is the cuts of electricity loadshedding challenges.

Shortage of Teachers in South African Primary and Secondary Education

The South African schools faces a challenge of a shortage of teachers. Eventually, the rapid educational growth during democracy period and since the transition resulted in a growing need for teachers. The steady enrolment expansion for several decades has meant that the demand for teachers also grew steadily yet supply of new teachers has not matched the demand. The major possible factor was the closing or amalgamation of the 120 largely rural teacher colleges into the 23 universities in 2003, which resulted in a dramatic drop in the number of teachers trained (Taylor et al. 2013: 8). Gradually, the number of new teachers seems to have risen since the introduction of the Funza Lushaka state bursary scheme for studying teaching in 2009.

According to Van Broekhuizen (2015) the rate calculations at which the higher education system is currently producing qualified teachers is still not sufficient to meet current and future needs of the schooling system. The scarcity of teacher is widespread: in almost all education districts throughout the country there are schools that are problematically under-staffed (Gustafsson 2016: 50). The matter at hand is much more serious at secondary than at primary level, as secondary-level teaching posts are more difficult to fill because of specific requirements, such as subject requirements. Van Broekhuizen (2015: 1) argued that the country faces a particular shortage of teachers in key subject areas like mathematics and physical sciences. Gustafsson (2016: 51) found that in some districts upwards of 45% of secondary learners attend understaffed schools. This has serious implications for meeting the country's skilled manpower needs. Most of teacher workforce is ageing. Taking into consideration that the under-supply of teachers already poses a major constraint to improving educational outcomes, this is likely to become worse as the teacher workforce shrinks over time due to retirement.

Recommendations

After reviewing the shortcomings that impacted the Primary and Secondary education in South Africa, the following recommendations can contribute to improve basic education system in South Africa:

- The DBE needs to consider employing enough teachers in Primary and Secondary schools to reduce the pressure on the current teachers.
- There is a need to increase extra buildings of school classes in schools to accommodate less leaners in class to reduce overpopulated classes.
- All Rural and Urban schools need to be supplied with enough computers, teaching equipments, free internet access for leaners and teachers.
- The South African Primary and Secondary education needs to implement the policy of keeping immigrants' leaners at five percent (5%) to avoid external forces interference on matters of school spaces.
- The teachers Unions needs to align their actions with the policies of Department of Basic Education to walk on equal feet. To keep in mind learners' education is significant as well as teachers' salaries and other needs.
- Political leaders need to make educational laws that are fair and bring about ethical morals that builds pooper disciplined for both teachers and leaners in primary and secondary schools to respect each other to reach a common goal being teaching and learning.
- Parents at home needs to come to play and help teachers in control of leaners best behavior. And the DBE needs to come with fair measures in disciplining the teachers considering they are working with minors from different backgrounds.
- The Department of Basic Education need to increase a minimum pass rate of 50% for South African learners to be on an equal foot competition with the rest of the world learners.

Conclusions

The South African Department of Basic Education has worked tremendously for the transformation of primary and Secondary education system after 1994 post Democracy. The review of these transition and changes of educational system is facing shortcomings that impacted education negatively due to 30% pass rate reduction to the minimum of 30% that will affect learners negatively to compete with other learners in the rest of the world. The

shortage of teachers is an important element to be looked at and the DBE will be deemed as failure if schools lack teachers to carry out the teaching tasks for so many leaners while there are shortages of class and leaners are overpopulated in classes. This will affect the pass rate as teachers will not have access to give each learner attention they need. The DBE turning a blind eye of shortage of school infrastructure in public schools in rural and townships is a meager disadvantage for the leaners to pass. The Government of South Africa facing unending cuts of electricity (loadshedding) is another contributing factor setting leaners for failure being in rural and urban schools.

Acknowledgements

I Mogoshadi Lynah Msiza would like to express my deepest appreciation to my family, my mother Elizabeth Msiza, daughters Phemelo Jadar Msiza and Sithelo Royalty Msiza for being supportive and respecting my time to write this paper. The humble thankfulness to colleagues for their invaluable contribution support throughout this article project and the financial support from my line managers of Sociology Department, The College of CHS Director and College of Human Sciences Executive Dean Unwavering Support. I will thus be grateful for the committee of submissions review in giving me positive outcome and acceptance for my paper to be presented in University College in London, United Kingdom. This research article stands as a testament to the power of collaboration and the collective pursuit of knowledge.

References

Chigona, Agnes; Chigona, Wallace (2010-01-01). "An Investigation of Factors affecting the Use of ICT for Teaching in the Western Cape Schools". *ECIS 2010 Proceedings*.

Chisango, Grasia; Marongwe, Newlin; Mtsi, Nomxolisi; Matyedi, Thembisile E. (2020-03-03). "Teachers' Perceptions of Adopting Information and Communication Technologies in Teaching and Learning at Rural Secondary Schools in Eastern Cape, South Africa". *Africa Education Review*. 17 (2): 1–19.

Clark, Nancy L.; William H. Worger (2016). *South Africa: the rise and fall of apartheid* (Third ed.). Abingdon, Oxon. ISBN 978-1-138-12444-8. OCLC 883649263.

Department of Basic Education (Volmink Report). (2016). Report of the Ministerial Task team appointed by Minister Angie Motshekga to investigate allegations on the selling of posts of educators by members of teacher's and departmental officials in provincial education departments. Final Report. DBE: Pretoria. May.

"Education Policy: School Fees". Etu.org.za. Retrieved 2017-08-27. http://www.etu.org.za/toolbox/docs/government/schoolfees.html

"Education | Statistics South Africa". *Statssa.gov.za*. Statistics South Africa. Retrieved 2017-08-26.

EPRI (2014). Audit of Early Childhood Development (ECD) Centres: National Report. Department of Social Development. Pretoria.

Graaff, J. (2016). Governance in the Poorer Public Schools in South Africa from the Perspective of the Parent Governor. Stellenbosch Economic Working Papers.

Gustafsson, M. (2016). Teacher supply and the quality of schooling in South Africa: Patterns over space and time. Stellenbosch Economic Working Papers.

Inchauste, Gabriela; Lustig, Nora; Maboshe, Mashekwa; Purfield, Catriona; Woolard, Ingrid. (2015). The distributional impact of fiscal Policy in South Africa. World Bank Policy Research Working Paper 7194. World Bank, Washington, DC.

Jansen, J. & Taylor, N. (2003). Educational Change in South Africa 1994-2003: Case Studies in LargeScale Education Reform. World Bank Country Studies: Education Reform and Management Publication Series, vol. II, No. 1. October.

Kotzé, J. (2015). The readiness of the South African education system for a pre-Grade R year. Working Paper 15/2015. Stellenbosch.

Lembani, Reuben; Gunter, Ashley; Breines, Markus; Dalu, Mwazvita Tapiwa Beatrice (2019-11-22). "The same course, different access: the digital divide between urban and rural distance education students in South Africa". *Journal of Geography in Higher Education*. 44 (1): 70–8.

Macha, Wilson; Kadakia, Aditi (2017-05-02). "Education in South Africa". *World Education News and Reviews*. World Education Services. Retrieved 2023-08-06.

Mashego, Lebogng. (2022). Mmusi Maimane Launches a petition to End the 30% Pass Mark, says it will Hurt the South African Economy. Friday, January 07, 2022. Change.org.

Mhlanga, David; Moloi, Tankiso (2020). "COVID-19 and the Digital Transformation of Education: What Are We Learning on 4IR in South Africa?". *Education Sciences*. 10 (7): 180. doi:10.3390/educsci10070180. ISSN 2227-7102

'Model C' is the model to emulate - 1 February 2011 - South AfricanInstitute of Race Relations". *Sairr.org.za*. Archived from the original on 2014-02-21. Retrieved 2017-08-27.

Moses, E., Van der Berg, S. & Rich, K. (2017). A Society Divided: How Unequal Education Quality Limits Social Mobility in South Africa: Synthesis report to the PSPPD.

Mwapwele, Samuel Dick; Marais, Mario; Dlamini, Sifiso; Biljon, Judy Van (2019-12-06). "Teachers' ICT Adoption in South African Rural Schools: A Study of Technology Readiness and Implications for the South Africa Connect Broadband Policy". *The African Journal of Information and Communication* (24).

NO fees Schools in South Africa - Policy Brief 7" (PDF). *Create-rpc.org*. Retrieved 2017-08-27.

Ocampo, Lizet (2004-09-19). "Global Perspectives on Human Language: The South African Context - Timeline of Education and Apartheid". *stanford.edu*. Retrieved 2017-08-26.

Pongweni, Takudzwa, (2023). Operation Dudula threat to Remove Migrant Children from Schools Sparks Warning from Activists.10 February 2023. Daily Maverick. Maveric Citizen.

Stellenbosch. August. Van der Berg, S & Moses, E. (2012). How better targeting of social spending affects social delivery in South Africa. Development Southern Africa 29(1): 127-139.

Van der Berg, S. (2007). Apartheid's enduring legacy: Inequalities in education. Journal of African Economies 16: 849–880.

Van der Berg, S., & Burger, Rulof. (2010). Teacher pay in South Africa. Stellenbosch Economic Working Paper 26/2010

Van der Berg, S., Girdwood, E., Shepherd, D., Van Wyk, C., Kruger, J., Viljoen, J., Ezeobi, O. & Ntaka, P. (2013). The impact of the introduction of Grade R on learning outcomes. Report to DPME. Research on Socio-Economic Policy (ReSEP), Stellenbosch

Van der Berg, S. & Gustafsson, M. (2017). Quality of Basic Education. A Report to Working Group 1 of the High-Level Panel on the Assessment of Key Legislation. Unpublished.

Contact email: msizaml@unisa.ac.za

Nurturing Politeness and Polite Expressions in English Language Teaching: A Study of Teacher Trainers and Preservice Teachers

Nicholas Isaac Mukwana, Makerere University, Uganda
Ssebbunga Masembe Connie, Makerere University, Uganda

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Knowledge of politeness and polite expressions in English language use is vital for every school going child to thrive and succeed in society as well as contribute to its well-being. Effective communication and interpersonal skills are essential for success in society, and politeness and polite expressions are a vital aspect of English language use. This qualitative study, conducted at Makerere University's School of Education, in the department of Humanities and Language Education, explores how English language teacher trainers (ELTT) nurture politeness and polite expressions in preservice English language teachers (PELT). Four ELTT and Twenty PELT were purposively selected to participate in the study. Interview guide, focus group discussions guide and document analysis guide were used to collect data. The research revealed that while politeness and polite expressions are not explicitly addressed in the English language teaching curriculum, ELTT spontaneously nurture politeness through lecturer-learner interactions. The study recommends integrating politeness and polite expressions into the curriculum, managing PELT admissions, and implementing a marking policy that prioritizes attendance, participation, and research to promote a more holistic learning approach. Thus, this research study addresses the importance of politeness in English language teaching and its impact on interpersonal communication.

Keywords: Politeness, Polite Expressions, Interpersonal Communication, English Language Teaching, Preservice Teachers

iafor
The International Academic Forum
www.iafor.org

Introduction

Politeness and polite expressions are concerned with the interactors' concern for the wellbeing of others. It is one of the components of interpersonal communication skills that every school going child should be taught. Politeness as exhibited in polite expressions is being conscious of other people's feelings, status in society and desirous of upholding their dignity. In interpersonal relations (IR), interpersonal communication skills (ICS) are vital in achieving success in communication and the knowledge of politeness and polite expressions is paramount.

In Uganda education system, teachers are trained either as in-service or preservice. In service category involves training teachers who are already in the service of teaching, attached to a school and study during official holidays. Preservice category on the other hand is where the individuals are admitted to a Teacher Education Institution or University, trained for specified period of time, go through practicum also known as school practice before engaging fully in the teaching profession. Pre-service teacher education is therefore, a teacher education program meant for students who have never been to classrooms as teachers but completed high school education certificate. It is called pre-service because the candidates are prepared and equipped with knowledge, skills and content in an education institute or university and thereafter, they undergo practicum in which they are supervised by the Teacher educators before they finally get certified to begin teaching. Ryan et al. (2017) argue that Pre-service education programmes are meant to stimulate experience in students that require the application of theory to practice, as pre-service teachers transform and become teachers. Ryan, Young, and Kraglund-Gauthier (2017) have all argued that in pre-service teacher preparation programs, the dominant focus is on understanding what it means to be a teacher and learning how to be a teacher rather than learning how to teach a specific subject to students. Therefore, in this study, the interest was on pre-service teachers of English language education since they entirely depend on the training to be able to practice teaching as a career.

Thus, in this study, the first component of interpersonal communication is politeness and polite expressions. This component involves the use of phrases/words, statements or expressions that show respect, regard or consideration for others in socially acceptable behavior. Phrases such as *please, excuse me, I beg your pardon, and could you please* among others, ought to be used by the teachers and also teach them such that the English Language Teacher trainers (ELTT) may nurture interpersonal communication skills among the teacher trainees. This will result in promoting health and successful impersonal relationships among the learners.

Definition and the Gist of Politeness

Oxford dictionary defines politeness as behaviour that is respectful and considerate of other people. For society to thrive and coexist, there must be agreed standards of peaceful coexistence. Politeness and polite expressions plays this role. When an individual exhibits politeness, t means that tribe, race, religion, ethnicity, social status, political affiliation comes are nonissues. It is more like thinking as a human being before anything else. Whenever politeness fails, then humanity is buried at the expense of tribe, race, religion, ethnicity, social status, and/or political affiliations.

Politeness as a skill in interpersonal communication is not only concerned with how well the message is delivered but also, how well the communicators create a lasting mutual relationship that can keep the communication lines open. As Hébert & Tabler (2019) discuss the six functions of language presented by Roman Jacobson in his book, *An Introduction to Semiotics*, the sixth function is the phatic function which is concerned with greetings for the purposes of establishing a mutual relationship with the communicants. This function reverberates well with politeness as both use language to establish a mutual relationship.

Therefore, in this study, the aspects of politeness are civility, gentility, courtesy, and phrases that are used to avoid offense, greetings, self-introduction, and phrases of regret, apologies, and inquiries among others.

Since the goal of politeness and polite expressions is to avoid conflict and create a lasting harmonious relationship between the communicators, the language users need to understand the language well, pronounce words correctly, know how to punctuate sentences well or understand the appropriate use of prosodic features, learn the use of idiomatic expressions or phrasal verbs as well as achieve illocutionary competence in the language. This implies that ELT trainers have a big role to play in preparing pre-service ELT to execute their teaching obligation. The teaching of language ought to be holistic, without paying attention to one part and forgetting the others. This is because politeness can be detected in writing and speaking discourse. The reader of written material can detect a polite tone or a rude tone, a humorous tone, or an arrogant one. In the same way, the listener can detect a disrespectful attitude, a condescending one or a respectful attitude or a unpretentious attitude (Permana & Tressyalina, 2020; Umaroh & Kurniawati, 2018).

Theoretical Underpinning

This study was guided by two theories: 1 Transactional Model of Communication (Barnlund, 1970), and 2, Scaffolding theory (Bruner, 1966).

Transactional Model of Communication (Barnlund 1970)

The transactional model of communication describes communication as a process in which communicators generate social realities within social, rational and cultural contexts. In this model, individuals do not just communicate to exchange messages; they communicate to create relationships, form intercultural alliances, shape their self-concepts, and engage with others in dialogue to create communities. In other words, interactors do not communicate about their realities, instead, communication helps them to construct their realities (Barnlund, 1970). According to this this model, interpersonal Communication is a continuous process of sending and receiving of messages which happens simultaneously between communicators. The sender interchanges roles with the receiver simultaneously.

Transactional model of communication guided this study through the idea that communication is meant to create relationships. The study investigated how ELT trainers attempted to create a relational context that enabled them build relationships with their learners during lectures. As well as the idea that communication was meant to form intercultural alliance. In this aspect, the study focused on how the ELT trainers helped their learners to build social context that allowed intellectual conversations, partnerships and tolerance among themselves within their lectures.

Scaffolding Theories (Bruner 1966)

The term scaffolding generally means support. In education, scaffolding is defined as an actively interactive process that happens between the teacher and the learner or the support given by a teacher to a learners during activity/task performance (van de Pol et al., 2010). According to Gonulal & Leowen (2018), the idea is imported from building construction where it refers to temporary structure used to help workers construct or renovate buildings. Later, the concept of scaffolding was used by Brunner & Sherwood (1976) in which the authors investigated the interaction between the mother and her child during the time of Peekaboo. Scaffolding is used in this scenario to refer to the interventions of the mother in the child needed during the game. Wood, Brunner & Rose (1976) are recognized for introducing the concept of scaffolding in education. Wood et al. (1976) used the term scaffolding to describe the role of parents during problem solving tasks carried out at home with their children. Wood et al. identify six scaffolding features of adult help. These are: recruitment of the child's interest in the task; 2, reduction in degree of freedom; 3, Maintaining goal orientation; 4, marking critical task features; 5, controlling frustration; and 6, modeling solutions.

Gonulal and Loewen (2018), as cited in Walqui (2006) who is credited for introducing Scaffolding theory in language teaching in their work; "Scaffolding technique", argue that for the second language teacher to give appropriate support to the learners, the following salient instruction scaffolding techniques ought to be followed. 1. Modeling, bridging, contextualizing, schema building, re-presenting text, and developing metacognition. In modeling, English language teachers can model proper pronunciation, prosodic features, or give them examples that guide the learners with concrete guidelines. In bridging, teachers can use learners' previous knowledge to build new skills, knowledge and attitudes that are necessary. In contextualization, teachers can use visual and non-verbal materials such as pictures, videos and drawings to help support learners in grasping the context of the items under study. In schema building, teachers support learners by helping them to connect new knowledge, skills and attitudes to the already existing structures. In re-presenting texts, teachers guide the learners in transforming linguistic structures found in one genre to another like a poem into a story. Lastly, in developing metacognition, teachers help learners carry out self-assessment such as think-loud. This study worked closely with the principles of scaffolding as observed by Gonulal & Leowen, 2018, and Puntambekar, 2022.

Review of Related Literature

There are many benefits of being polite in daily interpersonal communications and interactions. Politeness and polite expressions promotes the public image of the communicants, mitigates the would-be conflict or tension between the communicants, uplifts the listener or reader and grants peace and serenity in the conversational environment. It should be noted that due to differences in cultural background, what could be polite in one culture could be impolite in another. Some local languages exhibit a polite tone others do not exhibit so. Politeness is very necessary in the life of the learner. It influences the attitude of the language user positively, gives authority and support to the learners in order to achieve communicative competence and success in interpersonal relations. Politeness not only supports communicative competence but also leads to creation of understanding between the communicants which is interpersonal communication (Meiratnasari et al., 2020).

It is also important to note that when teachers of language embrace and emphasise the importance of politeness and polite expressions in the classrooms, it might go a long way in building a peaceful school environment and consequently building a peaceful society. Therefore, regardless of what one's cultural background is, while in school, in an English language classroom, politeness and politeness expressions must be emphasised.

Authors of English language textbooks have politeness expressions implicitly indicated. Some of the aspects of politeness are indicated in dialogues, comprehension passages and nonfiction stories. The ELT curriculum on the other hand does not list politeness as a key aspect to be covered in the lecture theaters. In their study, Meiratnasari et al. (2020) found that the teachers of the English language believe that politeness can help learners reflect better attitudes but they are limited by the syllabus which does not explicitly list politeness as a key factor to be covered in English language content.

Some researchers have looked at politeness from two angles; the words, phrases and sentence usage angle through the use of language by interactors, and the behaviour angle with encompasses appropriate behaviour patterns as evoked by the context of communication (Nurjati, et al., 2018). Impoliteness refers to aggressive language, rude and abusive while politeness can be explained through the use of words, phrases and sentences in the use of language by communicators (Nurjati et al., 2018).

It could be true that politeness can have various facets. There could be politeness at the religious level, politeness at cultural level and politeness at educational level. This study is looking at politeness at the linguistic level as one of the concepts that build relationships in interpersonal communication. Nurjati et al. (2018) found eleven ways teachers of English can teach politeness to students. The first aspect was addressing terms. These terms include; mister/miss/madam, ladies and gentlemen, sir/madam, and any other title that is well known to be possessed by an individual. The second aspect was rising intonation. Such intonation could communicate to the learners the effect and they could adopt it. The third aspect was code-switching and code-mixing where second language users drift back and forth to their first language in bid to avoid being impolite. The forth aspect was using agreement such as yes/yeah, no/nope, okay, all right, I understand among others. The fifth aspect was using jokes in bid to lighten the tension brought by formality. Teachers use jokes to invite their learners closer to them and make them approachable. The sixth aspect was using task-oriented/ instruction where the teacher uses interrogatives to confirm whether the learners have understood. Such interrogatives such as okay? Who is next? Are we together? The seventh aspect was using directness. The eight aspect was using metaphor. The ninth aspect was using non-serious utterances. The tenth aspect was using hyperbole and eleventh aspect was using mockery. This study adopted the first aspects of politeness because they are clear in explanation and applicable in the study context.

The above reviewed literature, with varying approaches to politeness and polite expressions, do concur with one thing. it is vital for the learners to be taught how to be polite in a language and how to exhibit politeness through polite expressions and phrases.

Methods

This research study adopted a qualitative research approach. This approach is appreciated because it is realistic in explaining the phenomenon of the preservice English language teachers' interpersonal communication skills nurtured among them in their preparation for

secondary school career. This study involved analysing the English language teacher trainers' interpersonal communication skills nurtured among the preservice English language teachers that meets with my interest as a researcher because of the desire to gain deep and comprehensive understanding of the interpersonal communication skills. This was done through interviews with the lecturers, focus group discussions with the teacher trainees and analysing the ELT curriculum. The purpose was to establish whether the lecturers are cognizant of the interpersonal communication skills they ought to nurture in the preservice English language teachers and how they nurture the learners in that line. Similarly, establish whether the preservice teachers are conscious of the interpersonal communication skills they ought to possess.

The research therefore is grounded in interpretive paradigm which adopts reality through subjective observation of the phenomenon. Consequently, content and thematic data analysis was adopted. Nevertheless, in order to achieve the desired outcomes, case study research design was embraced. This was because case study research design especially of a single entity helps to give an in-depth understanding and holistic evidence of the problem under investigation (Hollweck, 2015; Baškarada, 2014).

The study was conducted among ELT trainers and pre-service teachers of SoE, Makerere University. The focus was on interviewing lecturers with the purposes of establishing the interpersonal communication skills they nurture in the preservice English language teachers and how they do it. This was triangulated with analysing the course units they taught and involving the third year preservice English language teachers in four focus group discussions.

A total sample of twenty five (25) participants were purposively and conveniently selected. The four (04) ELT trainers and twenty one (21) Preservice English Language teachers were purposively and conveniently selected. Both purposive and convenient sampling was relevant because the population under study were of the same characteristics and convenience sampling was ideal given the big number of the population under study.

In this research study, three data collection methods were used; open ended interviews, focus group discussion, and document analysis. These data collection methods enabled the researcher to collect sufficient and pertinent data that helped to address the research objectives and answer the research questions.

Results

The findings in this section were in response to the first question which sought to explore the various aspects of politeness in the social, relational and cultural contexts that ELT trainers nurtured in the preservice English language teachers. This question sought to identify the various aspects of politeness and politeness expressions that ELT trainers use quite often during their nurturing process in their learners. The results are based on the researcher's analysis of five (05) course outlines, four (04) lecturers' in-depth interview and four focus group discussions, each group comprising of five members of the preservice English language teachers. The data was qualitative in nature and the data collected from document analysis guide was contently presented while the data collected by the help of interview guide and focus group discussion guide were thematically presented.

From the data collected and analysed form the three instruments, the results are thematically and contently summarised is in the table and the graph below:

Table 1: Summary of the Data Collected From Document Analysis

Document Analysed	Aspects Interpersonal Communication
Doc01:ELT2201 Professional Issues in ELT	No aspects of politeness and Polite Expressions
Doc02:ELL 3101 Literature Resources in ELT	No aspects of Politeness and Polite Expressions
Doc03: ELE 3101 Methods of Teaching Poetry	No aspects of Politeness and Polite Expressions
Doc04: ELE 3201 Methods of Teaching Literature (Novel, Plays)	No aspects of Politeness and Polite Expressions
Doc05: ELM3201 Language Skills in ELT	No aspects of Politeness and Polite Expressions
Overall Comment	The ELT Curriculum does not cater for aspects of Politeness and Polite Expressions to be nurtured in the PELT.

The data analysed from the documents of the five-course outlines indicate that politeness and polite expressions as skills in interpersonal communication are not catered for in the syllabus. This is in consonance with all the data collected from the in-depth interviews and focus group discussions. The analysed data shows that politeness is a very important component of ICS that every language teacher should possess. It further revealed that many factors are involved in a learner becoming politenss, but ELT trainers are responsible for nurturing it. Unfortunately, the curriculum does not cater for it and the trainers feel it would be asking too much from them. The table below summaries the data collected from analysis the ELT Curriculum, specifically from five course outlines.

The table below shows the modes of nurturing politeness as an aspect of interpersonal communication skills.

Table 2: Modes of Nurturing Politeness and Polite Expressions

Modes of Nurturing Politeness And Polite Expressions	Interview Guide	Document Analysis Guide	FGD Guide
Counselling	04	00	10
Mentorship	04	00	09
Modelling	04	00	08
Correction	04	00	07
Lecturer seekers	04	00	04

Table 2 above illustrates the manner in which politeness and polite expressions are nurtured in the preservice English language teachers who are English language teachers in waiting. Since the study revealed that the ELT curriculum does not provide for interpersonal communication skills to be taught, the ELT trainers do not plan for politeness and polite expressions to be taught but nurture it through counselling as the highest ranked mode followed by mentorship, modeling, corrections and lecturer seekers respectively. The study results revealed that the ELT trainers nurture politeness and polite expressions by counselling learners, probably on how to be polite, when to be polite and what it entails to be polite. They further go ahead and model politeness and polite expressions in the way they speak to the learners, correct them when they use wrong phrases mentor some of them as well as grab the opportunity with those who seek out lecturers for attention and other issues.

Also, the study findings revealed that the ELT trainers nurture politeness and polite expressions in various contexts. The ELTT are said to model politeness during lectures in lecture theaters and in some cases, outside lecture theaters in the lecturer-learners interaction. The case seemed to be different when it came to examination administration rooms. The study revealed that the ELTT seemed to forget politeness and polite expressions when they push learners out of the examination rooms due to tuition related issues.

When it came to the lecturers offices, there was a contradiction of sort. Whereas the in-depth interviews revealed that some learners go to the lecturers' office for assistance in a range of issues, the FGD revealed the opposite. It was argued that when it comes to the lecturers' offices, politeness and polite expressions that are nurtured or denurtured depending on the need at hand. For example, when the PELT were in search of missing marks, the ELTT forgot the politeness and polite expressions but when it was about consolations or passing by for a courtesy call, which they termed 'greetings', the story would be different. Rude and raising tone is experienced including being asked to get out of the offices. The table below shows the various contexts politeness and polite expressions are nurtured.

Table 3: Contexts in Which Nurturing Politeness and Polite Expressions Occur

Contexts for Nurturing Politeness And Polite Expressions	**Interview Guide**	**Document Analysis Guide**	**FGD Guide**
Outside Lecture Theater	04	00	05
Lecturer's Personal Space	04	00	05
Examination Rooms	04	00	05
Lecture Theatre	04	00	04
Lecturer's Office	04	00	03

Table 3 above illustrates the various contexts in which nurturing politeness and polite expressions occurs. The study revealed that outside lecture theaters, examinations rooms and lecturer's personal space as the highest ranked contexts in which nurturing or de-nurturing politeness and polite expressions occur, while lecture theaters and lecturers' offices were the least ranked contexts. The study, therefore, revealed five contexts in which politeness and polite expressions are nurtured and denurtured. For example, in the lecture theater and outside Lecture Theater, the lectures are polite and use polite expressions in addressing the learners. When it comes to the lecturers' offices, especially when tackling marks related issues, the learners reported that the politeness and polite expressions are replaced with less polite words and phrases. When it comes to examination rooms and what they termed as personal space, no politeness in exhibited.

Therefore, it could be concluded that since ELT trainers nurture politeness and polite expressions through counselling, mentorship and modeling, then what happens in the other contexts undo whatever politeness and polite expressions that would been taught. It is against this background that this study advocates for interpersonal communication skills to be included in all language education units for teaching and examining.

Discussions

The examined findings in this study established that politeness and polite expressions are not catered for in the ELT curriculum. This established observation is in congruent with the study conducted by Meiratnasari et al. (2020) who established that the teachers of the English language believe that politeness can help learners reflect better attitudes but they are limited by the syllabus which does not explicitly list politeness as a key factor to be covered in English language content. This is very unfortunate because, interpersonal relations fail and result into conflicts just because of failure to communicate effectively. In this study, interpersonal communication skills are those skills that can help interactants establish a lasting relationship and mitigate conflicts (Meiratnasari et al., 2020). This established fact is a pain in the neck, seeing that the curriculum does not guide the language teacher in instilling the most important values in communication, politeness.

However, politeness as established by this study, can be learned spontaneously through modelling and imitation. It was established that the ELT trainers nurture politeness through modelling, counselling, mentorship and corrections or rebukes. Aspects such as respect, consideration and use of soft tone of voice which is calm and gentle are nurtured in the preservice English language teachers. These findings are in congruent with Ivashchyshyn & Kashchyshyn (2020), and Yeomans et al. (2019) who argued that communication once the attitude of the speaker is arrogant and the tone of voice is rude, the communication changes direction from the message to self-reflection or defense.

Furthermore, Ivashchyshyn & Kashchyshyn (2020) argue that politeness is showing values and respect to the reader or listener, and softening one's communication. All these can be achieved through linguistic features and the teacher's demeanor in and out of the lecture rooms. It is important to note that mentorship and counselling as a mode of nurturing politeness in the preservice English language teachers is both ideal and realistic. It is ideal because the learners do imitate their trainers and realistic because that is what is actually happening in their three years training.

The study findings are further strengthened by the study of Umaroh & Kurniawati (2018) who asserted that the Politeness of the communicants is seen at two levels. The behaviour level and the linguistic level. Family background and religious background could be responsible for politeness exhibited in the behaviour of the communicators but linguistic politeness is grown and fostered at school. On top of that the present study is in agreement with the study conducted by Permana & Tressyalina (2020) who observed that politeness is learned at both behaviour and linguistic level.

In conclusion therefore, the data collected and analysed from three different tools of data collection reveal that ICS are neither planned nor taught as specific units, topics or themes. What is seen however, is that fact that the nurturing happens spontaneously through counselling as the highest ranked mode, followed by mentorship, modeling, corrections and lecturer seeking as the list mode preferred by the students.

Conclusions

The problem that led to this study was the failure of secondary school learners to have effective and health interpersonal relations in secondary schools, sparking off a lot of assaults, fights, and strikes which in some cases are fatal, leading to death or loss of property

or both. The study therefore investigated the politeness and polite expressions ELT trainers' nurture in the preservice English language teachers. This was based on the assumption that these preservice teachers, when trained in interpersonal communication skills such as politeness and polite expressions, they would nurture the same in their learners in order to harness health interpersonal relations in secondary schools and consequently spread to our society.

For that reason therefore, based on the analysed and discussed findings of this study, the following salient conclusions can be made:

Politeness and polite expressions should be catered for in the ELT curriculum/syllabus since this study established that politeness and polite expressions are successfully taught spontaneously based on the circumstances that arise during lecturer-learner interaction, either in the lecture theaters, outside lecture theaters, lecturers' offices, or in the examination rooms.

Two vital mysteries were unearthed during this study. First of all, the learners admitted to pursue Bachelor of Arts with Education degree in Makerere University, College of Education and External Studies, School of Education in the department of Humanities and language education, and Literature in English and English language section in particular, were so many that the group had to be split into two. This large number of learners are inconsistent in lecture attendance and they mostly come to University when there is course work presentations that require their presence or during examinations. This implies that the majority of the preservice English language teachers lack quality of the training since they may possess the grades but not the knowledge required to teach politeness and polite expressions adequately and sufficiently. Secondly, having discovered that politeness and polite expressions are not catered for in the ELT teaching curriculum, these learners who avail themselves for examination period are inadequately trained since they miss the spontaneous acquisition of these skills which are only summoned when circumstances arise in the lecture rooms or in any learning setting available in the university.

It could be therefore, argued that the prevailing poor relations among secondary school learners and the physical assault in and outside classrooms could be as a result of a majority of poorly trained English language teachers who possess the grades but not the skills. This study argues that the monster called examinations must be dealt with henceforth without any delay. The biggest percentage of marks should be attached to lecture attendance, active participation, engagement and arguments and presentations. Whereas grade should remain vital in selection and placement of learners, the examinations should not determine the grading.

Recommendations

Based on the analysed research findings, discussions and conclusions, it is recommended that:

The English Language Teaching (ELT) curriculum or syllabus should be designed to incorporate interpersonal communication skills, either by integrating relevant topics into existing course units or by proposing a dedicated course unit focused on this area. Explicitly, the content should encompass the teaching of politeness and polite expressions in diverse contexts, enabling PELT to develop essential communication skills.

In order to improve the quality of English language teacher graduates, the university needs to address the staffing disproportion in the School of Education. This can be achieved by either boosting the teaching staff in the Literature in English and English Language section or streamlining the admission of preservice English language teachers to ensure more personalised attention and mentorship.

A revision of the university's marks policy is necessary to prioritise students' lecture engagement, motivation and active participation. Due to the significant impact of grades on learner motivation, the policy should allocate marks for lecture attendance, active participation, group discussions, and coursework presentations. This approach would enable students to track their progress daily, with clear awareness of the marks earned for each attended lecture. Furthermore, the weightage of final examination marks should be reduced to less than 40% to underscore the importance of consistent lecture attendances, engagement and participation in the learning process, ultimately enhancing knowledge and skills acquisition.

References

Barnlund, D. (1970). A TRANSACTIONAL MODEL OF COMMUNICATION. In J. Akin, A. Goldberg, G. Myers & J. Stewart (Ed.), *Language Behavior: A Book of Readings in Communication. For Elwood Murray on the Occasion of His Retirement* (pp. 43-61). Berlin, Boston: De Gruyter Mouton. https://doi.org/10.1515/9783110878752.43

Gonulal, T., & Loewen, S. (2018). Scaffolding Technique. *The TESOL Encyclopedia of English Language Teaching*, 1–5. https://doi.org/10.1002/9781118784235.eelt0180

Hébert, L., & Tabler, J. (2019). A short introduction to semiotics. In An Introduction to Applied Semiotics (pp. 273-278). Routledge.

Hollweck, T. (2015). Robert K. Yin. (2014). Case Study Research Design and Methods. Canadian Journal of Program Evaluation, 30(1), 108-110.

Ivashchyshyn, O., & Kashchyshyn, N. (2020). Types of Politeness in English: Linguistic Aspects and Pedagogical Implications. *Inozenma Philologia*, *133*, 117–124. https://doi.org/10.30970/fpl.2020.133.3176

Kagoda, A. M. (2020). *Teacher Educators' Competences for Promoting Social Innovations in Teacher Education : School of Education, Makerere University*. *July*.

Kagoda, A. M., & Sentongo, J. (2015). Practicing Teachers' Perceptions of Teacher Trainees: Implications for Teacher Education. *Universal Journal of Educational Research*, *3*(2), 148–153. https://doi.org/10.13189/ujer.2015.030211

Meiratnasari, A., Wijayanto, A., & Suparno. (2020). Teacher's perspective on the impact of politeness strategies in the indonesian english textbook on student's communicative competence. *Issues in Language Studies*, *9*(1), 166–178. https://doi.org/10.33736/ils.1807.2020

Nurjati, N., D. Kurnia, F., & Mr., S. (2018). *Linguistic Aspects Revealing Politeness in EFL Community of Practice*. *222* (SoSHEC), 216–221. https://doi.org/10.2991/soshec-18.2018.47

Permana, T. D., & Tressyalina. (2020). *Implementation Politeness in Talk Show "Quality of Education in the Middle of Pandemy" For Learning Speech Skills In Schools*. *485*(Iclle), 337–341. https://doi.org/10.2991/assehr.k.201109.055

Puntambekar, S. (2022). Distributed Scaffolding: Scaffolding Students in Classroom Environments. *Educational Psychology Review*, *34*(1), 451–472. https://doi.org/10.1007/s10648-021-09636-3

Ryan, T. G., Young, D. C., & Kraglund-Gauthier, W. L. (2017). Action research within pre-service teacher education. Transformative Dialogues: Teaching and Learning Journal, 10(3).

Umaroh, L., & Kurniawati, N. (2018). How Does Politeness Emerge in Preoperational Stage? *ETERNAL (English Teaching Journal)*, *6*(2), 1–6. https://doi.org/10.26877/eternal.v6i2.2372

Van de Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in teacher-student interaction: A decade of research. *Educational Psychology Review*, *22*(3), 271–296.

Walqui, A. (2006). Scaffolding instruction for English language learners: A conceptual framework. International journal of bilingual education and bilingualism, 9(2), 159-180.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of child psychology and psychiatry*, *17*(2), 89-100.

Yeomans, M., Kantor, A., & Tingley, D. (2019). The politeness package: Detecting politeness in natural language. *R Journal*, *10*(2), 489–502. https://doi.org/10.32614/RJ-2018-079

Contact email: mnisaac30@gmail.com

ORCID: https://orcid.org/0009-0002-0690-5831

Assessing Metacognitive Skills in Mathematical Problem Solving: A Comparative Study of a Task-Specific Questionnaire and Think Aloud Protocol

Uthpala Athukorala, Institute of Technology University of Moratuwa, Sri Lanka
Dileepa Fernando, Singapore University of Technology and Design, Singapore
Chanakya Wijeratne, University of Colombo, Sri Lanka

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Metacognitive skills play a crucial role in aiding students to comprehend when, why, where, and how to apply their knowledge to mathematical problem-solving. Consequently, teachers seek effective measurements to assess metacognitive skills and identify students with low metacognitive skills in mathematical problem-solving. Think Aloud Protocol (TAP) is recommended as the best method for measuring metacognitive skills in Mathematics. But using TAP is impractical for classes with a large number of students due to administrative challenges and time constraints. Questionnaires, although have less administrative issues, they are not generating reliable data comparable to TAP. To address these challenges, a task-specific questionnaire was designed based on the TAP, boasting a reliability of 0.89 (ordinal alpha) and a content validation score (S-CVI/Ave) of 0.9. The primary objective of this study is to examine whether the data generated by the questionnaire align through data generated by TAP. Twenty (20), third-year undergraduates from the Sri Lanka Technological Campus (SLTC) pursuing a BSc in Information Technology participated in the study. Engaging in the problem-solving process, they verbalized their thoughts, and immediately filled out the newly designed questionnaire. The overall correlation between the questionnaire and TAP (r=0.52) suggests the potential utility of this questionnaire as an alternative to TAP.

Keywords: Assessing Metacognitive Skills, Mathematics, Questionnaire, Thinking Aloud Protocol

iafor
The International Academic Forum
www.iafor.org

1. Introduction

The Covid pandemic in 2020 brought significant transformations to the education sector. With students and teachers confined to their homes to prevent the virus's spread, traditional in-person classes became impossible. However, the passage of time and the need to continue education compelled schools, colleges, and universities to adapt swiftly. They transitioned from physical classrooms to virtual ones. Utilizing online meeting platforms like Zoom, educators worldwide resumed their lessons. This shift marked a profound change in the education landscape over the past five years.

Students remained at home, utilizing online meeting platforms to interact with their teachers and Learning Management Systems (LMS) for accessing notes and completing assignments. This shift eliminated direct connections with teachers and peers, requiring students to manage their studies independently. Students needed a skill to set learning goals and monitor, regulate, and control their cognition, motivation, and behavior according to these goals (Artino, 2007), a skill known as "Self-Regulated Learning (SRL)."

Improving self-regulated learning skills in students, specially who learn in online platforms is essential where teacher interaction and peer support is less (Dabbagh & Kitsantas, 2005). Metacognition is one of the three major components of SRL which describes students' ability to understand and control their cognitive process (Schraw et al., 2006). Having an idea about the students' metacognitive level supports the teacher to take necessary precautions. Hence assessing metacognitive level of the students in the classroom make the opportunity for teachers to expand their support for the students in a broad perspective.

Assessing metacognition is challenging because it is a complex structure that is not externally visible. It is sometimes affected by verbal ability and working memory capacity (Akturk & Sahin, 2011). Previous studies recommend that online measures are preferred for assessing metacognitive skills in mathematical problem solving (Veenman & van Cleef, 2019). However, practical issues with using online measures, especially in large classes, discourage teachers from using them. If a validated questionnaire that has a positive relationship with an online measure and generates accurate responses can replace an online measure with practical issues, it would resolve the usability concerns of online measures. This study aims to examine the relationship between the Questionnaire on Measuring Metacognitive Skills in Mathematical Problem Solving (Athukorala et al., 2024) and the Think Aloud Protocol (TAP) to determine the compatibility of the questionnaire with TAP.

Next sections describe the available methods for measuring metacognition, methodology followed, results and discussion.

2. Literature Review

Research has explored the relationship between SRL and online learning. Dabbagh and Kitsantas (2005) argued that students in digital environments require higher levels of self-regulatory skills compared to those in physical classrooms, due to reduced instructor support and less monitoring of students' attention and progress. An early study by Kinzie (1990) identified self-regulatory skills as one of the three critical factors influencing students' success in online environments. The effective use of SRL is crucial in digital learning settings where students have a high degree of autonomy due to the absence of a physically present instructor (Kinzie, 1990).

Previous studies indicate that learners often struggle with online learning due to a lack of critical self-regulated learning (SRL) skills (Azevedo, 2005). Further research supports the idea that SRL is essential for successful online learning. Broadbent and Poon (2015) discovered a positive and significant relationship between SRL and success in online learning, reinforcing this notion. Therefore, providing SRL support for online learners is likely to enhance their academic success in virtual environments (Wong et al., 2019).

According to Zimmerman, taking responsibility for their own learning involves students being metacognitively, motivationally, and behaviorally engaged in the learning process (Wong et al., 2019). In traditional learning environments, students with effective self-regulated learning (SRL) skills are recognized by researchers and educators as the most successful learners (Wong et al., 2019). Similarly, SRL skills are even more crucial in online environments, which feature high levels of learner autonomy and minimal teacher presence (Wong et al., 2019).

Self-regulation comprises three main components: cognition, metacognition, and motivation (Figure 1) (Schraw et al., 2006). Cognition involves the ability to encode, memorize, and recall information. Metacognition refers to students' capacity to understand and monitor their cognitive processes. Motivation encompasses the beliefs and attitudes that influence the application and development of cognitive and metacognitive abilities. While these three elements are essential for self-regulation, they are not sufficient on their own (Schraw et al., 2006).

Broadbent and Poon (2015) identified four self-regulated learning strategies that significantly impact online learning: metacognition, time management, effort regulation, and critical thinking. Their study highlights that metacognition is a critical factor in developing effective self-regulation strategies in digital learning environments.

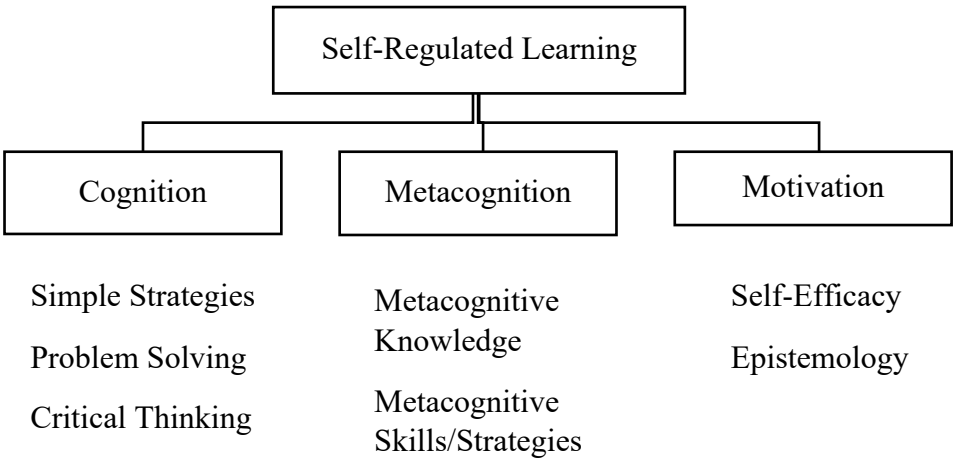


Figure 1: Components of SRL

Metacognition, simply put, is "thinking about thinking" (Akturk & Sahin, 2011). It involves reflecting on and regulating one’s own mental processes. Metacognition is the process of monitoring and evaluating comprehension during learning, representing a higher level of thinking about how to approach and manage a learning task.

Metacognition consists of two main components (Figure 2): metacognitive knowledge and metacognitive skills (Schraw et al., 2006). Metacognitive knowledge includes:

1) **Declarative Knowledge**: Understanding about the learner themselves.
2) **Procedural Knowledge**: Knowing strategies.
3) **Conditional Knowledge**: Understanding why and when to use a particular strategy in a specific context (Schraw et al., 2006).

This type of knowledge involves tasks like taking notes and summarizing main ideas, which are specific to the task at hand (Schuster et al., 2020).

Metacognitive skills, also known as metacognitive strategies, include three components based on Flavell's original categorization:

1) **Planning**: Deciding how to approach a learning task.
2) **Monitoring**: Keeping track of one's comprehension and performance.
3) **Evaluation**: Assessing the effectiveness of one's learning strategies and processes.

Within Self-Regulated Learning (SRL), cognition, motivation, and metacognitive knowledge are non-transferable and task-specific components that directly address specific learning tasks. Conversely, metacognitive skills, which manage a broad range of cognitive and motivational tasks, are task-general and transferable. Therefore, enhancing metacognitive skills is particularly beneficial, as these skills can be applied across various learning contexts.

At the same time, enhancing metacognitive skills can contribute to improving Self-Regulated Learning (SRL) strategies among online learners, as metacognitive skills are a major component of SRL. Hence, assessing metacognitive skills of the students can support to identify who need the improvements.

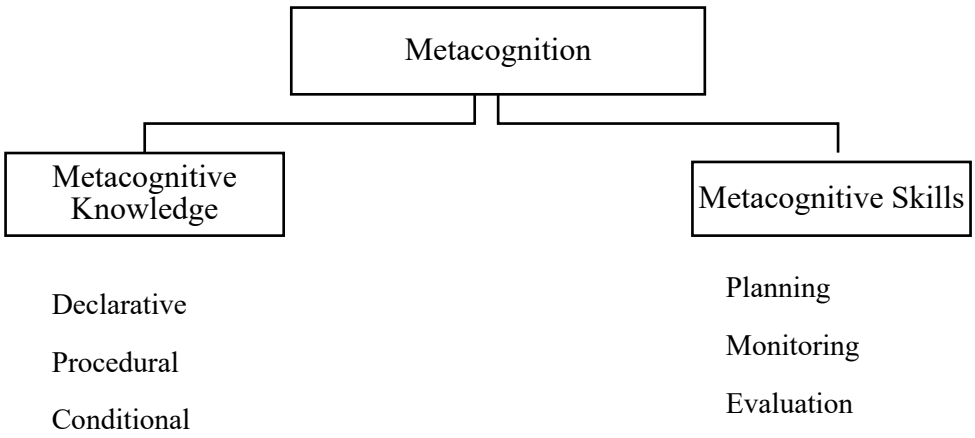


Figure 2: Components of Metacognition

2.1 Available Methods for Measuring Metacognition

For measuring metacognition, various methods can assess metacognitive knowledge and skills either separately or together. According to available literature, these measurement methods can be applied in different settings, categorized as follows:

i. **Method of Implementation**: Offline or Online
ii. **Behavior**: Objective behavior or Self-reporting
iii. **Applied Environment**: Physical classroom or Digital learning environment

i. Method of Implementation

Measurements of metacognition can indeed be categorized into offline and online measures based on when they are administered relative to the task:

a. **Online Measures**: These are taken while the student is actively performing a task. Examples include: Think-aloud protocol, Systematic observations
b. **Offline Measures**: These are administered either before (prospective) or after (retrospective) the task: Interviews, Questionnaires

These categorizations help researchers and educators choose appropriate methods to assess different aspects of metacognition in various educational settings.

ii. Behavior

Objective behavioral measurements in measuring metacognitive skills involve assessing observable behaviors or actions that reflect an individual's metacognitive processes. These measurements emphasize direct observation rather than relying solely on self-reporting (Ozturk, 2017). Examples of objective behavioral measurements include: think aloud protocol, systematical observations, eye tracking in digital learning environment, response time and error tracking. These objective behavioral measures are valuable for assessing how individuals apply metacognitive skills in real-time learning situations, offering a deeper understanding of their cognitive and metacognitive functioning beyond self-reported data.

iii. Environment

There are measures where we can apply physical classrooms and the digital learning environment. Interviews, questionnaires, think aloud protocol, and systematical observations can be applied in physical classroom settings. Online self-report questionnaires, eye tracking, log data analytics, or interactive learning analytics dashboards are some examples that can be applied in the digital environment (Ozturk, 2017; Veenman, 2013; Veenman et al., 2014). Most popular methods that were identified are questionnaires, interviews, and thinking aloud protocol (Ozturk, 2017). Log file analysis and eye tracking in the digital environment are trending. Some common measurement types are discussed below.

2.2 Common Measurement Types

i. Questionnaires

In questionnaires, students present their actions related to metacognition as answers to questions. Sometimes they may interpret their own metacognitive behavior or demonstrate their understanding about metacognition or apply metacognitive strategies. Some popular questionnaires measuring metacognition are tabled below.

Name	Metacognitive Knowledge /Skills or both	Description
1. Metacognitive Awareness of Reading Strategies Inventory (MARSI)	Metacognitive knowledge	To asses adolescent and adult readers' reading strategies and problem solving strategies (Ozturk, 2017).
2. Metacognitive Awareness Inventory (MAI)	Both	To assess adult's general metacognitive knowledge and skills (Ozturk, 2017).
3. Learning and Study Strategy Inventory (LASSI)	Metacognitive skills	Likert type questionnaire on individual's domain general and domain specific knowledge of metacognitive skills/regulation (Ozturk, 2017).
4. Motivated Strategies for Learning Questionnaire (MSLQ)	Metacognitive skills	This is a Likert type questionnaire which assess rehearsal, elaboration, organization, critical thinking, metacognitive monitoring and self-regulated learning.
5. Survey of Reading Strategies (SORS)	Metacognitive skills	Intends to measure use of strategies while reading academic materials.
6. Awareness of Independent Learning Inventory (AILI)	Metacognitive Knowledge, Regulation and Responsiveness.	Valid and reliable instrument for assessing effects of interventions

Table 1: Questionnaires for Measuring Metacognition

ii. Interviews

In interviews, students are asked questions about their metacognitive behavior, self-regulated learning strategies etc. Based on the answers given students' level of metacognition is evaluated. One common interview method is named as Self-Regulated Learning Interview Schedule (SRLIS). Students are asked questions on self-regulation and after that they are asked how they would behave in different situations like classroom discussion, short writing assignment, mathematics assignments, end of term tests, studying at home etc. Their responses are categorized into knowledge, metacognitive strategy use and regulation (Ozturk, 2017).

iii. Think Aloud Protocol

In think aloud protocol, participants are advised to verbalize their thoughts while performing their tasks. Task may be a laboratory experiment, mathematical problem solving or reading exercise. Only in case, participants are silent, assessor may tell "keep talking". Think aloud processes are transcribed and assessed using coding system (Ozturk, 2017). By those coding systems evaluators can identify and quantify the level of metacognition strategy usage, regulation and knowledge (Ozturk, 2017; Veenman & van Cleef, 2019). At least there should be two raters to assess think aloud activity. After evaluation, both raters get together and

discuss about their evaluation and come to a conclusion at points where they have given different marks (Jacobse & Harskamp, 2012; Ozturk, 2017). Think aloud is the only method that opens the opportunity for accessing students' thoughts and metacognitive deliberations parallel to task performance (Veenman & van Cleef, 2019).

iv. Systematical Observations

While student is performing the task, judges observe the activities done by the participants. Judges do not disturb the participants. Often used with young children. As in the think aloud method, there should be a coding system which includes all the possible activities for the evaluation (Ozturk, 2017).

v. Self-Report Judgement

Students are asked to rank their leaning ability before the task assignment. Then, after completing the given task, students again rank their learning and give judgement of their learning. Each student's actual learning is compared with their confidence in learning. This is metacognition monitoring. Both the students who felt they know and do and the students who felt they don't know and did not do are considered as students with better metacognitive skills/regulation (Ozturk, 2017).

vi. Error Detection Paradigm

This method is also used for metacognitive skills. Individuals are presented with texts that contain errors. Students' metacognitive ability is measured from their attention to identify errors in the text. Primary assumption on this is these errors/problems disturb the comprehension of the text and students whose metacognitive monitoring ability is high, will identify these errors while they are reading (Ozturk, 2017).

vii. Measures Used in Computerized Environment

Log file analysis is one method of assessing metacognitive skills in computerized environment. A learning task is performed in the computer and students' activities on the computer is recorded as log data in a separate file. These log file data should be evaluated using a coding system to infer metacognitive activities from these log file data (Veenman et al., 2014).

Eye tracking is also a method that is used to get some impressions about metacognition. No of blinks, eye movements, size of the pupil may reveal some information about metacognition specially metacognitive monitoring (van Gog & Jarodzka, 2013). Relevant information is extracted from the eye movements and transcribe into details about metacognition. Eye tracking data can be coupled with cognitive and metacognitive processes with high sensitivity and specificity and generate algorithms (van Gog & Jarodzka, 2013). They can be adapted in computer environment.

2.3 Online and Offline Methods for Assessing Metacognitive Skills in Mathematical Problem Solving

The previous section examined the available methods for assessing metacognition. It has been recognized that online measures are the optimal choice for evaluating metacognitive

skills in Mathematics (Veenman & van Cleef, 2019). Despite online measures yielding reliable data, conducting these methods can pose administrative challenges. Table 2 illustrates a comparison between online and offline measures for assessing metacognition.

Online measures, such as the think-aloud protocol and systematic observations, are time-consuming methods that are not suitable for larger classes. One of the main differences between offline and online measures is that offline measures rely solely on self-reports from individuals, whereas online measures involve coding student behavior based on externally defined criteria (Veenman & van Cleef, 2019).

In the think-aloud method, students verbalize their thoughts while performing the task. Although this may slow down the process, several studies have confirmed that this verbalization does not significantly affect the task performance (Veenman & van Cleef, 2019). In online observations, judges monitor metacognitive behavior either directly by observing the student or indirectly through video recordings. Observations are suitable when the task is not conducive to verbalization or when the student is not proficient enough to describe the task (e.g., primary students) (Veenman & van Cleef, 2019). Similar to the think-aloud method, observations are also time-consuming.

Log file data analysis, performed while the student is engaged in a task on a computer, is another online method. All students' log file data are automatically analyzed to identify the frequency of metacognitive activities and meaningful patterns in the data set (Veenman & van Cleef, 2019).

In offline measures such as self-report questionnaires, students have to answer based on their activities. In offline measures students have to seek help from their memory about their behaviors. They have to recall what they normally do. If the questionnaire is prospective, memory problems increase since they have to recall earlier experiences. This type of measurements can be often disturbed by the memory failures. Offline methods face validity challenges due to the prompting effect of questions, where inquiries may disrupt genuine self-reports and lead to socially desirable responses. Additionally, questions can create an illusion of familiarity with strategies or skills, prompting students to inaccurately label their behavior. This effect is particularly pronounced among students with limited metacognitive knowledge. Another issue arises with questions about activity frequency, requiring comparisons with others and potentially varying individual reference points. While consistent reference points can enhance measurement reliability, differences in these points among students can lead to disparate data (Veenman & van Cleef, 2019). There are some studies which have done some investigations about online and offline measures.

Sarac and Karakelle (2012) studied the relationship between online and offline measures. They measured metacognition using two offline and online measures. Teacher rating scale and a self-report questionnaire were used as offline measures. 47 fifth grade students participated in the study. The online measures were thinking aloud protocol and accuracy ratings of text comprehension. They concluded that using a combination of both online and offline measures will be more appropriate rather than using only online or offline measure.

Online	Offline
1. Conducts while task is doing	1. Conducts after or before the task.
2. Can conduct in smaller classes. Not practical for larger classes.	2. Can conduct in larger classes.
3. Administration is not easy.	3. Administration is easy.
4. Time consuming.	4. Minimum time consumption
5. Data is more reliable.	5. Data distortions can occur due to memory failures.
6. High response rate.	6. Low response rate and poor responses due to comparisons with various reference points such as the top student in class.

Table 2: Comparison on Online and Offline measures

In 2019, Veenman and van Cleef conducted a study with third grade students to identify the best method for measuring metacognitive regulation/skill. There they used 5 instruments. Two prospective questionnaires before the mathematics task (MSLQ-Motivated Strategies for Learning Questionnaire and ILS-Inventory Learning Styles), two online methods (observations and thinking aloud) and one task specific retrospective questionnaire after the mathematics task. Results revealed that prospective questionnaires have poor convergent and predictive validity in measuring metacognitive skills in mathematics. Retrospective questionnaire did slightly better than retrospective questionnaires. Online methods stand out the offline methods. It is concluded that online measures are preferred over offline measures to measure metacognitive skillfulness in mathematics (Veenman & van Cleef, 2019).

Most of the studies confirm that online measures are suitable for measuring metacognitive skills in mathematics. But conducting online measures is creating administrative issues specifically for large classes. It is debatable to decide whether “offline or online”. Offline methods such as questionnaires are easy to administer even for large number of students. But online measures, even though they are generating reliable data, are not suitable for large classes because of time and effort waste.

The correlation between self-report questionnaires and online assessments methods such as think aloud method, is reported to be low ranging from -0.07 – 0.31 (Schellings et al., 2013). These low values are reported due to several reasons. Limited self-reporting ability of respondents is the main reasons to have poor responses in self-report questionnaires (Schellings et al., 2013). In addition, different metacognitive activities may be measured by each method. Further, offline measures are not bound to a specific task while online measures are always bound to a specific task such as laboratory experiment, mathematical problem solving etc. (Schellings et al., 2013). When measuring metacognition using online measures, respondents will respond based on the activity they are engaged in. But in offline measures, they have to memorize what they did or what they usually do. That is the task general nature of offline measures such as questionnaires.

2.4 Assessing Metacognition: Questionnaire or Think Aloud?

Questionnaires are commonly used to examine metacognition. Respondents deduce their activities during studying while completing questionnaires. Questionnaires focus on the learner's activities during actual learning. Respondents rate the frequency or importance of different learning activities using Likert-type scales with five or seven points. Many

questionnaires target general learning strategies. Questionnaires like the Approaches to Studying Inventory, Study Process Questionnaire, Learning and Study Strategies Inventory (LASSI), and the Motivated Strategies for Learning Questionnaire (MSLQ) reveal how learners usually learn, regardless of the learning environment, task, content, and objectives (Schellings et al., 2013).

Many questionnaires are based on interview-based research, where learners are questioned about conducting learning tasks. Validity of self-reports is assumed to depend on mental episodes persisting in short-term memory for a specific learning task and in long-term memory for a general learning task (Schellings et al., 2013). Questionnaires can vary in specificity, assessing activities in one school domain or specific learning tasks. Mokhtari and Reichard (2002) developed the Metacognitive Awareness of Reading Strategies Inventory (MARSI) for academic reading contexts, assessing students' awareness and perceived use of reading strategies. All questions here ask about “what do you generally do?” in a general reading exercise. Items do not pertain to a specific reading task or a detailed reading assignment (Schellings et al., 2013). There are some efforts on generating task specific questionnaires for different learning tasks. A questionnaire was designed for reading an expository text by Samuelstuen and Bråten in 2007 (2007). Questions are based on the general LASSI instrument. However, these questions were adapted to point to the reading task as a frame of reference (Schellings et al., 2013).

Conducting questionnaires is preferred due to least labor intensive in both administering and processing raw data. Further, questionnaires have reported adequate reliabilities. Questionnaires may vary based on specificity, goals, content and targeted population etc (Schellings et al., 2013). Differences in questions in the questionnaire may lead to low correlations with other measures such as think aloud.

Think aloud is commonly used to assess metacognitive activities in educational research. Participants verbalize their thoughts while they are working on a specific task. These verbalizations are considered as a representation of the underlying thinking process of the current task. These activities are deduced to a well-defined coding system for analyzing. Since individuals have direct access to the working memory, verbalizing their thought process is considered to be more accurate (Schellings et al., 2013). Researchers have found that thinking aloud is a non-reactive measurement method which does not affect the metacognitive activities. It only slows down the process (Schellings et al., 2013). From thinking aloud, unexpected learner activities can be revealed. Further, we can identify new insights from the verbalization of the metacognitive activities. This method reveals information about activities or behaviors that are not yet automated (Schellings et al., 2013). Thinking aloud has a limited scope where non-automated processes in the mind is not revealed. Interpretation of thinking aloud process may require trained raters, which has the possibility of creating interrater issues. Thinking aloud protocol which is used for different tasks may have different evaluation methods and coding systems which may impact the consistency of the method (Schellings et al., 2013).

Even though thinking aloud is recognized as a suitable option for collecting maximum amount of information regarding it may not cover information such as facial expressions and silent moments. When unspoken process is not evaluated, it may create some uncertainty. At the same time, verbal reports may not complete since participants may not reveal their complete thought process.

Hence, both questionnaires and think aloud have their own pros and cons. There are studies which have been conducted to study the relationship between think aloud and questionnaire. In a study by Veenman et al., 2003, questionnaires such as the Inventory Learning Styles (ILS) and the Motivated Strategies for Learning Questionnaire (MSLQ) were administered to students prior to tasks while thinking aloud. Correlations between questionnaire scores and think-aloud measures varied, indicating some inconsistency in the assessment of metacognitive skills (Veenman et al., 2003).

Cromley and Azevedo (2007)conducted a study comparing three parallel strategy-use measures: a general questionnaire (MARSI), think-aloud protocols, and a multiple-choice strategy-use measure. The multiple-choice strategy-use measure required participants to read a passage and choose the best answer from four options, capturing actual strategy use. Both the multiple-choice measure and think-aloud protocols correlated significantly with reading comprehension measures and with each other. However, the MARSI showed non-significant correlations with the other measures, indicating potential limitations in its assessment of strategy use (Cromley & Azevedo, 2007).

Several studies have indicated the superiority of online measures in assessing metacognition, particularly in the context of mathematical problem-solving (Veenman & van Cleef, 2019). Veenman and his team found a moderate correlation between self-report questionnaires and online Think Aloud methods, suggesting the effectiveness of online approaches for evaluating metacognitive skills (Veenman & van Cleef, 2019). Emphasizing the importance of online methods in assessing metacognition, Veenman recommended their preference over offline methods, especially in mathematical contexts (Veenman & van Cleef, 2019). Despite the advantages, conducting the Think Aloud Protocol in larger classes presents several challenges, as highlighted by Schellings and colleagues, who noted its suitability primarily for research purposes rather than practical applications due to its labor-intensive nature (Schellings et al., 2013).

Therefore, employing the Think Aloud method to assess metacognition in Digital Learning Environments (DLEs) proves impractical given the large class sizes. Nonetheless, there remains potential for developing questionnaires based on the Think Aloud method. However, correlations between questionnaire data and Think Aloud measures typically range from moderate to low (Schellings et al., 2013). When comparing questionnaires with Think Aloud, the results vary. Researchers have observed that general questionnaires demonstrate a low correlation (0.22) with Think Aloud, whereas task-specific questionnaires show a moderately high correlation (0.42) (Schellings et al., 2013). Since questionnaires inquire about activities that students performed, they rely on long-term memory. However, they may not accurately represent the actual activities due to memory limitations (Schellings et al., 2013). Responses to questionnaires may be influenced by varying reference points, such as comparing oneself with others, like the teacher or the best/worst student in the class, contributing to the low correspondence of the questionnaire. Even though students may use more strategic activities, they are constrained by the questionnaire provided. Students may report activities as effective not because they use them, but because they believe they are effective. Variations in rating the activities in questionnaires and Think Aloud create non-correspondence between the two. For example, since Think Aloud uses a frequency scale, questionnaires measuring the usefulness of activities do not exhibit a high relationship (Schellings et al., 2013). Due to these reasons, self-report questionnaires and the Think Aloud protocol suffer from low correlations.

Schellings and colleagues (2013) developed a questionnaire to assess metacognition in reading activities, modeled after a taxonomy for coding Thinking Aloud protocols. Although the scale had some validity concerns, it exhibited a promising correlation (r=0.63) with Thinking Aloud. However, there is currently no domain-specific questionnaire for Mathematical problem solving derived from Thinking Aloud. In this study, a questionnaire that was constructed based on the scoring system devised by Veenman and colleagues (2000;2005) for systematic observations utilized in Thinking Aloud during Mathematical problem solving (Athukorala et al., 2024) is compared with Thinking Aloud Protocol to investigate how far this questionnaire is compatible with Thinking Aloud Protocol.

3. Methodology

3.1 Questionnaire Design

As mentioned above, the questionnaire on Measuring Metacognitive skills on Mathematical Problem Solving was developed based on the systematical observations suggested by Veenman and colleagues (Athukorala et al., 2024). It has 12 questions aligned with systematical observations in think aloud protocol. There are three possible answers such as "Often", "Sometimes" and "Almost never" which measures the frequency of each activity in Mathematical Problem Solving similar to Think Aloud evaluation. Student selects the suitable answer from the given 3 answers.

Content validity, construct validity and the reliability were calculated to ensure the results generated by the questionnaire. Content Validity Index (S-CVI/Ave) was 0.9 (Athukorala et al., 2024) and it confirmed the content validity of all the questions. Seven experts from the discipline of Mathematical education answered a questionnaire by studying the relevance, meaning and the correctness of it. Convergent and divergent validity were calculated to confirm the construct validity. Correlation between the questionnaire and the Cognitive and Metacognitive component of MSLQ (Metacognitive Strategies of Learning Questionnaire-35 questions) was calculated and it showed a significant correlation with MSLQ-Cognitive and Metacognitive component (Athukorala et al., 2024). Divergent validity was tested between the questionnaire and the Test Anxiety component of MSLQ. It did not show any significant correlation confirming the divergent validity (Athukorala et al., 2024). Hence, the newly designed questionnaire ensures the validity of the results it generates. Reliability of the questionnaire was calculated using ordinal alpha since the data generated by the questionnaire is ordinal. It was 0.89 endorsing a higher reliability of the results it generates (Athukorala et al., 2024).

As this questionnaire was designed based on the systematical observations on Thinking Aloud protocol, this study expects to study the relationship between the Think Aloud Protocol and the newly designed questionnaire. Methodology followed was described below.

3.2 Resources

Questionnaire on Measuring Metacognitive Skills on Mathematical Problem Solving.

3.3 Data Collection

27 students in third year who are following BSc in Information Technology (Hons) in Sri Lanka Technological Campus, Sri Lanka participated for the study. They first signed a

consent form which indicated their consent on participating the study. Every participant was rewarded for their participation. 20 responses were eligible for the analysis.

3.4 Procedure

Students were given a problem on Linear Congruential Method in Advanced Cryptography module. From the beginning of the solving process to the end, students are advised to verbalize their thought process (Thinking Aloud Activity) and record it. As soon as the solving process is over, students are given the Questionnaire on Measuring Metacognitive Skills on Mathematical Problem Solving.

3.5 Evaluation

Thinking Aloud activity was evaluated by two examiners and the average mark from both evaluators is considered. For that, evaluation criteria in Table 3 was used (Jacobse & Harskamp, 2012). For questionnaire, there were 3 options to be selected which describes the frequency of the activities that students are performing when they solve a Mathematical problem. For the options, "Often, Sometimes and No at all" score of 2, 1 and 0 are given respectively. Then the total marks for both evaluations for each student were calculated. Correlation between the Think Aloud measures and the questionnaire was calculated.

Results are discussed in the next section.

Think Aloud Evaluation			
Activity	**Executed (2 marks)**	**Partially executed (1 mark)**	**Not executed (0)**
(1) entirely reading the problem statement (as incomplete task analysis leads to trail-and-error			
(2) selection of relevant data (task analysis)			
(3) paraphrasing of what was asked for (task analysis and goal setting)			
(4) making a drawing related to the problem (task analysis)			
(5) designing an action plan before actually calculating (planning)			
(6) calculation correctness (avoid sloppiness)			
(7) avoiding negligent mistakes (such as inattentively switching numbers)			
(8) orderly note-taking of problem solving steps (in order to keep an overview of problem-solving steps and create an opportunity for checking outcomes)			
(9) checking the answer			
(10) drawing a conclusion (recapitulating)			

(11) reflecting on the answer (referring to the problem statement)			
(12) relating to earlier problems solved (reflection with the aim to learn from one's experiences).			

Table 3:Marking Rubric for Think Aloud Protocol (Jacobse & Harskamp, 2012)

4. Results

Data from 20 students out of 27 (74%) were able to use for results analysis. Each student's score for both questionnaire (Q) and think aloud (TAP) activity was used for the analysis. Using Statistical Package for Social Science (SPSS) software, correlation between each component of metacognitive skills (planning, monitoring and evaluation) and overall correlation was calculated. Data generated from both methods are ordinal. Hence, correlation was calculated using Spearman's rho. The Table 4, Table 5 and table 6 show the correlation coefficient of each component.

Correlations				
			PlanningTAP	PlanningQ
Spearman's rho	PlanningTAP	Correlation Coefficient	1.000	.530*
		Sig. (2-tailed)	.	.016
		N	20	20
	PlanningQ	Correlation Coefficient	.530*	1.000
		Sig. (2-tailed)	.016	.
		N	20	20
*. Correlation is significant at the 0.05 level (2-tailed).				

Table 4: Correlation of Planning Component

Correlations				
			MonitoringTAP	MonitoringQ
Spearman's rho	MonitoringTAP	Correlation Coefficient	1.000	.530*
		Sig. (2-tailed)	.	.016
		N	20	20
	MonitoringQ	Correlation Coefficient	.530*	1.000
		Sig. (2-tailed)	.016	.
		N	20	20
*. Correlation is significant at the 0.05 level (2-tailed).				

Table 5: Correlation of Monitoring Component

Correlations				
			EvaluationTAP	EvaluationQ
Spearman's rho	EvaluationTAP	Correlation Coefficient	1.000	.500*
		Sig. (2-tailed)	.	.025
		N	20	20
	EvaluationQ	Correlation Coefficient	.500*	1.000
		Sig. (2-tailed)	.025	.
		N	20	20
*. Correlation is significant at the 0.05 level (2-tailed).				

Table 6: Correlation of Evaluation Component

The Table 7 shows the overall correlation between the questionnaire and the think aloud protocol. It is 0.517 with 0.05 significant level.

Correlations				
			TAP	Q
Spearman's rho	TAP	Correlation Coefficient	1.000	.517*
		Sig. (2-tailed)	.	.020
		N	20	20
	Q	Correlation Coefficient	.517*	1.000
		Sig. (2-tailed)	.020	.
		N	20	20

*. Correlation is significant at the 0.05 level (2-tailed).

Table 7: Overall Correlation between the Questionnaire and Think Aloud

5. Challenges and Limitations

It was challenging to find students willing to participate in the think-aloud exercises. Because they had to verbalize their thought processes while solving problems, many students hesitated and showed reluctance to take part. Eventually, 27 students agreed to participate, but only 20 recordings met the required conditions. Issues such as incomplete recordings, recordings that did not sufficiently describe the entire thought process, and unclear recordings contributed to the low number of usable responses for the study.

6. Discussion

Metacognitive skills play a significant role in mathematics (Özcan, 2014). Assessing the metacognitive skills of each student in the classroom can provide valuable opportunities for both students and teachers to enhance the teaching-learning process. Veenman and colleagues (2019) conducted a study comparing online and offline measures of metacognitive skills, concluding that online measures are preferable to offline measures (Veenman & van Cleef, 2019). However, implementing online assessment methods in the classroom poses challenges due to time and effort constraints.

Offline measures are easier to administer, but their reliability in generating accurate information is a concern. Therefore, it is essential to investigate the relationship between offline measures and online measures. This study aimed to examine the correlation between

an offline measure, the Questionnaire on Measuring Metacognitive Skills on Mathematical Problem Solving (Q), and the Think-Aloud Protocol (TAP). The results revealed a moderate correlation of 0.52 between the questionnaire and the think-aloud protocol, indicating a moderate level of agreement between the two measures.

Furthermore, the study compared three main components—planning, monitoring, and evaluation—between the questionnaire (Q) and the think-aloud protocol (TAP). All three components showed moderate correlations with the think-aloud method.

7. Conclusion

Due to practical challenges in implementing online assessment methods to measure metacognitive skills in classrooms, there is a pressing need to develop offline measures that can generate reliable information comparable to online measures. Online methods like the think-aloud protocol, systematic observations, etc., are suitable for research purposes and small classes. However, they are not feasible for large classes or massive online courses. In such scenarios, offline measures that have been validated against online measures and demonstrate comparable reliability play a crucial role. The overall correlation between the questionnaire and TAP (r=0.52) suggests the potential utility of this questionnaire as an alternative to TAP.

References

Akturk, A. O., & Sahin, I. (2011). Literature Review on Metacognition and its Measurement. *Procedia - Social and Behavioral Sciences*, *15*, 3731–3736. https://doi.org/10.1016/j.sbspro.2011.04.364

Athukorala, U., Fernando, D., & Wijeratne, C. (2024, February 13). Thinking Aloud Protocol Based Self-Report Questionnaire to Measure Metacognitive Skills in Mathematical Problem Solving. *The Asian Conference on Education 2023 Official Conference Proceedings*. The 15th Asian Conference on Education, Japan.

Cromley, J. G., & Azevedo, R. (2007). Self-report of reading comprehension strategies: What are we measuring? *Metacognition and Learning*, *1*(3), 229–247. https://doi.org/10.1007/s11409-006-9002-5

Dabbagh, N., & Kitsantas, A. (2005). Using Web-based Pedagogical Tools as Scaffolds for Self-Regulated Learning. *Instructional Science*, *33*(5–6), 513–540. https://doi.org/10.1007/s11251-005-1278-3

Jacobse, A. E., & Harskamp, E. G. (2012). Towards efficient measurement of metacognition in mathematical problem solving. *Metacognition and Learning*, *7*(2), 133–149. https://doi.org/10.1007/s11409-012-9088-x

Mokhtari, K., & Reichard, C. A. (2002). Assessing students' metacognitive awareness of reading strategies. *Journal of Educational Psychology*, *94*(2), 249–259. https://doi.org/10.1037/0022-0663.94.2.249

Ozturk, N. (2017). Assessing Metacognition: Theory and Practices. *International Journal of Assessment Tools in Education*, 134–134. https://doi.org/10.21449/ijate.298299

Samuelstuen, M. S., & Bråten, I. (2007). Examining the validity of self-reports on scales measuring students' strategic processing. *British Journal of Educational Psychology*, *77*(2), 351–378. https://doi.org/10.1348/000709906X106147

Saraç, S., & Karakelle, S. (2012). *On-line and Off-line Assessment of Metacognition*. 15.

Schellings, G. L. M., Veenman, M. V. J., Van Hout-Wolters, G., & Meijer J. (2013). Assessing metacognitive activities: The in-depth comparison of a task-specific questionnaire with think-aloud protocols. *European Journal of Psychology of Education*. https://doi.org/10.1007/s10212-012-0149-y

Schraw, G., Crippen, K. J., & Hartley, K. (2006). Promoting Self-Regulation in Science Education: Metacognition as Part of a Broader Perspective on Learning. *Research in Science Education*, *36*(1–2), 111–139. https://doi.org/10.1007/s11165-005-3917-8

van Gog, T., & Jarodzka, H. (2013). Eye Tracking as a Tool to Study and Enhance Cognitive and Metacognitive Processes in Computer-Based Learning Environments. In R. Azevedo & V. Aleven (Eds.), *International Handbook of Metacognition and Learning Technologies* (Vol. 28, pp. 143–156). Springer New York. https://doi.org/10.1007/978-1-4419-5546-3_10

Veenman, M. V. J., Bavelaar, L., De Wolf, L., & Van Haaren, M. G. P. (2014). The on-line assessment of metacognitive skills in a computerized learning environment. *Learning and Individual Differences*, *29*, 123–130. https://doi.org/10.1016/j.lindif.2013.01.003

Veenman, M. V. J., Prins, F. J., & Verheij, J. (2003). Learning styles: Self-reports versus thinking-aloud measures. *British Journal of Educational Psychology*, *73*(3), 357–372. https://doi.org/10.1348/000709903322275885

Veenman, M. V. J., & van Cleef, D. (2019). Measuring metacognitive skills for mathematics: Students' self-reports versus on-line assessment methods. *ZDM*, *51*(4), 691–701. https://doi.org/10.1007/s11858-018-1006-5

Contact email: uthpalap@itum.mrt.ac.lk

Investigating the Relationship Between Gender Perception and Women's Representation in Higher Education Management and Leadership Positions

Mercy Olajumoke Kutu, University of Mpumalanga, South Africa
Thoko Mayekiso, University of Mpumalanga, South Africa

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Gender issues in management and leadership in higher education institutions (HEIs) continue to be a global phenomenon, as well as a significant one in post-Apartheid South Africa. Despite several measures to promote gender equality, women's proportion in management and leadership in HEIs remains low. This mixed methods paper formed part of the larger study which was conducted to understand the dynamic of gender on women's representation in management and leadership positions in HEIs. The research was conducted in two selected universities in South Africa. Self-developed Five-Point Likert Scale questionnaires were used to collect data from 151 of the 289 sampled academic and non-academic respondents. Additionally, face-to-face interviews were conducted with 10 selected participants from these universities. The qualitative data were analysed thematically, while the quantitative data were analysed using SPSS with Descriptive Statistics, a One-Way Analysis of Variance and a Pearson Correlation Coefficient. The study found a significant ($p<0.001$) relationship between gender identity and gender perception with a negative correlation (-0.180^{*}). It revealed a significant relationship between gender perception and perception of women's representation in HEIs' management and leadership positions ($p=0.004$) with a positive correlation (0.360^{**}). The study revealed how gender conceptualisation is embedded in society and determines how women's representation in HEIs' management and leadership is viewed. It found gender as a systematic phenomenon whereby cultural processes undermine the role of women. Notwithstanding, the various interventions from various stakeholders, the study suggested that competency and capability must play a critical role in addressing gender inequality in HEIs.

Keywords: Gender, Gender Perception, Women's Representation, Higher Education, Management and Leadership

iafor
The International Academic Forum
www.iafor.org

Introduction and Background to the Study

This study aimed to understand the perspectives of higher education institutions (HEIs) staff members on gender and women's representation in management and leadership. This was to understand the dynamic of gender and gender perception on women's representation in HEIs' management and leadership positions. Women's representation in management and leadership at higher education remains a global phenomenon as it is embedded in achieving gender equality (Jackson, 2019; Tran & Nguyen, 2020; Aiston & Fo, 2021). Gender equality discourses encompass women's empowerment and have been well-documented among policymakers and academics recently (Pathania, 2017). This is further underpinned by the United Nations (UN) Sustainable Development Goal (SDG) number 5, which seeks to promote gender equality and the empowerment of all women and girls (United Nations, 2020).

Despite the significant increases in the level of participation of women in HEIs, women's representation in management and leadership remains limited, even in more progressive regions globally (Azizi, Abdellatif, Nasrullah, Ali, Ding & Khosa, 2022; Meza-Mejia, Villareal-Garcia & Ortega-Barba, 2023; O'Connor, Carvalho, Vabø & Cardoso, 2015). O Conor (2020) found that men made up 86% of the heads of universities and 76% of professorial level across Europe. Likewise, across Canadian HEIs, men continue to dominate management and leadership positions (Ornstein, Stewart & Drakich, 2007; Johnson & Howsam, 2020; Cukier, Adamu, Wall-Andrews & Elmi, 2021; Azizi *et al.*, 2022). Several scholars have assessed the influence of numerous demographic factors on representation in management and leadership positions. Cukier *et al.* (2021) explored the demographic composition of academic leaders at Canadian universities, particularly through the lens of race. The study found that despite gender parity being reached at almost half of Canada's universities, there was a limited representation of racial minorities in senior leadership positions (Cukier *et al.*, 2021:570). Additionally, among minorities present in senior leadership positions in HEIs, it was observed that men had more representation than women. It was further highlighted that white women across most Canadian universities were more represented in senior leadership positions than women of colour (Cukier *et al.*, 2021:571-574). This finding is consistent with Johnson and Howsam (2020) who argued that despite the overrepresentation of white men in senior administrative leadership positions at Canadian HEIs, white women seemingly faced fewer barriers in attaining such roles as compared to the minority groups. Across North America's top 50 universities, five of which are situated in Canada, it was found that despite evidence of gender parity in senior leadership positions, women lacked representation in presidency and chancellorship roles (Azizi *et al.*, 2022). Following Hunt (2022) Navas and Siriwato (2024) argued that Canada has the highest proportion of women in its senior civil service and has ensured gender parity in the civil service. While this is a huge achievement, it is not the same in higher education representation. Azizi et al. (2022) finding is further supported by Cukier *et al.* (2021) which showed that women only took up 30.7% of presidency positions across Canadian universities, compared to 69.3% representation of men. Islam, Hack-Polay, Rahman, Jantan, Mas and Kordowicz (2023) opined that the situation is the same in Asian universities where the positions of vice-chancellor, deputy chancellor treasurer and registrar are still male-dominated. Likewise, the study of Tran and Nguyen (2020) showed that men are preferred leaders in Vietnamese universities due to unconscious prejudices against women.

Studies have stressed the importance of gender equality in South Africa's HEIs, many of which are shaped by historical injustices which remain persistent (Dunn et al., 2014; Akala &

Divala, 2016; Moodly & Toni, 2017). As far as examining gender (in)equality at HEIs in South Africa is concerned, scholars such as Phakeng (2015); Moodly and Toni (2017); Zulu (2017); Moodly (2021) and Mayekiso (2022) have noted the disproportionate of women in management and leadership positions in HEIs. Moodly (2021) reported the trend in HEIs' leadership in South Africa. Moodly's study reported a positive trend and achievement with 53 per cent of women leading as deputy vice-chancellors within South African educational leadership compared to only 26 per cent in 2013. It however established that despite all the changes in leadership at public universities over the last decade and the aspiration for 50/50 representation of women and men in leadership, only 23 per cent of twenty-six universities in South Africa have women vice-chancellors. The study also found that the percentage jumped from 15.1 per cent because of the two newly appointed vice-chancellors at the University of South Africa and Walter Sisulu University. It further reported a skew in the proportion of women's representation in positions such as operations, transformation, deans, and registrars with most of them being male. Likewise, Mayekiso (2022:10) noted the improvement in women's representation in leadership positions in HEIs but argued that "there are only six female vice-chancellors out of 26 universities." Accordingly, the Female Academics Leaders Fellowship (FALF, 2022) based at the University of the Witwatersrand (Wits) South Africa reported that less than 5% of Professors are black females. The current study investigated the dynamic of gender and women's representation in higher education management and leadership positions. This was to establish the relationship between gender perception and women's representation in higher education management and leadership. Gender perception is conceived as peoples' perceptions of gender roles and behaviours based on femininity and masculinity traits (Mergaert, van der Heyden, Rimkute & Duarte, 2013) as guided by gender norms. Gender norms are referred to as "informal rules and shared social expectations that distinguish expected behaviour based on gender" (Marcus, Harper, Brodbeck & Page, 2015: 3). Gender norms are societal underpinning, as they are imbued in societal norms which determine roles and expectations. Although gender norms might vary from one society to the other, they dictate expected behaviours and roles based on gender within groups and societies. According to Butler (1999), people tend to act or perform gender based on expected behaviours. Likewise, Mutongi (2020) agreed that people are active agents who create and modify roles for themselves.

Marcus et al. (2015) believed that gender norms may not be harmful as they could help in developing life skills. However, it was thought that in practice, gender norms reflect inequality in the distribution of power and resources and thus disadvantage women and girls. In the context of management and leadership positions, gender norms sometimes determine who assumes these positions and therefore manifest gender inequality. Gender norms as supported by social and cultural norms are argued to constitute a major barrier to women's attainment of management and leadership positions (Hanna, Collins., Moyer, Azcona, Bhatt & Valero). It is thought in this present study that attainment of gender equality in HEIs' management and leadership might be impossible without a holistic understanding of how gender is perceived about women's representation in higher education management and leadership. As such, the following questions navigated the study (i) How is gender perceived in the context of management and leadership among HEIs' staff members? (ii) What is the relationship between gender identity and perception among HEIs' staff members? (iii) What is the relationship between gender perception and women's representation in HEIs' management and leadership positions?

The study aimed to understand the dynamic of gender and gender perception on women's representation in HEIs' management and leadership positions. The objectives were to:

understand how gender is perceived among HEIs' staff members; establish the relationship between gender identity and perception among HEIs' staff members and establish the relationship between gender perception and women's representation in HEIs' management and leadership positions. The following two sets of hypotheses guided the study:

- H0: Gender identity exerts no influence on gender perception among higher education staff members
- H1: Gender identity exerts influence on gender perception among higher education staff members
- H0: There is no relationship between gender perception and women's representation in higher education management and leadership
- H1: There is a relationship between gender perception and women's representation in higher education management and leadership

Research Design and Methodology

The quantitative and qualitative research design and methodology were used to collect data for the study. Survey questionnaires were used to generate quantitative data from the study's respondents. The study employed qualitative interviews to explore the experiences and realities of ten selected participants, this is epistemologically entrenched in seeking to understand participants' viewpoints based on interactions between researchers and participants (Kivunja & Kiyuni, 2017). The units of analysis in the study were academic and non-academic staff in higher education settings. Two higher education institutions were selected for the study. Emphasis was placed on inclusivity. Hence, women, men and non-binary people were included in the study to ensure that the unique perspectives and voices of people in HEIs were well represented. Two hundred and eighty-nine samples were randomly selected for the study. Five-point Likert Scale survey questionnaires containing seventeen items were developed to measure respondents' perceptions of gender and women's representation in higher education leadership.

Process of Conducting the Study

The proposal for the study was submitted to the two selected universities for ethical clearance to ensure acceptable ethical research standards (Hasan, Rana, Chowdhury, Dola & Rony, 2021). Subsequently, consent to participate in the study was sought from the participants. Informed consent and the principles of anonymity, no harm, both psychological and social harm, and respect as noted by Ketefian (2015) were strictly followed during the study's implementation. The purpose of the study was highlighted in the consent form, this included how the data would be collected and used (Zong & Matias, 2022). Participants were informed that they could withdraw their participation in the study at any given time.

Self-developed survey questionnaires were administered to 151 of the 289 selected respondents from the selected universities. Five-point Likert scales were utilised to assess respondents' perceptions of gender and women's representation in HEIs management and leadership. Similarly, data were collected from ten purposefully selected participants in management and or leadership positions who participated in individual face-to-face interviews to gain a better understanding of their perceptions of the phenomenon. Data were collected through semi-structured interviews where participants were presented with open-ended questions. Open-ended questions allowed participants to express their thoughts and opinions (Albudaiwi & Allen, 2018). Interviews were conducted physically and virtually through the Microsoft Teams videoconferencing platform. The qualitative data were analysed

using thematic analysis within the compiling, disassembling, reassembling, interpreting, and concluding (Castleberry & Nolen, 2018). The quantitative data were analysed using SPSS with descriptive statistics and One-way Analysis of Variance (ANOVA) and Pearson Correlation Coefficient.

Findings and Discussion

The study sought to understand the relationship between the perception of gender and women's representation in higher education management and leadership. The research questions that guided the study were answered quantitatively and qualitatively. The demographic information of the participants is shown in Figures 1-4.

Participants' Demographic Information

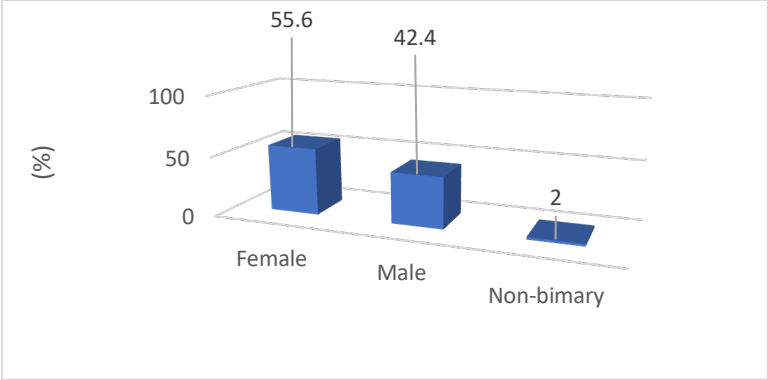


Figure 1: Respondents' Gender Identity

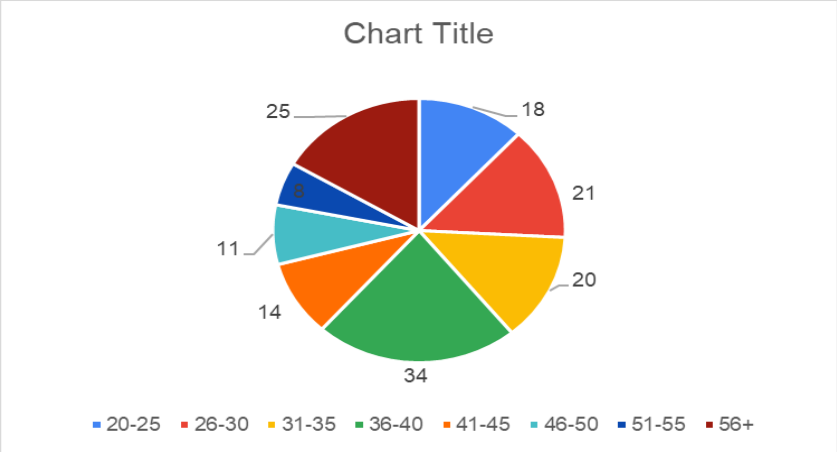


Figure 2: Respondents' Age Range

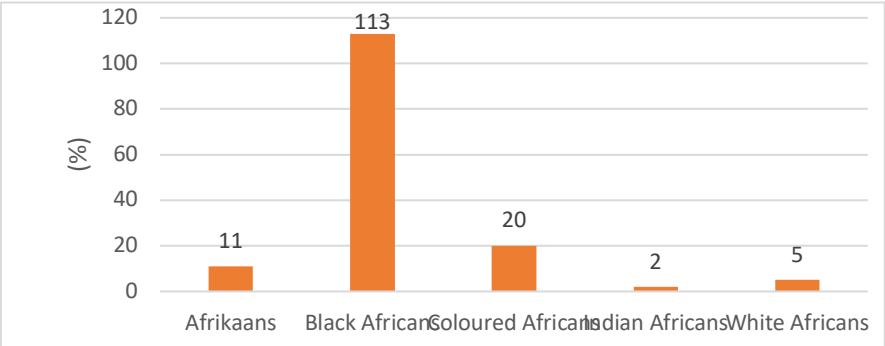


Figure 3: Respondents' Cultural Background

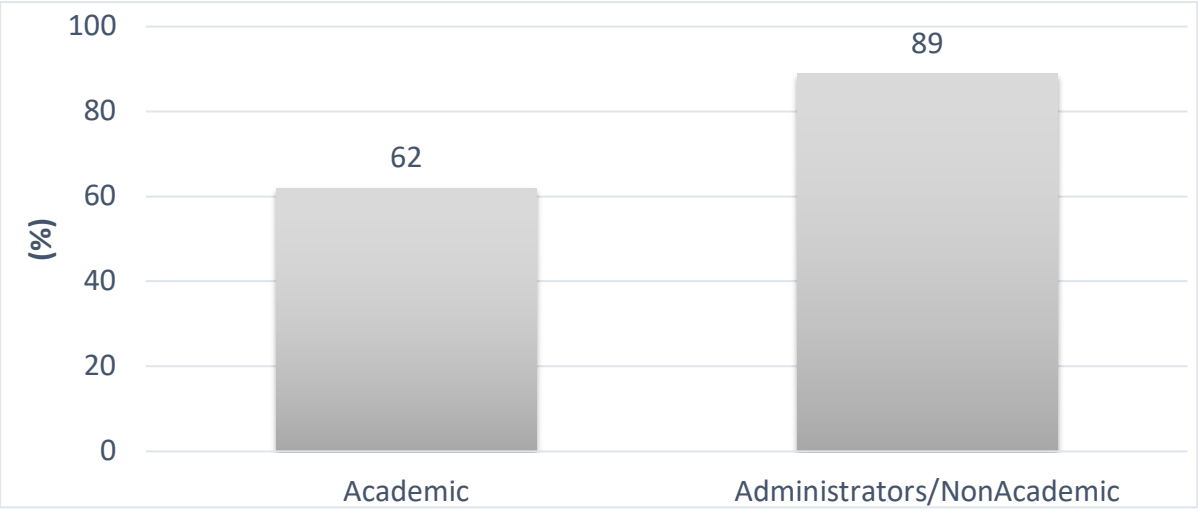


Figure 4: Respondents' Designation

The above figures show that females are the dominant respondents (56.6%) while gender binary is the least (2%). The prominent age group were ages 36-40 (34%) followed by ages 56+ (25%). Among the respondents, the black Africans were the dominant group followed by coloured Africans. The dominant respondents were non-academic/administrative staff members. Out of the respondents, 10 staff members who were in leadership positions were selected to participate in individual face-to-face interviews, four females and six males each. In the next tables (Tables 1-4), the findings of the study are depicted.

Table 1: Perception of Gender

S/N	Variable statements	Frequency distribution and percentage in bracket					Mean
1	Women and men are gendered	9 (6.0)	5 (3.3)	22 (14.6)	59 (39.1)	56 (37.0)	3.98
2	Gender is not about being female or male	40 (26.5)	25 (16.6)	22 (14.6)	34 (22.5)	20 (19.9)	2.93
3	Gender categorisation is based on social roles and power relations	25 (16.6)	17 (11.3)	20 (13.2)	50 (33.1)	39 (25.8)	3.40
4	There should be a distinction between what society expects of women and men	41 (27.2)	28 (18.5)	24 (15.9)	27 (17.9)	31 (20.5)	2.86
5	Gender is synonymous with sex	33 (21.9)	21 (13.9)	18 (11.9)	35 (23.2)	44 (29.1)	3.24
6	Gender is an identity and people conform to gender based on culture, norms, and belief systems	14 (9.3)	5 (3.3)	22 (14.6)	67 (44.4)	43 (28.4)	3.79
7	Differences between women and men are the same everywhere	34 (22.5)	45 (29.8)	31 (20.5)	22 (14.6)	19 (12.6)	2.65
8	Gender is created and influenced by society	19 (12.6)	12 (7.9)	18 (11.9)	53 (35.1)	49 (32.5)	3.67
9	Women and men should not be described based on their biological capacities	22 (14.6)	17 (11.3)	18 (11.9)	42 (27.8)	52 (34.4)	3.56

10	While we have people who can identify themselves as female/male, we have people who are different	13 (8.6)	4 (2.6)	17 (11.3)	59 (39.1)	58 (38.4)	3.96
	Overall Mean Total						3.40

Seven out of the ten statements used to measure perception of gender have a mean score of over 3, this means that respondents agreed with the statements. Respondents accordingly believed that:

> *Women and men are gendered*; *gender is an identity and people conform to gender based on culture, norms, and belief systems*; *gender is created and influenced by society, while we have people who can identify themselves as female/male, we have people who are different*.

Likewise, respondents' scores of below 3.00 in three of the statements showed their disagreement. As such, they disagreed that:

> *There should be a distinction between what society expects of women and men; Gender is not about being female or male and Differences between women and men are the same everywhere*.

However, the overall mean score of 3.40 showed that respondents are in the direction of agreeing with how gender is perceived in our society. Gender perception is underpinned by peoples' perceptions of gender roles and behaviours based on femininity and masculinity traits (Mergaert, et al., 2013). Gender perception is guided by gender norms as underpinned by social and cultural norms, although different from one society or group to the other.

Table 2: Perception of Women's Representation in Management and Leadership

S/N	Variable statements	Frequency distribution and percentage in bracket					Mean
1	Many women are enthusiastic to lead in higher education management and leadership	4 (2.6)	8 (5.3)	39 (25.8)	65 (43.1)	35 (23.2)	3.79
2	Both women and men still hold intrinsic biases against women's leadership in higher education	5 (3.3)	8 (5.3)	38 (25.2)	64 (42.4)	36 (23.8)	3.78
3	Regardless of their leadership styles, female leaders and managers often confront challenges in terms of public perception of the effectiveness of their leadership	8 (5.3)	11 (7.3)	44 (29.1)	63 41.7)	25 (16.6)	3.57
4	Women tend to lead differently compared to men	11 (7.3)	13 (8.6)	28 (18.5)	70 (46.4)	29 (19.2)	3.62
5	Women are more accepted and respected in management/leadership positions	24 (25.9)	38 (25.2)	55 (36.4)	22 (14.6)	12 (7.9)	2.74

6	When women are promoted to management/leadership positions they are more likely to perform better than men	14 (9.3)	18 (11.9)	61 (40.4)	39 (25.8)	19 (12.6)	3.21
7	I prefer working under women's management/leadership	6 (4.0)	16 (10.6)	45 (29.8)	62 (41.1)	22 (14.6)	3.25
	Mean Overall Total						3.42

The overall means score of 3.42 in Table 2 showed that the respondents agreed with the statements used to measure the perception of women's representation in management and leadership positions. The response's mean scores showed that many women are enthusiastic to lead. However, despite their *leadership styles and performance while promoted to management and leadership positions, both women and men still hold intrinsic biases against them, and they are not likely to be accepted and respected in management/leadership positions*. The above further reiterated the role of gender norms as supported by social norms which Hanna et al. (2023) presented as the major barriers to women's attainment of management and leadership positions.

Table 3: Participants' perception of gender and women's representation/leadership

Perception of Gender	• *Differences that define men & women, gender typing in expectations (P1M)* • *Characteristics of women, men, girls, and boys that are socially constructed (P5F)* • *Gender is something which is decided by society (P2M)*
Perception of Women's Representation (Challenges and Successes)	• Men have more of a voice because they measure each other against their titles, so it's gender, title and position of authority (P4F) • We have allowed people to think that when we see a woman, they are, oh, that's affirmative action but when they see incompetent men they don't say anything about that (P7M) • With three women I have worked with, I could see the success, the conducive working environment (P9M)

The statements in Table 3 align with the quantitative responses in Tables 1 and 2. Participants perceived gender *as differences that define men and women, gender typing in expectations* (P1M). It is also thought that despite women's performance when acquiring management and leadership positions, they are often not accepted. For example, one participant alluded to women's competency and success story, saying: *With three women I have worked with, I could see the success, the conducive working environment* (P9 M). Other participants echoed the issue of women's non-acceptance and the significance of men's voice and representation in management and leadership, she perceived that men *have more of a voice because they measure each other against their titles, so it's gender, title and position of authority (P4F).* The above might incline the role of gender norms whereby women's role is undermined.

According to Marcus et al. (2015) gender norms practically reflect inequality in the distribution of power and resources and thus disadvantage women and girls. Next, Table 4 depicts the significance between the mean scores of the respondents using One-Way ANOVA.

Table 4: Differences between gender perception and women's representation in HE

ANOVA						
		Sum of Squares	Df	Mean Square	F	Sig.
GCP1	Between Groups	999,783	2	499,891	13,583	<0.001
	Within Groups	5446,893	148	36,803		
	Total	6446,675	150			
WO-REP	Between Groups	212,098	2	106,049	5,493	<0.004
	Within Groups	2857,478	148	19,307		
	Total	3069,576	150			

Table 4 shows a significant (p<0.001) relationship between gender identity and gender perception. It reveals a significant relationship between gender perception and perception of women's representation in HEIs' management and leadership positions (p=<0.004). Consequently, Table 5 depicts the nature of the relationship between the variables using the Pearson Correlation Coefficient.

Table 5: Nature of Relationship between the perceptions of gender and women's representation/leadership

CORRELATIONS				
		GID	GCP	W-REP
Gender Identity	Pearson Correlation (r) Sig. (2-tailed) N	 151	-0.180* 0.027 151	-0.195* 0.016 151
Gender Perception	Pearson Correlation (r) Sig. (2-tailed) N	-0.180* 0.027 151	 151	0.360** <0.001 151
Women's Representation	Pearson Correlation (r) Sig. (2-tailed) N	-0.195* 0.016 151	0.360** <0.001 151	 151
*Correlation is significant at the o.05 level (2-tailed) **Correlation is significant at the 0.01 level (2-tailed)				

Table 5 shows that gender identity has a negative correlation with gender perception at r= -0.185* and Sig. (2-tailed) of p= < 0.027; and women's representation in leadership at r = -0.195* and Sig. (2-tailed) of p=0.016). As such, the null hypothesis H0: G*ender identity exerts no influence on gender perception among higher education staff members* is accepted

while the alternative hypothesis - H1: *Gender identity exerts influence on gender perception among higher education staff members* is rejected. However, there is a high positive relationship between gender perception and women's representation at r = 0.360** and Sig. (2-tailed) of p= <0.001. Subsequently, the null hypothesis is rejected while the alternative hypothesis is accepted.

Conclusion

The study revealed how gender and women's representation in HEIs' management and leadership are perceived. It is thought that despite women's performance and success in management and leadership positions, they are often not accepted. The study revealed how gender conceptualisation is embedded in society and determines how women's representation in HEIs' management and leadership is viewed.

The study showed no direct relationship between gender identity and perception of women's representation in HEIs' management and leadership positions. This means that when one variable increases the other decreases, as such they go in different directions. This implies that being female, male or non-binary exerts no direct influence on how gender is perceived. It also implies that gender identity does not have any direct influence on how women's representation in HEIs' management and leadership is perceived. Whereas gender identity does not directly determine how one perceives women's representation in HEIs' management and leadership, how we perceive gender exerts a direct influence on women's representation. Accordingly, gender perception becomes very significant in ensuring women's representation in higher education management and leadership positions. Furthermore, the study revealed gender norms as a systematic phenomenon whereby cultural processes undermine the role of women. Notwithstanding, the various interventions from various stakeholders, the study suggested that competency and capability must play a critical role in addressing gender inequality in HEIs. It also suggested the reconstruction of gender to have a positive influence on women's representation in HEIs.

Acknowledgements

We acknowledge the University of Mpumalanga, South Africa and the National Research Foundation (NRF) South Africa for their financial support. The views and opinions expressed in this paper are those of the authors.

References

Aiston, S. J., & Fo, C. K. (2021). The silence/ing of academic women. Gender and Education, 33(2),138-155. htts://www.tandfonline.com/doi/abs/10.1080/09540253.2020.1716955

Akala, B., & Divala, J. J. (2016). Gender equity tensions in South Africa's post-apartheid higher education: In defence of differentiation. South African Journal of Higher Education, 30(1), 1-16. https://www.journals.ac.za/index.php/sajhe/article/view/557

Albudaiwi, D. (2018). Survey: Open-ended questions. In Allen, M. (ed). The Sage encyclopaedia of communication research methods, 1716-1717). (Google E-Books). https://dx.doi.org/10.4135/9781483381411

Azizi, H., Abdellatif, W., Nasrullah, M., Ali, S., Ding, J. & Khosa, F. (2022). Leadership gender disparity in the fifty highest-ranking North American universities: Thematic analysis under a theoretical lens. Postgraduate Medical Journal, 98(1163): 705-709

Butler, J. (1999). Feminism and the subversion of identity. Routledge. NY.

Castleberry, A., & Nolen, A. (2018). Thematic analysis of qualitative research data: Is it as easy as it sounds? Currents in Pharmacy Teaching and Learning, 10(6), 807-815. https://www.sciencedirect.com/science/article/pii/S1877129717300606

Cukier, W., Adamu, P., Wall-Andrews, C., & Elmi, M. (2021). Racialized leaders leading Canadian universities. Educational Management Administration & Leadership, 49(4), 565-583.

Dunn, D., Gerlach, J. M., & Hyle, A. E. (2014). Gender and leadership: Reflections of women in higher education administration. International Journal of Leadership and Change, 2(1), 2. https://digitalcommons.wku.edu/ijlc/vol2/iss1/2/

Females Academic Leadership Fellowship. (2022). Wits strives for transformation in academic leadership. University of the Witwatersrand, Johannesburg.https://www.wits.ac.za/news/latest-news/general-news/2022/2022-05/wits-strives-for-transformation-in-academic-leadership--.html

Hanna, T., Meisel, C., Moyer, J., Azcona, G., Bhatt, A., & Valero, S. D. (2023). Forecasting women in leadership positions.

Hasan, N., Rana, R. U., Chowdhury, S., Dola, A. J., & Rony, M. K. K. (2021). Ethical considerations in research. Journal of Nursing Research, Patient Safety and Practice (JNRPSP), 1(01), 1-4. http://hmjournals.com/journal/index.php/JNRPSP/article/view/93

Islam, M. A., Hack-Polay, D., Rahman, M., Jantan, A. H., Dal Mas, F., & Kordowicz, M. (2023). Gender and leadership in public higher education in South Asia: examining the individual, socio-cultural and organizational barriers to female inclusion. Studies in Higher Education, 48(8), 1197-1215

Jackson, S. (2019). Coaching women towards authenticity: An appropriate workplace environment. International Journal of Evidence-Based Coaching and Mentoring, 17(2), 64-78. https://radar.brookes.ac.uk/radar/items/9b7eabe8-af00-4543-8b56-f3f14d99187d/1/

Johnson, G.F., & Howsam, R. (2020). Whiteness, power and the politics of demographics in the governance of the Canadian Academy. Canadian Journal of Political Science/Revue canadienne de science politique, 53(3):676-694.

Ketefian, S. (2015). Ethical considerations in research. Focus on vulnerable groups. Investigación y Educación en Enfermería, 33(1), 164-172. http://www.scielo.org.co/pdf/iee/v33n1/v33n1a19.pdf

Kivunja, C., & Kuyini, A.B. (2017). Understanding and applying research paradigms in educational contexts, International Journal of Higher Education, 6(5), 26-41. https://eric.ed.gov/?id=EJ1154775

Marcus, R., Harper C., Brobeck, S. & Page E. (2015). Social norms, gender norms and adolescent girls. Overseas Development Institute. ISSN: 2052-7209.

Mayekiso, T. (2022). Taking the University of Mpumalanga to new heights in 2022. In Tabane, O.J.J. (ed). Leadership Magazine, 8-19. www.nersa.org.za. https://indd.adobe.com/view/96085690-5178-41d0-ab5d-1ae88a3cbda7

Mergaert, L., Van der Heyden, K., Rimkute, D., Arnaut Duarte, C., Helfferich, B., Wuiame, N., & Pilvre-Storgard, B. J. (2013). A study of collected narratives on gender perceptions in the 27 EU Member States: Synthesis Report. European Institute for Gender Equality.

Meza-Mejia, M. D. C., Villarreal-García, M. A., & Ortega-Barba, C. F. (2023). Women and leadership in higher education: A systematic review. Social Sciences, 12(10), 555. https://www.mdpi.com/2076-0760/12/10/555

Moodly, A. (2021). Reconstructing notions of leadership: The gendered nature of South African university spaces. International Briefs for Higher Education Leaders, 9, 20-22. https://www.acenet.edu/Documents/Womens-Rep-in-Higher-Ed-Leadership-Around-the-World.pdf

Moodly, A., & Toni, N. M. (2017). Accessing higher education leadership: Towards a framework for women's professional development. South African Journal of Higher Education, 31(3), 138-153. https://journals.co.za/doi/abs/10.208535/31-3-917

Navas, M. A. A., & Siriwato, S. (2024). Examining gender equality in Guatemala: a case study of gender equality in the Ministry of Foreign Affairs of Guatemala. Asian Crime and Society Review, 11(2), 21-43.

O'Connor, P. (2020). Why is it so difficult to reduce gender inequality in male-dominated higher educational organizations? A feminist institutional perspective. Interdisciplinary Science Reviews, 45(2), 207-228.

O'Connor, P., Carvalho, T., Vabø, A., & Cardoso, S. (2015). Gender in higher education: A critical review. The Palgrave International Handbook of higher education policy and governance: 569-584.

Ornstein, M., Stewart, P., & Drakich, J. (2007). Promotion at Canadian Universities: The Intersection of Gender, Discipline, and Institution. Canadian Journal of Higher Education, 37(3), 1-25.

Pathania, S. K. (2017). Sustainable development goal: Gender equality for women's empowerment and human rights. International Journal of Research, 5(4), 1-15. https://pdfs.semanticscholar.org/d949/daca9c8080028336ff540f2260742e7c88e2.pdf

Phakeng, M. (2015). Leadership: The invisibility of African women and the masculinity of power. South African Journal of Science, 111(11-12), 1-2. https://sajs.co.za/article/view/3835

Tran, T. T. T., & Nguyen, H. V. (2020). Gender preference in higher education leadership: insights from gender distribution and subordinate perceptions and expectations in Vietnam universities. International journal of leadership in education, 1-2 https://www.tandfonline.com/doi/abs/10.1080/13603124.2020.1753244

United Nations. (2020). Transforming our World: The 2020 agenda for sustainable development goals. A/RES/70/1. www.undp.org

Zong, J., & Matias, J. N. (2022). Bartleby: Procedural and substantive ethics in the design of research ethics systems. Social Media+ Society, 8(1), 20563051221077021. https://journals.sagepub.com/doi/abs/10.1177/20563051221077021

Zulu, C. (2017). Promoting gender transformation at higher education in South Africa. In White, K., & O'Connor, P. (eds). Gendered success in higher education: Global Perspectives, 195-214. Palgrave MacMillan. London.

Contact email: Mercy.Kutu@ump.ac.za

Navigating Academic Success: The Impact of CGPA Goal Setting on Student Performance

Tee Hean Tan, Sunway University, Malaysia
Jaime Kwai Foon Yap, Sunway University, Malaysia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In academia, goal setting is crucial for success and personal growth, guiding students throughout their educational journey. It provides direction, motivation, and a sense of purpose, helping students navigate challenges and achieve their intellectual aspirations. Sunway University's American Degree Transfer Program (ADTP) facilitates credit transfer to U.S. universities, offering cost-saving and grading systems mirroring those in the U.S. Maintaining a commendable Cumulative Grade Point Average (CGPA) is emphasized, enhancing prospects for university enrolment and scholarships. A comprehensive study spanning two semesters delved into the influence of students' CGPA goal setting on student performance, particularly as a catalyst for increased effort. Among the 60 students surveyed, 30 set their CGPA goals with their academic advisor at the beginning of the semester. Students are encouraged to intensify their efforts should their coursework fall short of their target grades during the semester. The comparison of 2 semesters served as checkpoints for academic advancement. Notably, the survey findings highlight the efficacy of goal setting, with 90% of the selected students demonstrating notable strides in achieving their targeted results. Efforts are dedicated to supporting the remaining 10% in their academic pursuits, underscoring the institution's commitment to holistic student development. Furthermore, among the students who did not set desired grades, only 57% exhibited improvements in their academic performance, highlighting the transformative potential of goal setting in fostering individual growth and academic success.

Keywords: Goal-Setting, CGPA, Academic Success

iafor
The International Academic Forum
www.iafor.org

Introduction

In academia, goal setting serves as a fundamental pillar for success and personal growth (Locke & Latham, 2002). Whether embarking on a scholarly journey at the high school, undergraduate, or postgraduate level, establishing clear and measurable objectives is essential for navigating the intricate landscape of education. Academic goal-setting provides a roadmap for intellectual achievement and fosters motivation, self-discipline, and a sense of purpose (Manderlink & Harackiewicz, 1984), As students pursue excellence in their studies, the deliberate identification of academic goals becomes a catalyst for focused effort, resilience in the face of challenges, and, ultimately, the attainment of intellectual aspirations. Experimental studies (John et al. 2020, Schippers et al. 2020), revealing better academic outcomes even from non-specific goal setting, suggest a deeper interplay between goal expression, self-awareness, and commitment.

Sunway University's American Degree Transfer Program (ADTP) is designed for students aspiring to seamlessly transfer their credits and continue their academic journey at universities in the United States. By participating in the ADTP program, students can capitalize on potential cost savings due to favorable currency exchange rates while accumulating the necessary credits for transfer to their preferred U.S. universities. Notably, the grading system employed in Sunway University's ADTP mirrors that of U.S. institutions, with 70% of the grade derived from coursework and the remainder 30% from final exams. Additionally, achieving an 'A' grade requires a score of 90 and above, while a 'B+' falls within the range of 85-89 and so on. Table 1 shows the grading scales practiced in Sunway University's ADTP program.

Table 1: The grading scales practice in the ADTP program.

Marks	Grade
90 and above	A
85-89	B+
80-84	B
75-79	C+
70-74	C
65-69	D+
60-64	D
59 and below	F

Concurrently, students are encouraged to maintain a commendable Cumulative Grade Point Average (CGPA), enhancing their prospects for university enrolment and potential scholarship awards.

The objective of this study is to explore the influence of goal setting on student performance, specifically examining whether it serves as a motivating factor (Locke & Latham, 2019), prompting increased effort toward attaining academic objectives. The study was conducted over two semesters and aimed to explore the impact of students' CGPA goal setting on their academic performance, particularly in motivating increased effort. Two semesters were chosen instead of one because improving CGPA is challenging when a student's foundation is weak. Furthermore, a longer duration allows more time for students to modify their study habits and attitudes toward learning (Mendezabal, 2013).

Through this study, we hope to investigate how goal setting affects student performance, particularly its role as a driver of motivation.

The next section thoroughly reviews the literature on GPA and CGPA, examining the impact of academic goal setting on CGPA. This is followed by a detailed description of the study methodology, including sample selection, procedural execution, and the underlying motivations. The subsequent sections present and analyze the study's findings. Finally, the article summarizes the key discoveries and discusses their implications for practical application and future research directions.

Literature Reviews

Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA) are essential metrics used in educational institutions worldwide to assess students' academic performance and progress. GPA represents a student's average grades in a specific semester or academic year, while CGPA reflects the cumulative average of all grades obtained throughout the student's academic career (AACRAO, 2026). These measures are crucial in determining students' eligibility for scholarships, internships, graduate programs, and employment opportunities (Pascarella & Terenzini, 2013). For instance, many institutions and employers set minimum GPA or CGPA requirements as their selection criteria. Additionally, GPA and CGPA serve as valuable tools for students to monitor their academic progress, identify areas for improvement, and set realistic goals. By understanding the significance of GPA and CGPA and actively engaging with these metrics, students can strive for continuous improvement and academic excellence.

As a theory, goal setting is fundamentally focused on achievement motivation (Locke & Latham, 2019) based on the premise that conscious goals affect action (Locke & Latham, 2002). It builds on the idea that human actions are often purposeful and based on conscious goals, and by setting differing performance goals, individuals can achieve various levels of performance, varying levels.

Nor Abidah et al. (2017) conducted a study revealing that several factors, including self-motivation, the teaching and learning process dynamics, and students' attitudes toward their courses, significantly influence their CGPA. Furthermore, Ronnel B. King’s (2016) findings suggested that collectivism moderated the relationship between performance-avoidance and key outcome variables. Specifically, among students exhibiting high levels of collectivism, performance-avoidance goals correlated with increased utilization of cognitive and meta-cognitive learning strategies and heightened intrinsic motivation, contradicting findings in Western literature. These results underscore the importance of considering cultural nuances in motivation research. Additionally, Yeap Chun Sheng et al. (2016) emphasized the significance of students regularly monitoring their academic progress and proactively identifying areas for improvement. Such practices enable students to make informed decisions and adapt their study habits and strategies accordingly.

Methodology

Sixty students enrolled in Sunway University's ADTP program, each having completed a minimum of their second semester and pursuing diverse majors, were randomly selected to participate in this study. The students were divided into two groups of equal size: one with a structured goal-setting component and the other without. The goal-setting group received

guidance to help them set and achieve academic goals, while the other group did not receive any specific goal-setting instructions. This division allowed for a comparative analysis of the impact of goal-setting on academic performance and outcomes among the participants. The goal-setting group discussed their current subject results, GPA, and CGPA with their academic advisors and then set target CGPA goals for the next two semesters, Summer 2023 and Fall 2023. In contrast, the students' academic advisors in the group without goal setting were asked to provide the students' current standings. The selection criteria focused on students from the second semester onwards because newer students might not be as familiar with GPA and CGPA grading, which are not commonly used in Malaysia's national high school system (Tan, 2015). An example of a student's current academic performance, total credits, GPA, CGPS, and target CGPA is illustrated in Table 2.

Table 2: An example of a student's academic performance and target CGPA.

Subject	**credits**	**Grade**
Introduction to Human Communications	3	B
Introduction to Computer Applications	3	A
Programming I	4	D
Macroeconomics	3	D
Introduction to Critical and Creative Writing	3	C
Precalculus	3	C
Calculus I	3	C+
University Life - Freshman Seminar	1	B+
Appreciation of Ethics and Civilisation	3	B
Total Credits	**26**	
GPA	**2.8**	
CGPA	**2.31**	
Target CGPA	**2.7**	

The goal-setting group was required to set their desired grades for each subject at the start of the semester. The academic advisor assesses the attainability of these objectives by examining the student's previous academic records. Should a significant gap exist between the target grade and their typical performance, the advisor offers assistance unless the student presents compelling justifications. Additionally, the advisor may suggest alternative grades students must achieve to help them reach their goals, as depicted in Table 3.

Table 3: Options to achieve the target goal in the two semesters.

Summer 2023			
option 1	credits	Grade	GPA
Calculus 3	4	B	12
Probability and Statistics	4	B	12
	8		24

GPA	3
new credits	34
new CGPA	2.47

option 2	credits	Grade	GPA
Calculus 3	4	B	12
Probability and Statistics	4	B+	14
	8		26

GPA	3.25
new credits	34
new CGPA	2.53

option 3	credits	Grade	GPA
Calculus 3	4	B+	14
Probability and Statistics	4	B+	14
	8		28

GPA	3.5
new credits	34
new CGPA	2.59

Fall 2023			
option 1	credits	Grade	GPA
Programming 2	4	B	12
Calculus 2	4	B	12
Public speaking	3	B	9
US history	3	B	9
	14		42

option 2	credits	Grade	GPA
Programming 2	4	B	12
Calculus 2	4	B	12
public speaking	3	B+	10.5
US history	3	B+	10.5
	14		45

option 3	credits	Grade	GPA
programming 2	4	B	12
Calculus 3	4	B	12
public speaking	3	A	12
US history	3	B+	10.5
	14		46.5

option 4	credits	Grade	GPA
programming 2	4	B	12
Calculus 3	4	B	12
public speaking	3	A	12
US history	3	A	12
	14		48

Summer 2023	Fall 2023	new credit	new CGPA
option 1	option 1	48	2.63
option 1	option 2	48	2.69
option 1	option 3	48	2.72
option 1	option 4	48	2.75
option 2	option 1	48	2.67
option 2	option 2	48	2.73
option 2	option 3	48	2.76
option 2	option 4	48	2.79
option 3	option 1	48	2.71
option 3	option 2	48	2.77
option 3	option 3	48	2.80
option 3	option 4	48	2.83

Students who have established target grades are required to meet with their academic advisor at least twice per semester to evaluate their progress. Should their academic performance fall

significantly below their anticipated grades, they are encouraged to intensify their efforts to improve their chances of reaching their goals. This support involves offering constructive feedback and assistance, providing specific guidance on areas needing improvement, and suggesting strategies to overcome challenges. These feedback sessions, organized by the academic advisor in coordination with the respective subject lecturer, typically occur following major assignments and quizzes. During these sessions, the academic advisor can offer personalized guidance to students, highlighting their strengths and areas for growth.

Additionally, providing support through study groups or access to resources demonstrates a commitment to student's success and equips them with the tools they need to excel. Highlighting the advantages of reaching their goals, like opening up more opportunities for future pursuits, is a strong incentive to keep students concentrated and committed.

Result Analysis

Table 4: Comparison of academic performance between goal-setting and non-goal-setting groups.

Student no (percentage)	With Goal Setting		Non-Goal Setting	
	Summer 2023	Fall 2023	Summer 2023	Fall 2023
improvement in result	20 (66.7%)	**27 (90%)**	11 (36.7%)	**17 (56.7%)**
remain or decline in result	10 (33.3%)	3 (10%)	19 (63.3%)	13 (43.3%)

Table 4 provides a detailed comparison of academic performance trends between students equipped with structured goal-setting mechanisms and those lacking such provisions, spanning two successive semesters: the summer and fall of 2023. Notably, during the summer semester, 66.7% of students with goal setting experienced marked improvement in their academic results. This percentage substantially rose to 90% in the subsequent fall semester, indicating a significant positive correlation between goal setting and academic progression. Conversely, the improvement rates were comparatively lower among students without structured goal-setting components. In the summer semester, only 36.7% of students witnessed an enhancement in their academic performance, with a slight increase to 56.7% observed in the fall semester. This stark contrast in improvement rates underscores the instrumental role of goal setting in fostering academic advancement and underscores its potential as a proactive strategy for enhancing student outcomes.

Furthermore, the data highlights the impact of goal setting on the stability of academic performance. A smaller proportion of students in the goal-setting group either remained at the same level or experienced a decline in their results compared to their counterparts without structured goal-setting mechanisms. Specifically, during the summer semester, 33.3% of students with goal setting maintained their academic status quo or faced a decline, a percentage that dropped even further to 10% in the fall semester. Conversely, a larger percentage of students without goal setting, 63.3% during the summer semester and 43.3% during the fall semester, either remained stagnant or experienced a decline in their academic performance. These findings underscore the resilience and consistency fostered by goal-setting strategies, indicating their potential to mitigate academic stagnation and decline.

The disparity in academic outcomes between students with and without structured goal-setting mechanisms underscores the imperative of integrating proactive strategies into

educational frameworks to optimize student success and performance. The substantial improvement rates observed among students equipped with goal setting during both summer and fall semesters attest to the efficacy of structured goal-setting interventions in fostering academic advancement. Moreover, the stability exhibited in academic performance among goal-setting students underscores the resilience engendered by such strategies, highlighting their capacity to mitigate academic stagnation and decline. Thus, the findings underscore the critical role of goal setting as a proactive tool for enhancing student outcomes and advocate for its integration into educational practices to empower students and foster academic success.

Conclusion

Through the study's structured approach, involving 60 students enrolled in Sunway University's ADTP program, key insights were gleaned regarding the efficacy of goal-setting interventions in fostering academic advancement. The findings underscored the instrumental role of structured goal-setting in facilitating academic progression, as evidenced by marked improvements in academic outcomes among students equipped with goal-setting mechanisms. Moreover, the stability exhibited in academic performance among goal-setting students highlights the resilience fostered by such strategies, mitigating academic stagnation and decline.

In conclusion, the study's findings underscore the critical importance of goal setting as a proactive tool for enhancing student outcomes within educational contexts. By integrating structured goal-setting interventions into educational frameworks, institutions can empower students, foster academic success, and cultivate a continuous improvement and achievement culture. As such, the study advocates for the widespread adoption of goal-setting practices to optimize student success and elevate educational outcomes.

References

American Association of Collegiate Registrars and Admissions Officers (AACRAO). (2016). AACRAO GPA calculation rules. Retrieved from https://www.aacrao.org/docs/default-source/research-docs/grades-and-grading-practices-in-u-s-higher-education-2017-with-full-appendices-final.pdf?Status=Temp&sfvrsn=24a6c6c3_12

Ivana Mašková & Alena Nohavová. (2020). Beyond Grades: GPA and Its Relationship to Achievement Goal Orientations and Student Approaches to Learning. https://www.researchgate.net/publication/339031078_Beyond_Grades_GPA_and_Its_Relationship_to_Achievement_Goal_Orientations_and_Student_Approaches_to_Learning

John, R., John, R., & Rao, Z. U. R. (2020). The Big Five personality traits and academic performance. J Law Soc Stud, 2(1), 10-19.

King, R. B. (2016). Is a Performance-Avoidance Achievement Goal Always Maladaptive? Not Necessarily for Collectivists. Personality and Individual Differences, 99, 190-195.

Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. American Psychologist, 57(9), 705–717. https://doi.org/10.1037/0003-066X.57.9.705

Locke, E. A., & Latham, G. P. (2019). The development of goal setting theory: A half century retrospective. Motivation Science, 5(2), 93–105. https://doi.org/10.1037/mot0000127

Manderlink, G., & Harackiewicz, J. M. (1984). The effects of learning goals and commitment on self-regulation. Paper presented at the Annual Meeting of the American Psychological Association, Toronto, Canada.

Mendezabal, M. J. N. (2013). Study habits and attitudes: The road to academic success. Open Science Repository Education, (open-access), e70081928. doi: 10.7392/Education.70081928

Nor Adibah Abu Hasan, Nurhafizah Ahmad, & Noor 'Aina Abdul Razak. (2017). Factors that Significantly Affect College Students' CGPA. *International Academic Research Journal of Social Science.* 3(1) 2017 Page 77-81.

Pascarella, E. T., & Terenzini, P. T. (2005). How college affects students: A third decade of research (Vol. 2). Jossey-Bass.

Schippers, M. C., Morisano, D., Locke, E. A., Scheepers, A. W. A., Latham, G. P., & de Jong, E. M. (2020). Writing about personal goals and plans regardless of goal type boosts academic performance. Contemporary Educational Psychology, 60, 101823.

Tan, J. (2015). Educational Practices in Malaysia: An Overview. *Malaysian Journal of Education*, 40(2), 15-30.

Yeap Chun Sheng, M. B. Mustafa, S. Alam, S. H. Hamid, A. A. Sani and A. Gani, "Personal CGPA planning system for undergraduates: Towards achieving the first class CGPA," 2016 Fifth ICT International Student Project Conference (ICT-ISPC), Nakhonpathom, Thailand, 2016, pp. 113-116, doi: 10.1109/ICT-ISPC.2016.7519249

Failed Blended Instruction as Remedial Assistance for Underachieving English Language Learners

Nazli Ağgün Çelik, İskenderun Technical University, Türkiye

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The aim of this qualitative study is to understand why online remedial assistance blended with face-to-face assistance fails as remedial assistance from the perception of underachieving English as Foreign Language (EFL) learners in higher education. This study is the post-phase of an implementation of blended instruction in an EFL class, which consisted of students who were underachieving in the new language. Although the implementation was designed to assist these students who were repeating the elementary level due to their failure at the exam, the implementation failed to assist five out of twelve students, and they could not pass the exam for the second time. This qualitative study aims to understand implementation from a personal perspective. For this purpose, the students were interviewed for their self-reflections on their experience with the implementation. The semi-structured interviews were recorded, transcribed, and analyzed to find the reasons for the failures of online remedial assistance blended with face-to-face. The results of the analysis showed that the students did not benefit from the design for the following reasons: they were not seen as slow and weak language learners, the content was uncontextualized, they were not motivated to produce the new language in productive skills with the audience and the mode, there was the need for more extensive studies online, and the need for alternative assessment. The study cares importance for educators who want to prepare online remedial assistance by including the active involvement of underachieving language learners and empowering their voice in productive skills.

Keywords: Underachievers, English as Foreign Language, Blended Instruction, Online Remedial Assistance

iafor
The International Academic Forum
www.iafor.org

Introduction

Sparks and Ganschow (2001) broadly defined underachievers as students that are not able to learn a foreign language and have weak skills in listening, speaking, spelling, and thinking in English. In terms of differentiating between successful and unsuccessful learners, different explanations have been provided in the literature. According to the Affective Filter Hypothesis (Krashen, 1982), when learners suffer from anxiety, low motivation, or lack of confidence, they lack space in their filters to learn a new language and thus cannot succeed in acquiring the language. The reason for this is that their affective filter is up, and there is no space for introducing the new language. However, when learners have positive attitudes and feel confident, they contain space for another language in their filters. On the other hand, according to the Attribution Hypothesis (Heider, 1958), while successful language learners attribute their success to ability and effort, unsuccessful language learners attribute it to luck or reasons that they cannot control. Lam (2004) emphasized that language learners who have positive relationships with the new language and the people from that language have a higher chance of learning it.

Another researcher, Dewaele (2013), identified a link between learners' success and inner characteristics. According to him, musical ability, memory skills, and verbal ability, along with some personal features, might lead to high self-efficacy, low anxiety, and higher levels of inner motivation and communication in the target language. Lastly, Cook (as cited in Dewaele, 2013) mentioned that some learners may have proficient conversational skills in a foreign language, while others may demonstrate achievement in a different aspect of the language, like grammar. From the studies mentioned above, it can be concluded that it is difficult to generalize the reasons for achievement or underachievement because there are various factors such as learner motivations, styles, personality traits, and belief.

In fact, the concept of underachievement has been criticized as being too subjective because learners may fail due to exams, curriculums, and teaching methodologies that ignore learners' needs. For example, when teachers teach in a way that addresses students with high auditory skills, there is a chance that students with low auditory ability will be labeled as low-achieving in the classroom, as proved in one of the earlier studies (Pimsleur et al., 1964). Similarly, Holt (2005) explained that when schools are often places in which attendance is obligatory, teaching is one-sided, success depends solely on test performance, and students learn out of obligation rather than interest, students have a lower chance of success. It can be concluded that the greatest obstacle to quality instruction is the tendency of educators and school administrators to ignore the contributions of their students (Schank & Jona, 1991).

Since learner failure causes concern among educators, there have been attempts to identify those who underachieve and to design special programs tailored to their individual needs. In this way, schools would not lose learners' energy, intellectuality, and productivity. To illustrate, one way to assist underachieving language learners is to offer online or blended remedial instruction. Blended instruction (BL) has been defined (Neumeier, 2005) as "a combination of face-to-face (FtF) and computer-assisted learning in a single teaching and learning environment. The most important aim of a blended learning design is to find the most effective combination of the two modes of learning for individual learning subjects, contexts, and objectives" (p. 164).

BL has proven its success in teaching English as a foreign language (EFL). To begin with, blended studies in writing have demonstrated that blended instruction may enhance students'

writing performance and improve their attitudes toward writing itself. With BL, students use topic sentences, spelling, grammar, punctuation marks, and capitalization in a better way (Adas et al., 2013) and become less anxious (Miyazoe & Anderson, 2010) get more interaction with their teachers and peers (Shih, 2010). In addition to writing skills, some studies have produced results on the effectiveness of blended instruction in an EFL-speaking context. With BL, students do better in public speaking, use body language appropriately (Shih, 2010), think critically (Yang et al., 2013), speak with more confidence (Abal, 2012), and have better pronunciation (Bueno-Alastuey & Pérez, 2014). These studies demonstrated that blended instruction may enhance these different subcomponents of speaking.

Scholars and educators can successfully design blends specifically for underachieving language learners and target them to improve their weak language skills. To illustrate, in one study (El-Bassuony, 2016), underachieving students successfully studied grammar online in conjunction with YouTube videos and quizzes. On the other hand, they could ask their teachers about the problems and collaborate with their classmates in face-to-face time. In another study (Wang, 2011), the students studied English using computer programs, collaborated with their classmates on tasks, read assigned articles embedded with explanative power points, and used language on the Web. Further related studies demonstrated that students could improve their vocabulary with daily videos uploaded during the pandemic (Pasicolan, 2021), and struggling readers could read better with a Padlet that included interaction and various assessment opportunities (Zainudin, 2019). In brief, considering the needs of students, educators could address different issues in language classes by organizing the syllabus, students' demographics, and program goals, as well as the environment, both online and blended.

Nevertheless, using technology in and out of the classroom remains problematic in some respects. To begin with, various frameworks and designs have been suggested for educators, administrators, and institutions to determine the most suitable combination of modes, roles of participants, and complexity of the blends according to individual needs and contexts (Banados, 2006; Picciano, 2009; Goertler, 2012). Thus, it is necessary to continue examining blended and online instruction designs to determine more efficient instructional methods for national or local use.

Furthermore, online and blended instruction might not have been normalized for the students, and it might still need some regulations to be considered "the tradition". There could be some students who were not ready to receive online instruction. To illustrate, in one study (Shimkovich et al., 2022), the students mentioned that although they have high experience with hybrid online and face-to-face learning, they missed getting immersed in the classroom and receiving direct observation and assessment from the teacher. In another study (Tayebinik, 2013), the students did not prefer sole online instruction because it could not give them a feeling of belonging and real communication with their peers. In another study (Al Zumor, 2013), it was recommended that online language learning experiences could be enhanced with technical support, computer labs, and educating both teachers and students about technology. One study (Mori, 2019) mentioned that, compared to overachievers, underachievers did not participate much because some characteristics of the online task hindered them from doing so. One final study (Wang, 2011) revealed that teachers and underachievers were not on the same ground in terms of how they saw the use of computers. In short, blended instruction has not yet been proven to be a sufficient educational model since there is a need to continue investigating ways of promoting it and for closer consideration of blended instruction in underachieving language learning.

In fact, the use of technology in education could be exaggerated and may not deserve the popularity it has earned. Cogen (1992) observed a classroom of learners in which technology was introduced as an instructional method. He found that computer use in the classroom had entirely replaced the face-to-face lecture method of the instructor and had been dictated by a higher authority than the agency of the instructor. In this case, it is possible that the instructional method itself—which had not been designed in collaboration with either the teacher or learners—may have contributed to the underachieving of additional learners. Cogen (1992) suggested that technology use among underachieving learners should be accompanied by ongoing teacher-to-learner and learner-to-learner interactions involving questions and comments arising from dialog. Technology use in modern education can be compared to the use of pencils in 1564. At that time, there were no expectations that pencils would substitute for the act of teaching, fully prepare learners for the practical world, or enable them to achieve their full potential. Similarly, it is unrealistic to expect technology alone to shape students' critical thinking skills or to replace the necessity of face-to-face instruction. The belief that students can learn easier online than in face-to-face instruction is a myth (Gregori, 2015). Further myths mentioned not to be true are as follows (Kleiman, 2000):

- The school will increase academic access by having more computers.
- There are certain ways to achieve this with computers.
- The teacher could be ready to include computers in their instruction with some basic training.
- Students in poorer environments can achieve equally good results when they have access to computers.

In summary, blended learning can enhance language learning and elicit positive attitudes from students. However, blended instruction may not always be useful and may meet resistance from some learners. It is especially important to address underachieving language learners because imposing an unsuitable method of blending instruction for their needs may increase their already existing burden of struggling learners. Few studies (Mercan, 2009; Bozgün et al., 2022; Eranil, 2024) have addressed the underachieving group, especially in the context of English language learning in Turkey (Aggun, 2018; Gökçe, 2021; Akçayoğlu &Özer, 2021). Additional studies are required to understand the experience of underachieving language learners with technology assistance and the reasons for the failure of remedial assistance. In light of the aforementioned information, the research question of this study is as follows:

- Why does online remedial assistance fail to benefit underachieving English learners?

Methodology

Research Setting

The research setting is an EFL classroom in a preparatory English program at the Department of Foreign Languages in a public university located in southeast Turkey. The foreign language department administers an entry exam to all students, the scores of which determine students' placement in modules such as A1 Elementary, A2 Upper Elementary, or B1 Intermediate (based on the Common European Framework of Reference for Languages). Each module of study lasts for eight weeks, during which time students must demonstrate their proficiency level by earning a passing grade of at least sixty points. These grades are based on a combination of student evaluation (participation grade), quizzes, portfolios, and

exit exams (writing, speaking, and multiple-choice). If learners fail, they must repeat that level by using the same learning materials and curriculum.

A blended design was applied in one of the repeating A1 modules. The aim is to address these learners and extend their learning opportunities. The students in that classroom could not get the minimum grade to start the A2 module, so they had to repeat the A1 module with the same teaching materials and methodology. With the aim of offering remedial assistance, an online portion of face-to-face teaching time was added. However, blended instruction still did not work for five students, and they did not receive the minimum grade required to start the A2 module for the second time. The current study deals with the reasons for the failure of the online remedial assistance for these five students.

Participants

All five male participants were prospective engineering students who had to learn English to become freshmen the following year. However, they were still at the elementary level, despite 16 weeks of instruction. The average age of the participants ranged from 18 to 22 years. Four learners possessed Turkish nationality, with the exception of one who was Syrian. Finally, all participants consented to participate in this study.

Collecting Data and Analysis

The current qualitative study used semi-structured interviews to collect data on the students' experiences following a failed implementation. The interviews began with structured questions such as:

- What has been your experience with online remedial help?
- ”What kind of changes would benefit your experience more? Would you like to make any changes?
- If you were the designer, how would you modify the implementation in a way that would suit you personally?
- Did blended instruction cause you to experience some difficulties, or did it have unnecessary features that made your writing and speaking skills challenging? If so, would you explain them by providing examples and details from your learning experiences?
- Please note some suggestions to overcome these difficulties, if you have any.

These questions revealed the reasons for their answers and additional details related to their experiences with blended instruction. Each interview session lasted at least 20 minutes and was conducted in the office of the researcher. Throughout each interview, the participants' responses were recorded and transcribed by the researcher. The data analysis was content-based. The results shed light on the reasons for the failure of the implementation for these particular underachievers and possible solutions for improving it.

The Failed Online Remedial Assistance Blended With Face-to-Face

The blended instruction was implemented throughout this study, combining face-to-face with online instruction. The design was layered according to three levels, each containing differences in content and duration, as described below. The design details are presented in the following section.

Primary Design Mode

The same content of the formal syllabus was paralleled and delivered online to enhance language learning in the class and to promote the grades of the students in the exit exam. The core and static designs were prepared according to Neumeier's framework (2005):

- The leading mode is face-to-face in class.
- Distribution of modes: 100% face-to-face in class and 100% online.
- Sequencing of modes: Parallel: Similar content is repeated both face-to-face and online.
- Level of integration: Face-to-face classes are obligatory and online classes are optional.
- Introduction of the content: face-to-face classes and online teaching methods: present, practice, and produce
- Involvement of learning subjects: the students-computer or Students-teacher
- Location: face-to-face in class, online is anywhere

Additional Mini-Designs

In addition to this main design, the researcher added weekly mini-designs by combining the parameters of the core design in different ways. The purpose of recombining the main blended instruction parameters on a weekly basis was to offer learners alternative learning contexts in which they could succeed:

- For example, although the online component of the main design took place asynchronously between learners and online content, in one of the additional mini-designs, the learners and instructor met on Zoom's mobile application to practice speaking before the final speaking exam.

Extended Design Component

Learners were motivated to reflect on what they wanted to communicate in English to the world outside of the classroom and pursue their interests. Some of examples have been given below:

- Learners share stories from their online experiences during a week in class.
- Learner share useful online websites, videos, or applications in the WhatsApp group.
- Learners analyze pieces of language they have come across while surfing online in terms of grammar, vocabulary, and punctuation.
- Learners are sent links by the researcher in accordance with their interests.

Results

Following implementation, semi-structured interview results were analyzed in order to understand learners' experiences and reasons for the failure of the implementation from the students' point of view.

Unseen as a Slow Language Learner: The students stated that the syllabus was hectic and overwhelming. On the other hand, they were slow and did not have the ability to learn languages. The online portion only added to their frustration with a huge amount of material and the request by the teacher to finish a certain task in a certain amount of time. They wanted to be seen and recognized as slow learners.

"I hate it when I do not understand certain content with the rest of the class. The teacher moves on, yet my head is still on the previous topic."

Overload of Content: The fact that the online portion was prepared in a parallel manner was problematic for some students. That made a lot of resources to be covered. However, they could not regulate their studies in a way to both understand the content in face-to-face and finish related content online. Although at the beginning the online portion was eye-catching, later none of the students looked at them.

"There were too many things to do both face-to-face and online. I know they were all useful to me. Yet I could not finish all of them. I do not know… They were just too much for me. I felt guilty for not studying them. I am not hardworking."

Irrelevant Content: The learners mentioned that they were bored with speaking or writing skills. They did not want to speak or write for the mere purpose of doing so. Another problem was that they could not find what to write or speak most of the time. They could not even produce most of the content, even in their mother tongue. When the learners were encouraged to list topics in which they were very interested in their mother tongue, they mentioned some of the topics from daily life as follows:

"*I never miss Oscar Film Festivals on the TV. Every year I watched it and enjoyed the awarding shows. In addition, I read reviews about the show the following day online and searched for other winners, actors, or actresses. I think that show is spectacular. I know a lot about the names of the films, actor, and I always feel proud of myself to know every detail of Oscar Show."*

"After long studying for the university entrance exam, I realized I should change my style to fit in the campus, so I watched online tutorial videos related to makeup or style. When you (the instructor) told me that I would also search for resources in English, I gave it a try and found much better videos related to color match. I have been watching them for one week in English, and I realized that I am also learning some basic words."

"*I am a fan of soccer. When there is a derby, I should watch it, not matter what. I know every footballer and soccer club around the world. I do not understand matches in English, so I prefer watching them in Turkish, but last week I found an interview with my favorite footballer. He spoke good English with a very poor accent, but I could understand a few things."*

"*I am away from my family and miss my home. I always check Facebook to see what they are doing. I also believe my hometown is much better than the city I study. I love my city very much. If there is something about my hometown on the news, I would focus on it."*

The Uninterested Audience: The students preferred an audience that would help them write or speak better. The classmates were a source of unsatisfaction for most students. They believed a repeat class would not benefit or contribute to their English because they also had weak English skills. They preferred a different and new audience for communication.

"I do not like my classmates. I guess they don't like me either. I wish it was an online class with all strangers. Then I will speak more English. "

Not Producing in Productive Skills: The learner complained about the methodology of teaching productive skills both online and face-to-face. The general routine of the instruction was introduction of the topic, conducting activities related to the topic, and receiving feedback from the instructor. This type of instruction did not match their expectations in terms of writing and speaking skills. They spent half of their time in class or online trying to study grammar, vocabulary, or task achievement.

"*We do reading and grammar in writing class."*

Need for a More Extendive Component: The students mentioned that they enjoyed the extended component of the design more than the primary component. They enjoyed participating in online activities that were not part of the main course book and were not related to exams or homework. They taught that they felt they could achieve it or were not stressed.

"I found a friend online from Spain. We exchanged information about Turkey and Spain. I think we will become best friends."

Not Having the Right Mode for Expression: Different students had different preferences for expressing or producing in English. While one student found online expression was easier than face-to-face expression, the other student found writing in class with the observation of the teacher was easier. In addition, some learners preferred to reflect on themselves in a way in a way similar to what they liked in their mother tongue. To illustrate, if students are shy about speaking face-to-face, they are also speaking in class.

"People did not worry about seeming tidy with their English, and people with their pseudonym wrote in the way they wished." I wrote more about them. The teacher in the school gets obsessed with even one wrong letter. That is so crazy. "

The Need for Alternative Assessment: A few students mentioned that exams could be the reason for their English failure. The primary reason is that being forced to produce in a foreign language was a challenge for them because they were anxious about the examination and did not have the ability to express themselves even in their mother tongue. Another thing for them was that the exams only covered the primary component, and the things they did extensively were not assessed.

"There are so many things on the internet. I want to spend time on them. But they are not in the exams."

Discussion and Implication

From the results, it can be concluded that the students did not participate in both face-to-face and online instruction, were not satisfied with their experience, and did not benefit from the remedial blended instruction. To begin with, the students believed that they did not have the aptitude to learn a foreign language. Hence, they wanted to be recognized as slow, weak, or poor learners, and we approached them that way. They mentioned that face-to-face instruction with online instruction had high speed, overloaded material and activities,

inefficient methodology, and limited assessment that contributed to their underachievement. From these findings, it can be concluded that underachieving language learners require more than an organized blend of face-to-face and online that was determined in advance for them. These students require intellectual, contextualized, and dynamic instruction. Designing a blend as remedial assistance for underachieving students requires a professional team working on the syllabus, content, and technology. When students feel they are obligated to learn rather than are interested in learning, the instruction itself tends to result in underachieving students (Holt, 2005). The results of this study demonstrate that transferring traditional instruction online or digitalizing face-to-face instruction does not guarantee success.

On the other hand, relevant literature has demonstrated that teachers and organizations do not know how to approach or intervene with these learners (Merga et al., 2021; Le, Allen, & Johnson, 2022). To illustrate, underachievers could be recognized at the beginning of the instruction, and tools, scales, or tests can be applied (Bozgün et al., 2022) to understand who these underachievers are and what their learning styles or preferences are for learning a language. When educators spare more time to understand underachieving language learners from the beginning, they will not lose time and energy or put an unnecessary burden on students. Not involving students in the instruction process is the biggest obstacle to quality instruction (Schank & Jona, 1991).

Another reason for the failure of the online remedial assistance was the methodology, namely, presentation, practice, and production (PPP). The students had to spend most of their time trying to understand the content presentation, which was increasing in complexity. Consequently, it left them with little time and motivation to produce the language. These results are not in the same vein as those of a study that benefitted from PPP in blended instruction (Hu & Hsu, 2020). On the other hand, all the students praised the extended design of the blend and expressed their satisfaction with it. This aspect encouraged students to follow their interests online and interact with the world of the internet. The next time online remedial assistance was prepared, more attention and space could be given to the extended component compared to the formal static component. The reason is that when students think of learning a language as a fun and interesting experience, they take part, comprehend the content more, and consequently achieve more (Gökçe, 2021). On the contrary, when anxiety occurs, students' achievement decreases, and the idea of dropping out of school arises (Eranil, 2024).

Despite participating in the extended design, the students were not satisfied with that part, which contributed to their underachievement. In fact, assessment was one of the main reasons for their failure in general. To give one example, while one student expressed their lack of talent by expressing their opinions both in their mother tongue and in a foreign language in a short period of time, another student mentioned their reluctance to speak English in front of a teacher in the examinations. In that case, the vast opportunities the online world offers should be included in the assessment. As an example, some portion of the assessment could be spared for extended design in which students could express themselves in the way they want, like participating in an online group or leaving a comment under a video.

Conclusion

An implementation with the intention of offering online assistance blended with face-to-face support to underachieving EFL learners failed to assist five students. The current study aimed

to understand implementation from the point of view of students who failed the examination for the second time. The semi-structured interviews showed that the students wanted to be recognized as slow language learners and accordingly prepared programs. In addition, they need an audience, mode, and content to motivate them to produce the language. Lastly, they want to be assessed for extension studies in which they have their own interests. The findings of this study are important for educators who want to closely monitor underachieving language learners and prepare blends that directly suit them without placing further burdens on their language learning processes.

This study has a few limitations that should be considered when interpreting the findings. To begin with, the number of participants was limited to five male students, which is a small number for generalizing the findings. The second limitation concerns the data collection method. There was only one way to collect data: the structured interview. The final limitation was related to bias that the author could have introduced in the study because she was also the instructor of the class. Further studies will use triangulation methods and larger numbers of participants.

Acknowledgments

I thank Prof. Dr. Hatice Soft, my super-advisor, for her expertise and assistance throughout all aspects of my dissertation, from which this study evolved.

References

Abal, A. (2012). A comparison of the effects of classroom and Multi-User Virtual Environments on the perceived speaking anxiety of adult post-secondary English Language Learners.

Adas, D., & Bakir. (2013). Writing difficulties and new solutions: Blended learning as an approach to improve writing abilities.

Ağgün, N. (2018). Tailoring blended instruction to underachieving language learners in order to enhance their productive language skills.

Akcayoglu I., D., & Özer, Ö. (2021). The'Sink or Swim'Dilemma: Mindsets of Successful and Underachieving EFL Learners at a School of Foreign Languages. *Novitas-ROYAL (Research on Youth and Language)*, *15*(2), 37-51.

Al Zumor, A. W. Q., Al Refaai, I. K., Eddin, E. A. B., & Al-Rahman, F. H. A. (2013). EFL Students' Perceptions of a Blended Learning Environment: Advantages, Limitations and Suggestions for Improvement. *English Language Teaching*, *6*(10), 95-110.

Bañados, E. (2006). A blended-learning pedagogical model for teaching and learning EFL successfully through an online interactive multimedia environment. *CALICO Journal, 23*(3), 533-550.

Bozgün, K., Can, F., & Baytemir, K. E. M. A. L. (2022). Adaptation of The Triarchic Model of Grit Scale and Perceived Academic Underachievement Scale into Turkish. *International Journal of Psychology and Educational Studies*, *9*(3).

Bueno-Alastuey, M. C., & López Pérez, M. V. (2014). Evaluation of a blended learning language course: students' perceptions of appropriateness for the development of skills and language areas. *Computer Assisted Language Learning*, *27*(6), 509-527.

Cogen, V. (1992). Why schools can't. *Boosting the adolescent underachiever*, 127-38. Springer Science & Business Media.

Cook, V. (1999). Going beyond the native speaker in language teaching. TESOL quarterly, 33(2), 185-209.113-150.

Dewaele, J. (2013). Learner-internal psychological factors. In Herschensohn J.&Young-Scholten, M. *The Cambridge Handbook of Second Language Acquisition*, 159-79. Cambridge, UK: Cambridge University Press.

El-Bassuony, J. M. (2016). The effectiveness of flipped learning in developing English grammatical performance of underachieving language learners at the secondary stage. *International Journal of English Language Teaching, 4*(8), 76-102.

Eranıl, A. K. (2024). School Dropout Causes in Turkish Education System (2009-2022): A Pareto Analysis by Grade Level. *Journal of Theoretical Educational Science*, *17*(2), 451-477.

Goertler, S. (2012). Theoretical and empirical foundations for blended language learning. In: F. Rubio & J. Thoms (Eds.), *Hybrid language teaching and learning: Exploring theoretical, pedagogical, and curricular issues.* (pp. 27049). Boston: Cengage/Heinle.

Gökçe, S. (2021). Turkish university students'causal attributions to their perceived achievements and failures in learning english. *International Journal of Current Approaches in Language, Education and Social Sciences*, *3*(1), 157-173.

Gregori, E. B. (2015). Learners and Technology: Myths about Online Education. In *Myths in Education, Learning and Teaching: Policies, Practices and Principles* (pp. 173-189). London: Palgrave Macmillan UK.

Heider, F. (1958). The Psychology of Interpersonal Relations, New York: Wiley.

Holt, J. (2005). *The underachieving school*. Sentient Publications.

Hu, T. C., & Hsu, Y. J. (2020). Effects of a remedial program on beginner-level, low-achieving EFL learners. *Bull. Educ. Psychol*, *51*, 687-711.

Kleiman, G. M. (2000). Myths and realities about technology in K-12 schools. *Leadership and the New Technologies*, *14*(10), 1-8.

Krashen, S. D. (1982). Principles and practice in second language acquisition. https://www.sdkrashen.com/content/books/principles_and_practice.pdf

Lam, W. S. E. (2004). Second language socialization in a bilingual chat room: global and local considerations. *Language Learning and Technology 8*(3),44-65.

Le, T. N., Allen, B., & Johnson, N. F. (2022). Blended learning: Barriers and drawbacks for English language lecturers at Vietnamese universities. *E-learning and Digital Media*, *19*(2), 225-239. https://doi.org/10.1177/20427530211048235

Mercan, Ç. S. (2009). School underachievement from 'underachiever's point of view. *Ceed*, 201.

Merga, M. K., Malpique, A., Mat Roni, S., Valcan, D., & Ledger, S. (2021). Teachers' perceptions of the impact of COVID-19 on writing instruction in Australia. *Issues in Educational Research*, *31*(4), 1138-1155.

Miyazoe, T., & Anderson, T. (2010). Learning outcomes and students' perceptions of online writing: Simultaneous implementation of a forum, blog, and wiki in an EFL blended learning setting. *System, 38*(2), 185-199.

Mori, S. (2019). Behavioral and Attitudinal Differences between Overachievers and Underachievers on a Web-based Task. *Studies in e-Learning Language Education*, *13*, 14-28.

Neumeier, P. (2005). A closer look at blended learning—parameters for designing a blended learning environment for language teaching and learning. *Recall, 17*(2), 163-178.

Pasicolan, J. M. F., Banera, R. T., Catabay, M. J. A., & Tindowen, D. J. C. (2021). Enhancing Students' English Language Vocabulary Skills Through An Online Remediation Program. *Journal of Language and Linguistics in Society (JLLS) ISSN*, 2815-0961.

Picciano, A. G. (2009). Blending with purpose: The multimodal model. *Journal of Asynchronous Learning Networks, 13*(1).

Pimsleur, P., Sundland, D. M., & McIntyre, R. D. (1964). Under-Achievement in Foreign Language Learning. IRAL-International Review of Applied Linguistics in Language Teaching, 2(1).

Schank, R. C., & Jona, M. Y. (1991). Empowering the student: New perspectives on the design of teaching systems. *The Journal of the Learning Sciences, 1*(1), 7-35.

Shih, R. (2010). Blended learning using video-based blogs: Public speaking for English as asecond language students. *Australasian Journal of Educational Technology, 26*(6).

Shimkovich, E., Makhmutova, G., Ivanova, D., & Urunova, R. (2022). Advantages and Disadvantages of Hybrid Learning for International Students. *ARPHA Proceedings*, *5*, 1533-1544.

Sparks, R., & Ganschow, L. (2001). Aptitude for learning a foreign language. *Annual Review of Applied Linguistics, 21*, 90-111. speaking anxiety of adult post-secondary English Language Learners.

Tayebinik, M., & Puteh, M. (2013). Blended Learning or E-learning?. *arXiv preprint arXiv:1306.4085*.

Wang, A. L. (2011). Interactions between human and computer networks: EFL college students using computer learning tools in remedial English classes. In *Human-Computer Interaction. Users and Applications: 14th International Conference, HCI International 2011, Orlando, FL, USA, July 9-14, 2011, Proceedings, Part IV 14* (pp. 107-112). Springer Berlin Heidelberg.

Yang, Y. C., Chuang, Y., Li, L., & Tseng, S. (2013). A blended learning environment for individualized English listening and speaking integrating critical thinking. *Computers & Education, 63*, 285-305.

Zainudin, Z. E. (2019). Remedial online materials as learning tools for struggling readers *The Journal of the English Language Teaching Centre Malaysia.*1 (7), 75-85.

Educational Inequities and Achievement Gap: Which Way Forward

Cordelia Azumi Yates, Morningside University, United States

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This Systematic Literature Review highlights the root causes of inequities and explores the potential solutions to bridge the achievement gap. The study utilized the PRISMA guidelines to select the eligible studies presented in the study. The persistent achievement gap globally is evident in the disparities in educational outcomes and economic opportunities. Prejudice and achievement gaps are found in the same communities, leading to a cycle of inequality and limited social mobility. The outcome negates the Sustainable Development Goal (SDG) 4 by the United Nations, which calls for ensuring quality education for all (Gust et al., 2024). Yang and Lee (2022) utilize data from PISA 2015 to discover that privileged pupils gain academically from excellent teachers significantly more than their less fortunate counterparts. As a result of this plight, this SLR explores the root causes underlying these pervasive inequities. A thorough, rigorous analysis of the extant research aims to elucidate the multifaceted factors - economic, social, cultural, or institutional - contributing to disparities in educational outcomes. The SLR yielded 72 studies with the themes of inequalities, disparities, colonial legacy, impact on the achievement gap, solutions, and bridging the achievement gap. The study implication is the need to re-evaluate and redesign tracking systems to reduce the impact of socioeconomic status on student outcomes. The study implies that policymakers should prioritize equity-focused policies for inequalities.

Keywords: Achievement Gap, Bridging Achievement Gap, Critical Race Theory, Inequities, Socioeconomic Status

iafor
The International Academic Forum
www.iafor.org

Introduction

The persistent achievement gap globally is evident in the disparities in educational outcomes and economic opportunities among various demographic groups. It is the discrepancy in academic performance between minorities, immigrants, and underprivileged students (Hernandez, 2022). The existence of persistent and pervasive differences in school achievement between groups has been repeatedly confirmed by extensive research (McFarland et al., 2018; Reardon, 2018; Schnell & Azzolini, 2015). For instance, the achievement gap is the most discussed topic in American education as the phrase describes the differences in standardized test results between White and Black pupils, White and Latina/o students, and White students who have just immigrated (Ladson-Billings, 2006). Furthermore, the Achievement gap is a recognized term used across the political spectrum to describe social injustice and societal inequities (Clark, 2013; Harris & Herrington, 2006). Given the importance of this topic, there is a clear need for further research on the achievement gap between students from higher and lower economic backgrounds (Artiles, 2011; Hanushek et al., 2019), making the work in this area crucial In 2007, Fanning asked, 'Is there a global achievement gap?' (p. 28) Moreover, “If we broaden our understanding by slightly reframing our view of the achievement gap to include the learning gap between children who are part of the privileged, dominant culture and children who are in the minority culture and are not privileged, will we find an achievement gap in other parts of the world?” (p. 28). “If we believe that an inequitable distribution of learning reflects discrimination, then will we find that prejudice and achievement gaps are found in the same communities? Is there any part of the world where no one has prejudices, and no one acts on these prejudices in ways that are discriminatory towards children? " (p. 28).

These fundamental questions were reflected in a UNESCO report highlighting education inequality as a global issue, with slow progress toward achieving education for all. Disparities in access to quality education and completion rates persist, notably between higher- and low-income high schools (Gust et al., 2024). According to a National Student Clearinghouse Research Center report, students from higher-income high schools were 25% more likely to enroll in college immediately after high school. They had higher return and completion rates compared to students from low-income schools. Completion rates also varied by school type, with urban schools at 36%, rural schools at 41%, and suburban schools at 47%. These disparities negate Sustainable Development Goal (SDG) 4, which calls for quality education for all (Gust et al., 2024). Thus, the significance of addressing the educational achievement gap, particularly race and implicit bias, and ensuring education as a right for all children cannot be overlooked (Howard, 2019). The achievement gap is a complex issue with diverse interpretations. Ladson-Billings (2006) views it as an "education debt" shaped by historical, economic, sociopolitical, and moral factors. Wagner (2010) identifies two gaps: one in the quality of education available to different socioeconomic groups and the resulting outcome discrepancy. Sayed et al. (2003) emphasize the complexity of understanding achievement gaps and social injustice due to varying perspectives. Artiles (2021) highlight that efforts to improve education and provide equal opportunities have been influenced by flawed assumptions about race and ability differences stemming from ideologies of meritocracy and individualism.

Furthermore, other scholars highlighted the crucial issue of the achievement gap in their studies. Yang and Lee (2022) found that privileged students benefit more academically from excellent teachers than their less fortunate counterparts. Ladson-Billings (2016) describes the achievement gap as an "education debt," disproportionately affecting children from low-

income and racialized backgrounds. Hanushek et al. (2022) suggest that systemic inequities perpetuate these disparities. Shukla et al. (2022) also highlights how biased curriculum design and limited resources in low-income schools exacerbate the issue. Mills and Read (2019) emphasize the importance of equity policies to ensure all students have access to high-quality facilities and resources. Hodgkinson et al. (2019) demonstrate the role of social mobility in closing the achievement gap. Thus, addressing the root causes of the achievement gap and implementing targeted solutions can create a more just and equitable educational system.

Considering the above perspectives on achievement gap, this systematic literature explores the root causes underlying these pervasive inequities. A thorough, rigorous analysis of the extant research aims to elucidate the multifaceted factors - economic, social, cultural, or institutional - contributing to disparities in educational outcomes. Importantly, this review will explore potential evidence-based interventions and policy approaches that promise to bridge these gaps and foster more equitable access. Through a comprehensive, scholarly synthesis of the literature, this work seeks to advance our understanding of this critical challenge and inform efforts to create more inclusive, supportive educational environments that enable the success of all students.

- The following research questions guided this study:
    - What are the root causes underlying educational inequities and achievement gaps, and what potential solutions could help bridge these gaps?
    - How do the disparities in educational attainment perpetuate cycles of poverty, limit opportunities for upward social mobility, and contribute to broader social inequities?
    - In what ways do issues of multicultural education impact achievement gaps?
    - What specific practices and interventions have been effective in facilitating the closure of achievement gaps and promoting more significant educational equity?

Background

Achievement gaps refer to continuous differences in test scores or other results, forming the basis for structural and educational policy reforms (Shukla et al., 2022). Rooted in the legacy of colonialism, racism, and slavery, achievement gaps perpetuate structural inequalities in the United States (Wright, 2022). Critical race theory has showcased that racism is a systemic oppression embedded in society, perpetuating the exploitation and marginalization of communities of color (Kumasi, 2015). According to a Pew Research Center Report (2019), more than 4 in 10 Americans believe that the country still needs to work on providing black people with equal rights compared to whites. Gillborn (2023) used critical race theory to analyze black-and-white inequalities and identified that misleading statements are used to create a false impression of rapid progress in minority student achievement, obscuring the persistent nature of racial inequality. In addition, colonialist and racist ideologies continue to influence the distribution of resources, opportunities, and power, resulting in systemic inequalities affecting educational outcomes and employment opportunities (Gillborn, 2005).

Furthermore, it has been illustrated that white powerholders and policymakers intentionally perpetuate the pattern of racial advantage and inequality structured in domination (Gillborn, 2005). Huang, F. L. (2018) demonstrated that black students are 3.8 times more likely to be suspended than white students, even when controlling for factors like socioeconomic status

and behavior. To create a more just and equitable society, it is necessary to address the historical and intergenerational effects of colonialism and slavery. Researchers must consider how power, race, culture, and socioeconomic status influence educational practices globally. Hanushek et al. (2022) identified trends in socioeconomic status inequalities reflected in the accomplishments of U.S. student cohorts born between 1961 and 2001. Addressing root causes, historical and systemic factors, socioeconomic status, and potential solutions are essential to bridge the achievement gap.

Methods

The systematic literature review under this section adhered to the uniform methodology. For carrying out and documenting the investigation, the systematic review was based on PRISMA criteria (Moher et al., 2009). The recommendations include a checklist of elements that must be included in the review to improve reliability and openness.

Study's Inclusion/ Exclusion Criteria

The inclusion criteria are:
a) Studies exploring systemic inequalities such as racism, colonialism, and intersectional forms of oppression on educational outcomes
b) Impact of systemic inequalities on low-income students
c) Historical and intergenerational effects of colonialism, slavery, and racism on the achievement gap
d) Studies incorporating critical race theory.

The exclusion criteria are:
a) Studies that do not acknowledge the impact of systemic inequalities on educational outcomes, economic opportunities, and the achievement gap
b) Studies not published in English.

Search Strategy

I conducted a systematic review using various search databases and terms related to education inequality, racism, colonialism, critical race theory, education policy, and student demographics. I screened and included relevant studies after refining the search using Boolean algebra commands.

Risk of Bias

The included studies show a moderate to high risk of bias due to selection, performance, and detection bias. This limits the strength of the evidence, and caution is advised when applying the findings to real-world settings or broader populations. The risk of bias assessment indicates a moderate to high risk, with the most significant concerns being selection bias (31%), performance bias (36%), and detection bias (33%).

Study Selection and Data Extraction

PRISMA guidelines made post-identification of research and the removal of duplicates easier. The researcher produced the current review articles by doing full-text screening utilizing eligibility criteria and according to screening parameters for titles and abstracts.

Data extraction for articles eligible for the qualitative synthesis was done by tabulating data using attributes that indicated and reflected article inclusion. From the previous systematic analysis, 248 were found in online searches after duplicates. After reviewing the abstracts and conclusions, 72 publications were eligible and chosen based on the prior criteria backed up by four reports. The PRISMA 2020 guidelines were further integrated to update the number of studies included in this review.

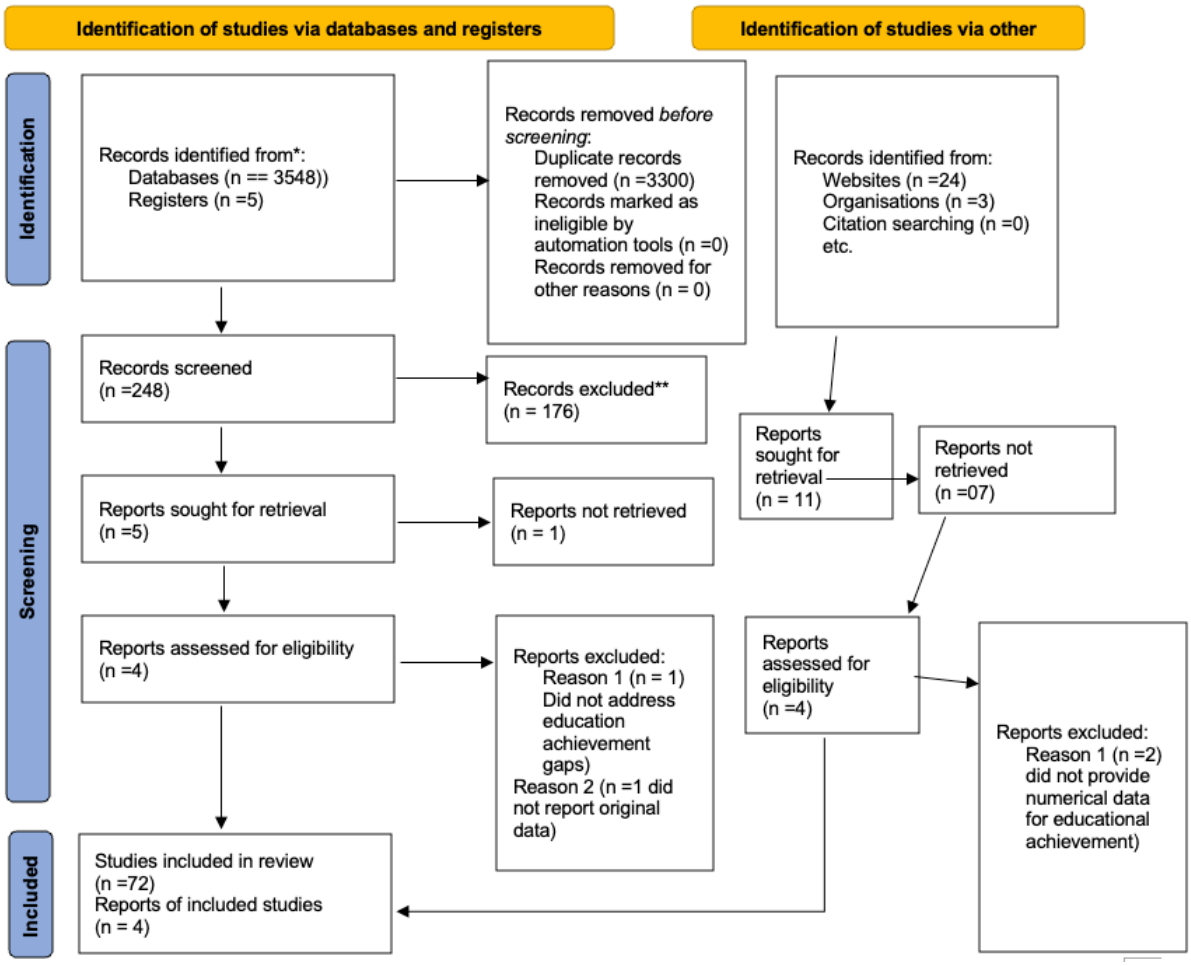


Figure 1: PRISMA 2020 Flow Diagram

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi:10.1136/b

Findings

Root Causes of Achievement Gap

Inequalities

The studies highlighted the widespread use of attainment and achievement metrics in evaluating education quality. However, these metrics may oversimplify educational inequality and fail to capture essential aspects such as critical thinking and social-emotional learning. These shortcomings perpetuate a narrow understanding of educational success, disregarding broader social and economic factors influencing student outcomes. Criticism

exists regarding the educational system's contribution to global disparities. This issue affects at least two-thirds of young people worldwide, emphasizing the universal nature of the problem. Also, Capitalism's impact on standardized testing results in a narrow focus on critical thinking in education, influencing what is taught, how it is taught, and access to education. This leads to educational inequality, particularly for disadvantaged backgrounds (Irwin et al., 2023; Gust et al., 2024; Giroux, 2020). Racial disparities in education contribute to the academic achievement gap and are driven by competition within the system, suggesting structural bias. Educational equity is essential for America's future, but income distribution and poverty directly affect education input and perpetuate disadvantage (Dixson & Rousseau Anderson, 2018; Darling-Hammond, 2010; Haveman & Wolfe, 1994; Howard, 2019). The report by Langthaler and Malik (2023) emphasized the persistent issue of educational inequalities, particularly the lack of prioritization of desegregation policies. School segregation perpetuates educational inequalities and perpetuates the academic achievement gap. The report highlighted the urgent need for policymakers and educators to address the issue of school segregation and develop targeted interventions for more inclusive and equitable education systems.

Considering the above, the educational disparities are deeply rooted in socioeconomic inequalities, as highlighted by Jotterand (2018). The author notes that poverty is a significant predictor of low academic achievement, as students from low-income backgrounds often face numerous barriers to success. These barriers can include limited access to quality educational resources, such as textbooks, technology, tutoring, and inadequate nutrition, healthcare, and housing. Additionally, students from low-income families may experience stress and trauma due to economic insecurity, which can negatively impact their mental and emotional well-being and ability to focus on their studies. Furthermore, poverty can also perpetuate a cycle of disadvantage, as students who do not have access to quality education may struggle to secure better-paying jobs and escape poverty later in life. As a result, the achievement gap between students from high-income and low-income families continues to widen, with students from low-income backgrounds being disproportionately represented among those who drop out of school or struggle academically. The education system's structural inequalities result in disproportionate disciplinary measures for students from lower socioeconomic backgrounds, affecting their education equity. Gregory et al. (2010) illustrated its impact on academic performance for students of color, while Carter et al. (2017) showed how race influences disciplinary measures within educational institutions, as seen in Brown v. Board of Education. Addressing these racial disparities and rectifying institutional policy inequities is crucial.

Colonial Legacy

This theme was supported by fifteen studies (n=15). Colonialism has had a lasting impact on the education systems, curricula, and pedagogies of these countries, perpetuating cultural imperialism and dominance. The colonial legacy continues to profoundly impact academic achievement, perpetuating the achievement gap between white and African American students. According to Love (2004), the colonial yoke of racism and oppression has been perpetuated through Critical Race Theory. This theory suggests that the concept of white intellectual superiority and African American intellectual inferiority has been deeply ingrained in Western society, resulting in a widening of the achievement gap. The colonial legacy's effects on education include the lack of representation and validation of African American culture and experiences in curriculum materials, as well as the historical erasure of African American contributions to knowledge and innovation (Wiggan, 2007). This has

perpetuated systemic inequalities in education, such as underfunding of schools in predominantly African American communities and the disproportionate suspension and expulsion rates of African American students. As a result, African American students face significant barriers to academic success and limited opportunities for social mobility. Ladson-Billings (2019) contended that the education debt is impacted by historical and ongoing structural injustices, including poverty, racism, and segregation, resulting in poor quality education and limited resources for marginalized communities. Maldonado-Torres (2007) also argued that coloniality is a persistent and ongoing structure perpetuating dominance and noted that the colonial legacy has a persistent impact on the representation and validation of Indigenous cultures, histories, and identities in education.

This is further exacerbated by unequal powers in today's world, which continue to reinforce the colonial era modeling approach in educational systems. The legacy of colonialism perpetuates neocolonialism and racial/ethnic disparities, leading to ongoing structural injustices. Resolving these injustices requires decolonizing educational leadership and going beyond policy and structural shifts to include Indigenous ways of knowing and learning. (Abu-Shoman, 2013; Lee, 2002; Regmi, 2022; Ladson-Billings, 2019; Jaramillo, 2013; Tuck and Yang, 2018). Tuck and Yang (2012) argue that decolonization involves more than just incorporating diversity and inclusivity into education. It requires dismantling colonial and imperial structures that have shaped education. They assert that decolonization demands a fundamental transformation of the education system, encompassing the curriculum, pedagogy, and institutional structures. This transformation should be grounded in a critical understanding of the ongoing impacts of colonialism and imperialism on marginalized communities. Including diverse perspectives is insufficient; true decolonization necessitates disrupting power structures perpetuating inequality and marginalization. This process involves acknowledging and appreciating Indigenous knowledge, challenging dominant narratives, and combatting stereotypes and racism. The dominance of Western epistemology characterizes coloniality, prioritizing Western knowledge over indigenous knowledge. This has led to the marginalization of indigenous cultures and perpetuated power imbalances, (Mignolo 2018).

Disparities

Reardon (2018) emphasized the widening achievement gap between children from high- and low-income families born in 2001 compared to those born 25 years earlier. The impact of geographical location on academic achievement was highlighted, especially for Black students in the United States (Morris & Monroe, 2009). The southern region of the U.S. has historically faced neglect and underinvestment in education, leading to a widening academic achievement gap for Black students, perpetuating inequalities due to historical segregation and systemic racism. The achievement gap disproportionately affects students from lower socioeconomic backgrounds and immigrant families, perpetuating inequality in education (Hanushek et al., 2019). This gap is not fully explained by parents' educational level (Schnell & Azzolini, 2015). Differences in work and the long-term consequences of unequal learning experiences also contribute to this disparity (Bailey & Dynarski, 2011). Furthermore, ethno-racial disparities within schools have far-reaching impacts on academic achievement and schooling outcomes (Warikoo & Carter, 2009). Cultural and ethnic differences among student groups can significantly affect academic achievement and schooling outcomes, impacting native and immigrant students (Berkowitz et al., 2017).

Thus, addressing these disparities is vital to ensuring that all students have an equal chance to succeed academically and achieve their full potential (Berkowitz et al., 2017). Teachers' lack of recognition of students with migration backgrounds, particularly their cultural and linguistic backgrounds, can significantly exacerbate the achievement gap (Vieluf & Sauerwein, 2024). Similarly, Salmela-Aro and Chmielewski (2019) found that students from low-income backgrounds tend to perform worse than their peers from higher socioeconomic backgrounds, with significant gaps in reading and mathematics. To address this issue, culturally sensitive education and support for teachers working with diverse student populations are essential (Kozleski & Waitoller, 2017).

Achievement Gap

Sixteen studies supported the theme that the achievement gap profoundly impacts student engagement, decreasing motivation and interest in learning. The National Center for Education Statistics analysis of NAEP data sheds light on the magnitude and trends of these gaps over time, helping to identify potential causes (National Center for Education Statistics, n.d). The data reveals that despite addressing them, these gaps have persisted and even widened in some cases. The achievement gap is described as an "education debt," disproportionately impacting children from low-income and racialized backgrounds (Ladson-Billings, 2006, 2016). McFarland et al. (2018) state that the persistent gap between racial and ethnic groups has resulted in declining student engagement. Addressing the achievement gap is crucial to promoting student engagement and motivation and achieving educational equity. Additionally, the gender gap in education persists in some regions, perpetuating existing inequalities (Friedman et al., 2020). The increasing economic segregation of schools perpetuates the achievement gap, impacting diversity and representation in the student body (Reardon & Owens, 2014). This segregation exacerbates the achievement gap, mainly affecting students from low-income backgrounds (Giroux, 2020). These persistent issues highlight the systemic inequalities that must be addressed for a more equitable society. The achievement gap is exacerbated by poverty, which significantly impacts students' academic achievement (Lacour & Tissington, 2011). Poverty can limit students' access to resources and opportunities, affecting their ability to succeed in school (Autor, 2014). Addressing poverty is crucial in reducing the achievement gap and ensuring that all students can succeed. The achievement gap is reflected in persistent racial and economic disparities in labor market outcomes, with race being a significant factor. Unfair disciplinary practices and other factors contribute to these disparities. Quality teaching can help address the achievement gap and reduce racial and economic disparities (Carneiro et al., 2005; Chetty et al., 2012; Okonofua et al., 2016; Wiggan, 2007). The achievement gap reflects persistent racial and economic disparities and systemic issues in education. Hanushek et al. (2012) found that while some countries and the United States have improved student achievement, others have stagnated or experienced declines, indicating more work is needed. Harris and Herrington (2006) also highlighted the unintended consequences of accountability standards and policies, which can narrow curricula and increase testing pressure, widening the achievement gap.

Cycles of poverty limit opportunities for upward mobility and contribute to social inequity, especially for disadvantaged students in an overly testing-focused education system. Lavrijsen and Nicaise's (2015) findings indicated that educational tracking exacerbates social inequalities in reading achievement, with students from lower socioeconomic backgrounds being more likely to be assigned to lower tracks and performing poorly in reading. The authors also found that the negative effect of tracking social inequalities is more pronounced among boys than girls. Artiles (2011) concluded that an interdisciplinary approach is

necessary to understand and address systems shaped by racialized beliefs and stereotypes, perpetuate educational inequalities and marginalize students and that educators, policymakers, and researchers must work together to develop more inclusive and equitable educational practices that recognize the complex interactions between race, culture, and ability.

Solutions and Bridging Achievement Gap

The theme was explored through eighteen studies (n=18), discussing interventions that address the achievement gap and promote educational equity. Wang and Eccles (2012) emphasized the impact of social support from teachers, parents, and peers on student school engagement. Meanwhile, Schnell et al. (2015) highlighted the significance of family involvement in predicting educational success. Both studies emphasized the positive influence of support systems on student engagement and the correlation between higher family involvement and better educational outcomes. Heckman et al. (2010) found that the High Scope Perry Preschool Program positively affected participants, showing the importance of investing in early childhood education to improve outcomes and reduce social inequality.

Furthermore, in the study by Demie and Mclean (2015), the authors identified ways to narrow the academic achievement gap by deploying the best teachers and supporting free school meals for students from disadvantaged homes. They suggested that deploying the best teachers and providing free meals could bridge the academic achievement gap globally. By identifying and developing high-quality teachers through professional development, mentorship, and incentives, students can receive instruction from experienced educators who can effectively address their learning needs. This can lead to increased attendance, participation, and engagement. When combined with systematic changes to transform educational policies and practices, such as addressing systemic inequalities and resource disparities, a positive impact on educational equity and student outcomes can be seen. Oakes and Lipton (2007) argue for such changes to enhance school social justice and equity.

Additionally, positive changes in poverty level and income distribution could positively affect students' academic performance, as Dumais-Desrosiers and Janosz (2019) pointed out in their meta-analytic synthesis of the relationship between socioeconomic status and achievement. "Cultivating equity literacy among educators is essential for creating equitable and just educational environments that support the success of all students (Gorski & Swalwell, 2015). This involves developing inclusive pedagogies, fostering student engagement, and promoting social mobility to close the achievement gap (Harper & Quaye, 2015; Hodgkinson et al., 2019; Mills & Read, 2019). By implementing these strategies, educators, administrators, and policymakers can enhance educational opportunities and outcomes for all learners.

According to Strietholt et al. (2018), educational policies should address socioeconomic inequality that significantly impacts student performance. The current policies are insufficient in addressing this issue and may not be sufficient to reverse the trend. The authors suggest that policies must go beyond rhetoric and address systemic barriers and biases perpetuating inequality (Strietholt et al., 2018). Moreover, Strietholt et al. (2018) study suggested that current policies may even exacerbate existing inequalities, as they often focus on individual-level solutions, such as teacher training or parental involvement, rather than addressing the broader structural issues. This approach may inadvertently reinforce existing power dynamics

and reinforce inequalities. To effectively address the decline in academic performance and achievement gap, educational policies must prioritize a more nuanced understanding of the complexities of socioeconomic inequality (Wang & Eccles, 2012). This includes recognizing the interplay between individual, family, and societal factors that contribute to unequal opportunities and outcomes (Wang & Eccles, 2012). Along the same line, a study by Mardon and Ahmed (2023) stated that learning inequity in the Indigenous population is described, and the rationale and relevant approaches to education, including prioritizing a more nuanced understanding of the complexities of socioeconomic inequality for Indigenous people, are also stressed. Policies must also acknowledge the role of systemic barriers, such as lack of resources, inadequate infrastructure, and discriminatory practices, in perpetuating inequality. It can, therefore, be argued that closing the achievement gap can be viewed as a social justice issue as it entails not only attending to the academic learning needs of students but also addressing the social and economic causes that contribute to inequality. Carter and Welner (2013), in their work, stressed the principle of equity in education and stated that the solution to this problem can be sought in programs and mechanisms that are aimed at providing equal education to all.

Furthermore, educational policies must prioritize a more equitable distribution of resources, including funding, staffing, and facilities. This may involve re-examining budget allocations and redistributing resources to schools serving low-SES communities. Policies must address teacher recruitment and retention issues in these communities and provide targeted support for students from low-SES backgrounds (Heckman et al., 2010). Ultimately, educational policies must prioritize a comprehensive approach that acknowledges the complexity of socioeconomic inequality and addresses its root causes. By doing so, policymakers can work towards creating a more equitable education system that promotes student performance and achievement for all students, regardless of their socioeconomic background.

Inclusive education practices foster education equity. Loreman et al. (2005) provided practical strategies for educators to promote inclusive education, including developing inclusive curricula, using inclusive teaching practices, and fostering positive student relationships. Therefore, using inclusive teaching practices and fostering positive relationships with students can create more inclusive and supportive educational environments. Portes (2008) advocated for a cultural approach recognizing the importance of students' cultural backgrounds and experiences in shaping their educational experiences and outcomes. Making education inclusive, the cultural approach recognizes the importance of students' cultural backgrounds and experiences can help create more inclusive and equitable educational environments. Culturally inclusive education practices through culturally responsive pedagogy will improve educational outcomes and reduce the academic achievement gap. Gay (2018) indicated how cultural differences can impact students' experiences and outcomes and provides strategies for teachers to develop cultural competence, build relationships with students, and design culturally responsive lessons. Clark (2013) highlighted the importance of addressing systemic barriers through promoting inclusive teaching practices and fostering a sense of belonging among students. In this regard, closing the achievement gap and eliminating educational disparities are complex and multifaceted social issues. Other strategies suggested by a case study conducted by Darling-Hammond et al. (2017) stressed teacher professional development as one that focuses on enabling teachers to cope with students' differences.

In addition, it is important to develop a cultural understanding reflective of culturally responsive and inclusive teaching practices. Grant (2005) highlighted the need for teachers to

develop a deep understanding of their students' cultural backgrounds, including their values, beliefs, and traditions, and to use this knowledge to inform their teaching practices. Saint-Hilaire (2014) emphasized the need for teachers to move beyond surface-level awareness of diversity and instead develop a deeper understanding of their students' cultural experiences, values, and beliefs. As Lee and Buxton (2020) and Au and Ferrare (2015) highlight, culturally responsive teaching is vital to embracing diverse students' cultural content in the curriculum and teaching. As a result, a deeper appreciation of diversity improves education outcomes, thereby reducing the achievement gap. Therefore, Ameny-Dixon (2004) encouraged incorporating diverse perspectives, experiences, and knowledge into the curriculum to promote cross-cultural understanding, empathy, and critical thinking based on democratic principles that upheld cultural pluralism within culturally diverse societies in an interconnected world based on multicultural education. Multicultural education requires teachers to develop a deep understanding and appreciation of their students' cultural backgrounds, as emphasized by Grant (2005) and Saint-Hilaire (2014). This cultural competence enables teachers to design and implement culturally responsive teaching practices, as outlined by Gay (2018). By integrating a multicultural education framework, educators create equitable learning environments.

Conclusion

This SLR highlights the root causes of inequities and explores potential solutions to bridge the achievement gap. This systematic literature review was based on 72 studies and four reports that answered the question and provided insights on the achievement gap, educational inequalities, disparities, and impact on the achievement gap. The study utilized a systematic review methodology whose search terms on databases depended on the inclusion and exclusion criteria. The emerging themes were discussed in-depth and depended on the publications within the theme. The themes that emerged were inequalities were answered with thirteen (n=13) studies, colonial legacy (n=15), disparities (n=14), impact on achievement gap (n=16) as well as solutions and bridging achievement gap with eighteen (n=18) studies. The methodology's strengths are based on the method's comprehensive nature. This systematic review method identifies all relevant studies regardless of publication status. Through such efforts, the evaluation became more comprehensive, reducing the risk of bias. As a result of its nature, it is reproducible because it can be replicated. On the other hand, its limitations were due to the limited availability of evidence as sources. As a result, it limits the scope as well as conclusions. The study implication is the need to re-evaluate and redesign tracking systems to reduce the impact of socioeconomic status on student outcomes. The study implies that policymakers should prioritize equity-focused policies for social inequalities.

References

Abu-Shoman, A. (2013). The politics of education and critical pedagogy: considerations from the English literary tradition in post-colonial academic contexts. *Postcolonial Directions in Education, 2*(2), p. 263-313.

Ameny-Dixon, G. M. (2004). Why multicultural education is more important in higher education now than ever: A global perspective. *International Journal of Scholarly Academic Intellectual Diversity, 8*(1), 1–9.

Artiles, A. J. (2011). Toward an interdisciplinary understanding of educational equity and difference: The racialization of ability. *Educational Researcher*, *40*(9), 431-445.

Artiles, A. J., Kozleski, E. B., & Waitoller, F. R. (2017). Equity and excellence in special education: Contemporary issues for research and practice. Routledge.

Au, W., & Ferrare, J. J. (2015). Culturally sustaining pedagogies: Teaching and learning for justice in a changing world. Teachers College Press.

Autor, D. (2014). Skills, education, and the rise of earnings inequality among the "other 99 percent". *Science, 344(*6186), 843–851.

Bailey, M., & Dynarski, S. (2011). *Patterns of college success: Insights from longitudinal data*. Russell Sage Foundation.

Berkowitz, R., Moore, H., Astor, R. A., & Benbenishty, R. (2017). A research synthesis of the associations between socioeconomic background, inequality, school climate, and academic achievement. *Review of Educational Research*, *87*(2), 425-469.

Carneiro, P., Heckman, J. J., & Masterov, D. V. (2005). Labor market discrimination and racial differences in premarket factors. *Journal of Law and Economics, 48*(1), 1-39.

Carter, P. L., Skiba, R., Arredondo, M. I., & Pollock, M. (2017). You cannot fix what you don't look at: Acknowledging race in addressing racial discipline disparities. *Urban Education*, *52*(2), 207-235.

Chetty, R., Friedman, J. N., & Rockoff, J. E. (2012). *The long-term impacts of teachers: Teacher value-added and student outcomes in adulthood*. National Bureau of Economic Research.

Clark, J. V. (2013). The road to excellence: Promoting access and equity to close the achievement gap internationally. In *closing the achievement gap from an international perspective: Transforming STEM for effective education* (pp. 307–315). Dordrecht: Springer Netherlands.

Darling-Hammond, L. (2010). *The flat world and education: How America's commitment to equity will determine our future*. Teachers College Press.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. Learning Policy Institute Report.

Delgado, R., & Stefancic, J. (2023). *Critical race theory: An introduction* (Vol. 87). NyU press.

DelliCarpini, M., & Alonso, A. (2020). English language learners in US schools: An overview of research findings. Journal of Education for Teaching, 46(3), 283-293.

Demie, F., & Mclean, C. (2015). Tackling disadvantage: what works in narrowing the achievement gap in schools. *Review of Education*, *3*(2), 138-174.

Dixson, A. D., & Rousseau Anderson, C. (2018). Where are we? Critical race theory in education 20 years later. *Peabody Journal of Education*, *93*(1), 121-131.

Fanning, M.C. (2007). Developing a Perspective on the Global Achievement Gap: School Leaders as International Collaborations: Educational Leadership and Administration: *Teaching and Program Development,* 19, 25–42.

Friedman, J., York, H., Graetz, N., Woyczynski, L., Whisnant, J., Hay, S. I., & Gakidou, E. (2020). Measuring and forecasting progress towards the education-related SDG targets. *Nature*, *580*(7805), 636-639.

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice.* Teachers College Press.

Gillborn, D. (2005). Education policy as an act of white supremacy: Whiteness, critical race theory, and education reform. *Journal of Education Policy*, *20*(4), 485–505.

Gillborn, D. (2023). Coincidence or conspiracy? Whiteness, policy, and the persistence of the Black/White achievement gap. In *Mapping the Field* (pp. 204–223). Routledge.

Giroux, H. A. (2020). On critical pedagogy. Bloomsbury Publishing.

Gorski, P. C., & Swalwell, K. (2015). Equity literacy for all. *Educational Leadership, 72*(6), 34–40.

Grant, C. A. (2005). Culturally relevant teaching: The key to making multicultural education work. In *Research in multicultural education* (pp. 107–123). Routledge.

Gregory, A., Skiba, R. J., & Noguera, P. A. (2010). The achievement gap and the discipline gap: Two sides of the same coin? Educational researcher, 39(1), 59-68.

Gust, S., Hanushek, E. A., & Woessmann, L. (2024). Global universal basic skills: Current deficits and implications for world development. *Journal of Development Economics*, *166*, 103205.

Hanushek, E. A., Light, J. D., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2022). Long-run trends in the US SES—Achievement gap. *Education Finance and Policy*, *17*(4), 608–640.

Hanushek, E. A., Peterson, P. E., & Woessmann, L. (2012). Achievement growth: International and US state trends in student achievement. *Education Next*, *12*(4), 24-33.

Hanushek, E. A., Peterson, P. E., Talpey, L. M., & Woessmann, L. (2019). The Unwavering SES Achievement Gap: Trends in US Student Performance. Program on Education Policy and Governance Working Papers Series. PEPG 19-01. *Program on Education Policy and Governance.*

Harper, S. R., & Quaye, S. J. (2015). *Student engagement in higher education: Theoretical perspectives and practical approaches for diverse populations*. Routledge.

Harris, D. N., & Herrington, C. D. (2006). Accountability, standards, and the growing achievement gap: Lessons from the past half-century. *American Journal of Education*, *112*(2), 209–238.

Haveman, R., & Wolfe, B. (1994). Income inequality and poverty in the United States. In *American attitudes toward inequality* (pp. 137-188). Russell Sage Foundation.

Heckman, J. J., Moon, S. H., Pinto, R., Savelyev, P. A., & Yavitz, A. (2010). The rate of return to the HighScope Perry Preschool Program. Journal of Public Economics, 94(1-2), pp. 114–128.

Hernandez, A. (2022). Closing the achievement gap in the classroom through culturally relevant pedagogy. *Journal of Education and Learning*, *11*(2), 1-21.

Hill, N., & Tyson, D. F. (2019). Parental involvement in middle school: A meta-analytic assessment of the strategies that promote achievement. Developmental Psychology, 55(6), 1190–1205.

Howard, T. C. (2019). *Why race and culture matter in schools: Closing the achievement gap in America's classrooms*. Teachers College Press.

Huang, F. L. (2018). Do Black students misbehave more? Investigating the differential involvement hypothesis and out-of-school suspensions. *The Journal of Educational Research*, *111*(3), 284-294.

Irwin, V., Wang, K., Tezil, T., Zhang, J., Filbey, A., Jung, J., Bullock Mann, F., Dilig, R., & Parker, S. (2023). *Report on the Condition of Education 2023 (NCES 2023-144). U.S. Department of Education*. Washington, DC: National Center for Education Statistics. Retrieved [date] from https://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2023144.

Janks, H., & Ivanic, R. (2016). Discourse, learning, and teaching. A&C Black.

Jaramillo, D.M.B. (2013). Achievement as white settler property: How the discourses of achievement gaps reproduce settler colonial constructions of race. Education Policy Analysis Archives, 31(13). https://doi.org/10.14507/epaa.31.7131

Jotterand, F. (2018). Childhood brain development, the educational achievement gap, and cognitive enhancement. *Frontiers in Pharmacology*, *9*, 413260.

Kumasi, K. D. (2015). *Critical race theory and education: Mapping a legacy of activism and scholarship.* Routledge.

Lacour, M., & Tissington, L. D. (2011). The effects of poverty on academic achievement. *Educational Research and Reviews, 6*(7), 522-527.

Ladson-Billings, G. (1995). However, that is just good teaching! The case for culturally relevant pedagogy. Theory into Practice, 34(3), 159-165.

Ladson-Billings, G. (2006). From the Achievement Gap to the Education Debt: Understanding Achievement in U.S. Schools. *Educational Researcher*, *35*(7), 3-12

Ladson-Billings, G. (2015). Culturally relevant pedagogy 2.0: A.k.a. the remix. Harvard Educational Review, 85(4), 550-567.

Ladson-Billings, G. (2016). From the achievement gap to the education debt: Understanding achievement in US schools. Educational researcher, 45(7), 424-432.

Ladson-Billings, G. (2019). From the Achievement Gap to the Education Debt: Understanding Achievement in U.S. Schools. *Educational Researcher, 48*(9), 536-541.

Langthaler, M., & Malik, J. (2023). Inequalities in education from a global perspective: Theoretical approaches, dimensions and policy discussions, ÖFSE Briefing Paper, No. 34, Austrian Foundation for Development Research (ÖFSE), Vienna, https://www.oefse.at/publikationen/briefing-papers/detail-briefing-paper/publication/show/ Publication/inequalities-in-education-from-a-global-perspective/

Lavrijsen, J., & Nicaise, I. (2015). New empirical evidence on the effect of educational tracking on social inequalities in reading achievement. *European Educational Research Journal*, *14*(3-4), 206-221.

Lee, C. D., Quinn, H., & Valdés, G. (2015). Beyond the language given: The cultural and linguistic resources of heritage learners. Review of Research in Education, 39(1), 213-244.

Lee, J. (2002). Racial and ethnic achievement gap trends: Reversing the progress toward equity?. *Educational researcher*, *31*(1), 3-12.

Lee, J. J., & Buxton, C. A. (2020). Culturally responsive teaching through multicultural literature: A case study of a Korean American teacher. Urban Education, 55(4), 498-524.

Loreman, T., Deppeler, J., & Harvey, D. (2005). *Inclusive education: A practical guide to supporting diversity in the classroom.* Psychology Press.

Love, B. J. (2004). Brown plus 50 counter-storytelling: A critical race theory analysis of the "majoritarian achievement gap" story. *Equity & Excellence in Education*, *37*(3), 227-246.

Maldonado-Torres, N. (2007). On the coloniality of being. *Cultural Studies*. 21. 240-270. 10.1080/09502380601162548.

McFarland, J., Hussar, B., de Brey, C., Snyder, T. D., Wang, X., Wilkinson-Flicker, S., Gebrekristos, S., Zhang, J., Rathbun, A., Barmer, A., Bullock Mann, F., & Hinz, S. (2018). *The condition of education 2018 (NCES 2018-144).* National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education.

Mignolo, W.D. (2018). Coloniality is far from over, and so must be decoloniality. *Cultural Studies, 32*(4), 613-626.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group*, T. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Annals of Internal Medicine*, *151*(4), 264-269.

Morris, J. E., & Monroe, C. R. (2009). Why study the US South? The nexus of race and place in investigating Black student achievement. *Educational Researcher*, *38*(1), 21-36.

National Center for Education Statistics. (n.d). *Achievement gaps*. https://nces.ed.gov/nationsreportcard/studies/gaps/

National Student Clearinghouse Research Center report (2019). High School Benchmarks – 2019 | National Student Clearinghouse Research Center (nscresearchcenter.org).

Oakes, J., & Lipton, M. (2007). Teaching to change the world. McGraw-Hill Education.

Pew Research Center Report (2019). Views of racial inequality in America | Pew Research Center.

Portes, P. R. (2008). A Cultural Approach to Establishing Equity and Closing the Educational Achievement Gap. *Penn GSE Perspectives on Urban Education*, *5*(2), n2.

Reardon, S. F. (2018). The widening academic achievement gap between the rich and the poor. *In Social stratification* (pp. 536–550). Routledge.

Reardon, S. F., & Owens, A. (2014). Sixty years after Brown: Trends and consequences of school segregation. *Annual Review of Sociology*, pp. 40, 199–218.

Reardon, S. F., & Portilla, X. A. (2016). Recent trends in income, racial, and ethnic school readiness gaps at kindergarten entry. *Aera Open, 2*(3), 2332858416657343.

Reardon, S. F., Valentino, R. A., Kalogrides, D., Shores, K. A., & Greenberg, E. (2017). Patterns and trends in the black-white income gap among U.S. children, 1980-2010. Demography, 54(4), 1293–1313. doi:10.1007/s13524-017-0592-6

Regmi, K.D. (2022). The enduring effects of colonialism on education: three praxes for decolonizing educational leadership. “International Journal of Leadership in Education, pp. 1–19.

Saint-Hilaire, L. A. (2014). So, how do I teach them? Understanding multicultural education and culturally relevant pedagogy. *Reflective Practice*, *15*(5), 592-602.

Salmela-Aro, K., & Chmielewski, A. K. (2019). Socioeconomic inequality and student outcomes in Finnish schools. *Socioeconomic disparities and student outcomes: Cross-national trends, policies, and practices*, 153-168.

Sayed, Y., Soudien, C., & Carrim, N. (2003). Discourses of exclusion and inclusion in the South: Limits and possibilities. *Journal of Educational Change*, *4*(3), 231-248.

Schnell, P., & Azzolini, D. (2015). The academic achievements of immigrant youths in new destination countries: Evidence from southern Europe. *Migration Studies*, *3*(2), 217-240.

Schnell, P., Fibbi, R., Crul, M., & Montero-Sieburth, M. (2015). Family involvement and educational success of the children of immigrants in Europe. Comparative perspectives. *Comparative Migration Studies*, *3*, 1-17.

Shukla, S. Y., Theobald, E. J., Abraham, J. K., & Price, R. M. (2022). Reframing educational outcomes: Moving beyond achievement gaps. *CBE—Life Sciences Education*, *21*(2), es2.

Strietholt, R., Gustafsson, J. E., Hogrebe, N., Rolfe, V., Rosén, M., Steinmann, I., & Hansen, K. Y. (2019). The impact of education policies on socioeconomic inequality in student achievement: A review of comparative studies. *Socioeconomic inequality and student outcomes: Cross-national trends, policies, and practices*, 17-38.

Tuck, E., & Yang, K. W. (2012). Decolonization is not a metaphor. Decolonization: *Indigeneity, Education & Society*, 7(1).

U.S Department of Education. (2023). Fact sheet: *Biden-Harris administration announces new actions to build on work to accelerate learning and improve student achievement*. U.S Department of Education. https://www.ed.gov/news/press-releases/fact-sheet-biden-harris-administration-announces-new-actions-build-work-accelerate-learning-and-improve-student-achievement

Vieluf, S., & Sauerwein, M. N. (2024). Does a lack of teachers' recognition of students with migration backgrounds contribute to achievement gaps? *European Educational Research Journal*, *23*(1), 3-27.

Wagner, T. (2010). *The global achievement gap: Why even our best schools do not teach the new survival skills our children need and what we can do about it*—read How You Want. Com.

Wang, M. T., & Eccles, J. S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Development, 86*(3), 877–899.

Warikoo, N., & Carter, P. (2009). Cultural explanations for racial and ethnic stratification in academic achievement: A call for a new and improved theory. *Review of Educational Research*, *79*(1), 366-394.

Wiggan, G. (2007). Race, school achievement, and educational inequality: Toward a student-based inquiry perspective. *Review of Educational Research*, *77*(3), 310-333.

Wright, J. (2022). The deep roots of inequity: Coloniality, racial capitalism, educational leadership, and reform. *Educational Administration Quarterly*, *58*(5), 693–717.

Yang, M., & Lee, H. J. (2022). Do school resources reduce the socioeconomic achievement gap? Evidence from PISA 2015. *International Journal of Educational Development*, *88*, 102528.

Contact email: yatesc@morningside.edu

Gamified Assessment in Higher Education: A Conceptual Framework for Students' Motivation and Engagement

Ying Wu, University of Dundee, United Kingdom
Malcolm Stewart, University of Stirling, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Gamification of assessment has recently emerged as a valuable strategy to enhance student motivation and engagement in higher education. However, studies have focused on behavioural reactions and learning outcomes in response to gamification, the effective design of gamified assessment to improve students' motivation and engagement remains unclear, creating a notable gap in the current literature. The purpose of this research is to fill this identified research gap, proposing a conceptual framework addressing the design elements of gamified assessment in higher education. The provisional conceptual framework, Gamified Assessment for students' Motivation and Engagement, which is abbreviated as GAME, aims to enable educators in higher education to design positive gamified assessment experiences for students. A systematic literature review has been conducted as the research methodology, with PRISMA systematic procedures used to screen the articles across JSTOR, SCOPUS, ProQuest, and Web of Science databases. Through this procedure, 69 relevant studies have been identified. Eight attributes in relation to assessment design were summarised. The conceptual framework on the assessment methodology was constructed. The framework, GAME, provides valuable insights for creating motivating and engaging assessment in higher education. It emphasises the design elements of gamified assessment and has the potential for improving other aspects of student experience such as student satisfaction and academic performance. The framework can also be used as a tool for future empirical and experimental research.

Keywords: Higher Education, Gamification, Assessment Methodology, Student Motivation, Student Engagement

iafor
The International Academic Forum
www.iafor.org

Introduction

In recent years, gamification has gained significant traction as an innovative approach to enhance student motivation and engagement within higher education (Deterding et al., 2011; Hamari et al., 2014; Kapp, 2012; Ryan & Deci, 2000; Barata et al., 2013; Domínguez et al., 2013; Seaborn & Fels, 2015; Anderson & Dill, 2000; de-Marcos et al., 2014; Chapman & Rich, 2018). By integrating game mechanics into educational contexts, educators aim to create more interactive and enjoyable learning experiences that resonate with students' intrinsic and extrinsic motivations (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011; Nah et al., 2014; Huang & Soman, 2013; Nicholson, 2012). Despite the growing interest in this area, the application of gamification in assessment, particularly its design to foster motivation and engagement, has not been sufficiently explored (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013; Anderson & Dill, 2000; De Freitas & Griffiths, 2008). This paper seeks to address this gap by proposing the Gamified Assessment for students' Motivation and Engagement (GAME) framework, which provides a structured approach for designing gamified assessments that effectively engage and motivate students.

Recent studies emphasize the critical role of gamification in enhancing motivation, engagement, and academic performance in higher education. For instance, a longitudinal study by Lampropoulos and Sidiropoulos (2024) demonstrated that gamification significantly improves academic outcomes, including success and retention rates, compared to traditional and online learning methods. Similarly, Alenezi (2023) found that gamification not only boosts engagement but also fulfills students' psychological needs for autonomy, competence, and relatedness, aligning with self-determination theory. Additionally, Sánchez-Martín et al. (2023) highlighted the effectiveness of gamification in making challenging subjects, like physics, more engaging through game elements like challenges and leaderboards. Collectively, these studies reinforce the notion that well-designed gamification strategies can significantly enhance both student motivation and educational outcomes across various learning contexts.

The significance of this study lies in its potential to transform traditional assessment practices by incorporating elements that are proven to stimulate student interest and participation (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Anderson & Dill, 2000; Ryan & Deci, 2000; Barata et al., 2013; Domínguez et al., 2013; Seaborn & Fels, 2015; Chapman & Rich, 2018). Through a systematic review of the existing literature, this paper identifies the key attributes of successful gamified assessments and integrates them into a comprehensive framework that can be applied across various educational contexts (Deterding et al., 2011; Hamari et al., 2014; Kapp, 2012; de-Marcos et al., 2014).

Methodology

A systematic literature review was conducted to identify the key attributes of gamified assessments that contribute to student motivation and engagement (Higgins & Green, 2011; Moher et al., 2009; Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Anderson & Dill, 2000; Barata et al., 2013; PRISMA Group, 2009). The review adhered to the PRISMA guidelines, which provide a standardized approach to literature selection and evaluation (PRISMA Group, 2009; Moher et al., 2009; Higgins & Green, 2011; Nicholson, 2012). Articles were identified through comprehensive searches in JSTOR, SCOPUS, ProQuest, and Web of Science databases, focusing on journal articles, books, and conference papers that

address gamification, assessment, and student engagement in higher education (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011; Huang & Soman, 2013).

The search yielded 8,397 potential sources, which were then subjected to a rigorous screening process (Higgins & Green, 2011; Moher et al., 2009; PRISMA Group, 2024; Hamari et al., 2014; Chapman & Rich, 2018). Duplicates were removed, and the remaining 2,397 articles were further screened based on relevance to the research question (Deterding et al., 2011; Anderson & Dill, 2000; Barata et al., 2013; Kapp, 2012; De Freitas & Griffiths, 2008). Abstracts were reviewed, leading to the exclusion of 2,062 articles that did not meet the inclusion criteria (Hamari et al., 2014; PRISMA Group, 2024; Moher et al., 2009; Nah et al., 2014). Full-text reviews were conducted on 75 articles, with 69 studies ultimately being included in the analysis.

The selected studies were analyzed to identify recurring themes and attributes related to the design of gamified assessments (Deterding et al., 2011; Hamari et al., 2014; Anderson & Dill, 2000; Barata et al., 2013; Seaborn & Fels, 2015; Huang & Soman, 2013; Nah et al., 2014). These attributes were then synthesized into the proposed GAME framework, which is structured around four key aspects: Control, Context, Components, and Connectivity (Kapp, 2012; Ryan & Deci, 2000; Domínguez et al., 2013; Seaborn & Fels, 2015; Chapman & Rich, 2018). The potentially relevant literature has been identified, screened and checked for eligibility as show in the flowchart below (Figure 1).

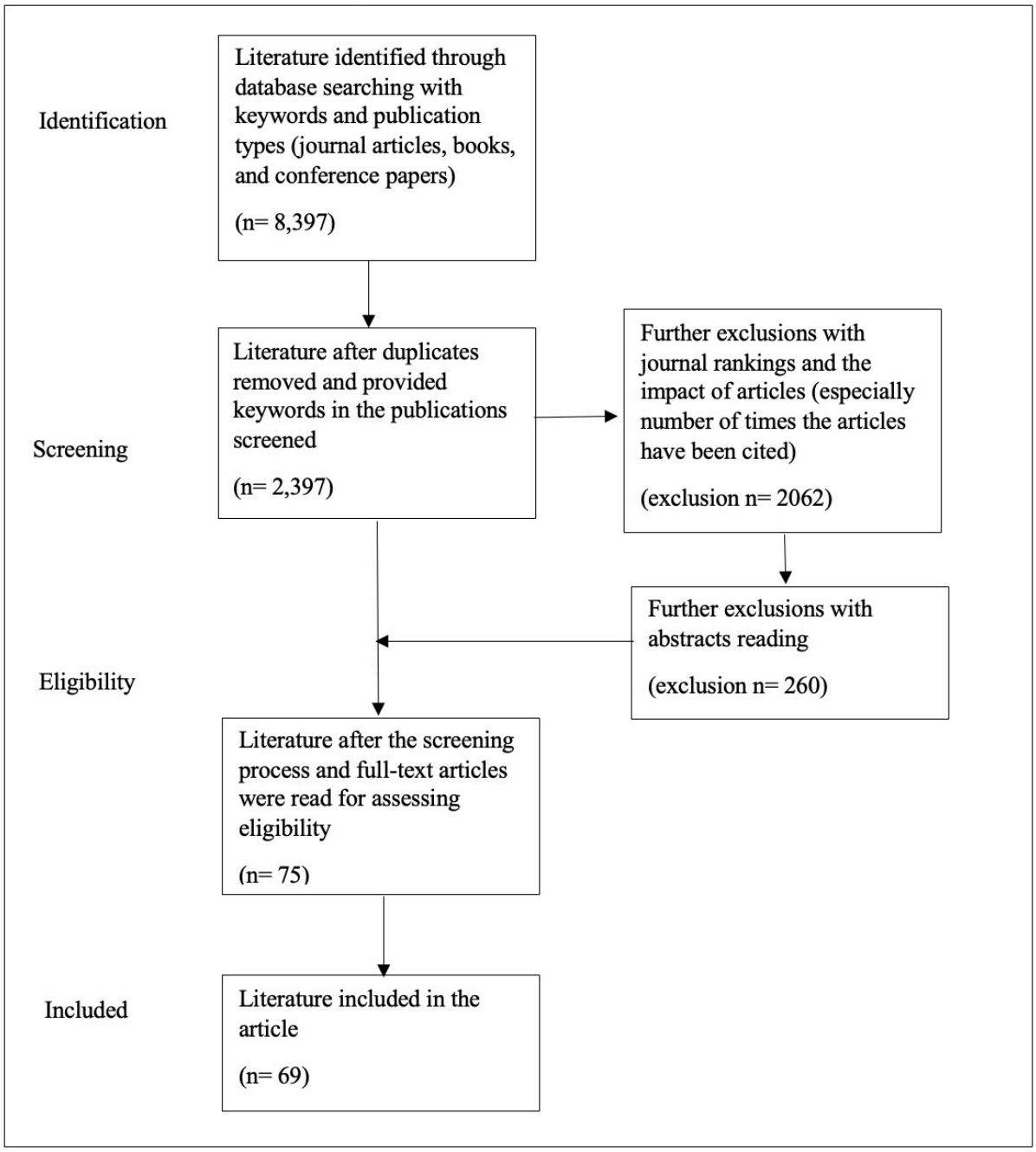


Figure 1 PRISMA Flow Chart Based on PRISMA Group (2024)

Proposed GAME Framework

The systematic review revealed eight key attributes (Table 1) that are critical to the design of gamified assessments aimed at enhancing student motivation and engagement. These attributes are organized into four overarching aspects within the GAME framework (Figure 2): Control, Context, Components, and Connectivity.

Attributes	**Relevant Research**	**Main Arguments & Critical Reflections on Professional Practices**
Gaming Objectives	e.g. Werbach & Hunter (2012), Deterding et al. (2011), Landers (2014), Suh, Wagner, & Liu (2015), Bai et al. (2020)	The inclusion of SMART objectives ensures clarity but needs to be balanced with flexibility to cater to diverse learning styles. Recent studies (Suh, Wagner, & Liu, 2015; Bai et al., 2020) highlight the need for goal setting that also allows for adaptive pathways based on learner progress.
Gaming Rules	e.g. Koivisto & Hamari (2019), Nicholson (2015), Sailer et al. (2017), Lameras et al. (2022)	Clear rules are crucial for fairness, but overemphasis on structure can stifle creativity and engagement. Sailer et al. (2017) and Lameras et al. (2022) stress the importance of balancing rule structure with creative freedom to maintain engagement.
Adaptability	e.g. Bodnar et al. (2016), Seaborn & Fels (2015), Holstein, McLaren, & Aleven (2021), Huang (2022)	Adaptability is key for personalizing learning, ensuring that gamification meets diverse learner needs, though it requires careful implementation to avoid inconsistencies. Research by Holstein et al. (2021) and Huang (2022) further supports the role of adaptability in enhancing learning outcomes.
Associations	e.g. Kapp (2012), Sweller, Ayres, & Kalyuga (2011), Plass, Homer, & Kinzer (2020), Koivisto & Hamari (2019)	Strong associations between game elements and educational content are vital for relevance; misalignment can reduce educational value. New studies underline the importance of these connections for effective learning transfer (Plass et al., 2020; Koivisto & Hamari, 2019).
Measures	e.g. Hattie & Timperley (2007) Nicol & Macfarlane-Dick (2006), Sailer et al. (2017), Bai et al. (2020)	Transparent measures linked to learning objectives enhance fairness, but a balance between quantitative and qualitative assessments is necessary. Recent findings highlight the need for both types of assessments to capture a complete picture of learner progress (Sailer et al., 2017; Bai et al., 2020).
Multimedia	e.g. Mayer (2009), Fiorella & Mayer (2015), Clark & Mayer (2016), Tsai (2021)	Using multimedia caters to different learning styles and enhances engagement, but it must be integrated thoughtfully to avoid cognitive overload. Recent research emphasizes the importance of careful multimedia design to enhance learning without overwhelming students (Clark & Mayer, 2016; Tsai, 2021).
Evaluation & Feedback	e.g. Ryan & Deci (2000), Koivisto & Hamari (2019), Nicol & Macfarlane-Dick (2006), Hattie & Timperley (2007)	Continuous, formative feedback is essential for motivation and self-regulation; however, the timing and specificity of feedback are critical. Research supports the importance of immediate and specific feedback for sustaining engagement and learning (Nicol & Macfarlane-Dick, 2006; Hattie & Timperley, 2007).
Engagement & Interactions	e.g. Plass, Homer, & Kinzer (2020) Lameras et al. (2022), Suh, Wagner, & Liu (2015); Holstein et al. (2021)	Engagement is sustained through meaningful interactions, but professional practices must ensure these interactions are well-facilitated and aligned with learning goals. Suh et al. (2015) and Holstein et al. (2021) stress the importance of interaction quality in maintaining learner motivation.

Table 1: Critical Attributes Contributing to Gamified Assessment Design for Enhancing Student Motivation and Engagement

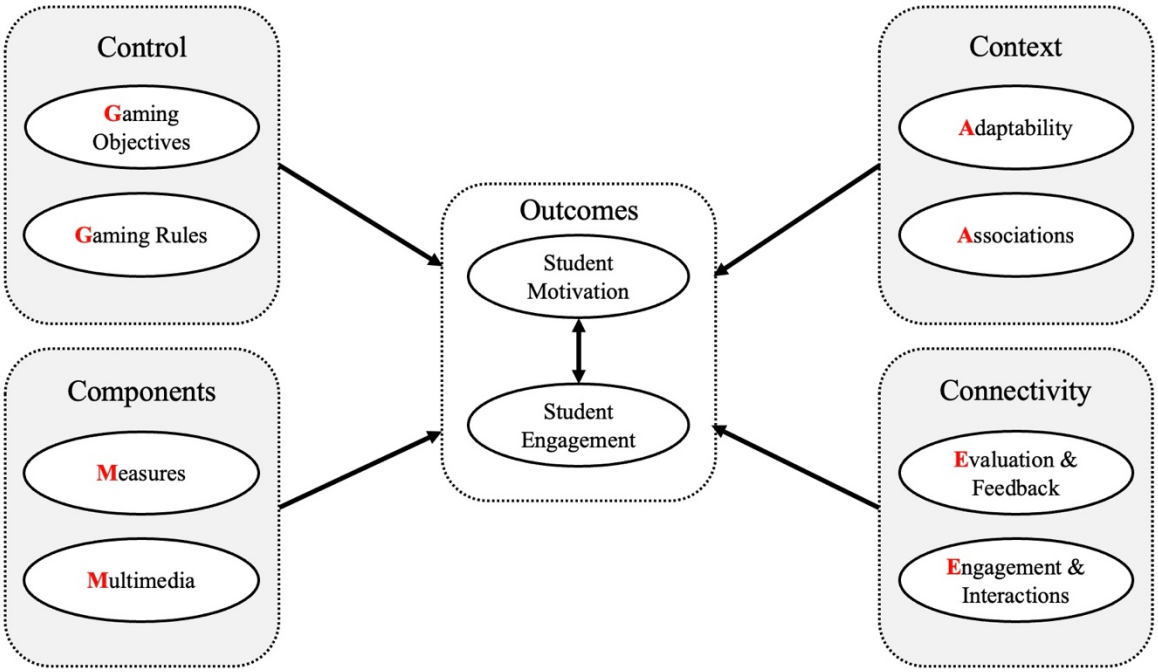


Figure 2: Proposed Game Framework by the Authors of This Article

Control (The Two Gs in GAME)

Gaming Objectives (SMART): The integration of SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) objectives within gamified assessments is critical for providing clear direction and measurable outcomes (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011; Huang & Soman, 2013). These objectives ensure that students understand what is expected, which fosters a focused learning environment where students can achieve set goals efficiently. Recent studies have further substantiated the effectiveness of SMART goals in enhancing student motivation by making tasks appear more attainable and providing a clear pathway to success (Alenezi, 2023; Lampropoulos & Sidiropoulos, 2024). However, while SMART objectives can enhance clarity and focus, they may also limit creativity and engagement for students who prefer exploratory or less structured environments (Nicholson, 2012; Sánchez-Martín et al., 2023). To address this potential limitation, it is essential to balance the rigidity of SMART objectives with flexible opportunities that allow students to explore various pathways to achieve success, thereby catering to diverse learning preferences (Chapman & Rich, 2018; Yildirim & Demir, 2024).

Gaming Rules: Establishing clear and structured rules is another vital aspect of the Control component in gamified assessments (Domínguez et al., 2013; Seaborn & Fels, 2015; Barata et al., 2013). Rules provide a framework that ensures fairness and consistency, which is crucial in maintaining the integrity of the assessment and fostering a competitive yet collaborative learning environment (Kapp, 2012; Huang & Soman, 2013). However, recent research highlights that an overemphasis on rules can create a restrictive environment, potentially stifling creativity and reducing student engagement (Nicholson, 2012; Van Roy & Zaman, 2023). Therefore, it is critical to design rules that offer enough structure to guide student behavior while still allowing for flexibility and creative problem-solving, which can lead to more meaningful and engaging learning experiences (Ryan & Deci, 2000; Hamari et al., 2014).

Context (The Two As in GAME)

Adaptability: The adaptability of gamified assessments is crucial for personalizing the learning experience to meet diverse student needs and preferences (Kapp, 2012; Hamari et al., 2014; Deterding et al., 2011). Customization allows educators to tailor activities to align with individual learning styles, thereby increasing student engagement and motivation (Seaborn & Fels, 2015; Huang & Soman, 2013). Recent studies support the view that adaptability in gamified environments leads to more personalized and effective learning experiences, particularly in diverse classroom settings (Alenezi, 2023; Lampropoulos & Sidiropoulos, 2024). However, the downside of high customization is the potential for resource-intensive implementations, which can be challenging for educators to manage and sustain over time (Chapman & Rich, 2018). Additionally, excessive personalization may introduce inconsistencies in assessment outcomes if not carefully balanced with standardized criteria (Barata et al., 2013; de-Marcos et al., 2014).

Associations: Strong associations between gamified elements and course content are essential for ensuring that the game mechanics are directly relevant to the learning objectives (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013). This alignment reinforces the educational value of the assessment and facilitates the transfer of skills and knowledge to real-world applications (Kapp, 2012; Hamari et al., 2014). Recent research emphasizes the importance of this connection, showing that well-integrated gamification can significantly enhance learning outcomes by making content more relatable and engaging (Sánchez-Martín et al., 2023; Van Roy & Zaman, 2023). Conversely, weak or poorly defined associations can lead to perceptions of irrelevance, where students may view the gamified components as disconnected from the actual course material, thereby reducing the overall effectiveness of the assessment (Chapman & Rich, 2018; Ryan & Deci, 2000).

Components (Two Ms in GAME)

Measures: Transparent and well-aligned criteria for evaluating student performance are critical in gamified assessments (Hamari et al., 2014; Kapp, 2012; Deterding et al., 2011). These measures should be directly linked to learning objectives to ensure fairness and provide students with clear benchmarks for success (Barata et al., 2013; Domínguez et al., 2013). However, recent studies caution against an overemphasis on measurable outcomes, as this may lead to a narrow focus that overlooks more qualitative or holistic aspects of learning (Chapman & Rich, 2018; Anderson & Dill, 2000). There is a growing recognition of the need to balance quantitative measures with qualitative assessments to capture the full scope of student learning and development (Yildirim & Demir, 2024; Sánchez-Martín et al., 2023).

Multimedia: The use of multimedia in gamified assessments can significantly enhance the learning experience by catering to different learning styles and making the content more engaging (Seaborn & Fels, 2015; Barata et al., 2013; Domínguez et al., 2013). Incorporating various media formats such as videos, animations, and interactive simulations not only diversifies the modes of learning but also improves comprehension and retention (Kapp, 2012; Huang & Soman, 2013; Nicholson, 2012). However, integrating multimedia elements must be done thoughtfully to avoid overwhelming students or distracting them from core learning objectives (Chapman & Rich, 2018; Seaborn & Fels, 2015). Recent research supports the idea that well-designed multimedia components can enhance learning outcomes, particularly in complex subjects that benefit from visual and interactive explanations (Lampropoulos & Sidiropoulos, 2024; Alenezi, 2023).

Connectivity (Two Es in GAME)

Evaluation & Feedback: Continuous and formative feedback is essential for maintaining student motivation and guiding progress in gamified assessments (Kapp, 2012; Hamari et al., 2014; Anderson & Dill, 2000). Effective feedback not only reinforces learning but also encourages a growth mindset by framing challenges as opportunities for improvement (Nicholson, 2012; Domínguez et al., 2013). The quality and timeliness of feedback are critical, as vague or delayed responses can lead to frustration and disengagement (Seaborn & Fels, 2015; Barata et al., 2013). Recent studies highlight the importance of providing specific, actionable feedback promptly to maximize its impact on student learning and motivation (Deterding et al., 2011; Chapman & Rich, 2018; Van Roy & Zaman, 2023).

Engagement & Interactions: Meaningful interactions within gamified environments are vital for sustaining motivation and fostering a sense of community among students (Seaborn & Fels, 2015; Domínguez et al., 2013; Barata et al., 2013). These interactions, whether with content, peers, or instructors, enhance the social dimension of learning and provide multiple sources of feedback (Ryan & Deci, 2000; Kapp, 2012; Hamari et al., 2014). However, the effectiveness of these interactions depends heavily on the quality of facilitation and the level of student participation (Chapman & Rich, 2018; Huang & Soman, 2013). Poorly facilitated interactions or superficial participation can lead to diminished learning experiences, emphasizing the need for thoughtful design and active facilitation to ensure that interactions are meaningful and contribute to learning objectives (Seaborn & Fels, 2015; Yildirim & Demir, 2024).

Discussion

The eight elements of the proposed GAME framework including 4Cs - Control (Gaming Objectives, Gaming Rules), Context (Adaptability, Associations), Components (Measures, Multimedia), and Connectivity (Evaluation & Feedback, Engagement & Interactions) - represent a comprehensive approach to designing gamified assessments aimed at enhancing student motivation and engagement. These elements align with existing gamification frameworks, such as Werbach and Hunter's (2012) emphasis on goal-setting and rules, but the GAME framework offers a more tailored application for educational contexts. The inclusion of SMART objectives within the Gaming Objectives element parallels the goal-setting components found in other frameworks, such as Deterding et al.'s (2011) work on gameful design. However, the GAME framework's balance between structured objectives and flexible pathways directly addresses critiques of the rigidity often associated with SMART goals, which have been highlighted as potentially limiting creativity and autonomy in learning environments (Dichev & Dicheva, 2017; Landers, 2014). This flexibility is increasingly recognized as essential in educational settings, as it allows for differentiation and adaptation to individual student needs, a critical aspect that traditional gamification models often overlook (Seaborn & Fels, 2015; Koivisto & Hamari, 2019; Xu, 2021).

The Context elements of the GAME framework—Adaptability and Associations—underscore the importance of personalizing learning experiences and ensuring that game mechanics are directly relevant to course content. This approach contrasts with frameworks like the Octalysis model (Chou, 2015), which, while focusing on core drives like empowerment and ownership, does not explicitly address the need for content alignment or adaptability in educational contexts. The emphasis on Adaptability in the GAME framework resonates with recent findings by Bodnar et al. (2016), who argue that adaptive learning systems are critical

for maximizing student engagement and learning outcomes. Furthermore, the need for strong Associations between gamified elements and learning objectives responds to concerns raised by Kapp (2012), who warned that poorly integrated game mechanics could diminish the educational value of gamification. This targeted alignment with learning outcomes is further supported by the principles of Cognitive Load Theory, which suggest that well-designed instructional materials can reduce cognitive load and improve learning (Sweller, Ayres, & Kalyuga, 2011; Van Roy & Zaman, 2018). Recent research has further corroborated this, demonstrating that contextual relevance in gamification enhances the transfer of knowledge and skills to real-world applications (Huang, 2022; Plass, Homer, & Kinzer, 2020).

The Components and Connectivity aspects of the GAME framework—Measures, Multimedia, Evaluation & Feedback, and Engagement & Interactions—further extend the principles found in frameworks like the Mechanics-Dynamics-Aesthetics (MDA) model (Hunicke, LeBlanc, & Zubek, 2004) and the Self-Determination Theory (Ryan & Deci, 2000). The inclusion of Multimedia as a key component acknowledges the diverse ways in which students engage with content, reflecting the importance of multimodal learning as highlighted by Mayer (2009) and further supported by recent studies that emphasize the role of multimedia in enhancing student engagement and understanding (Bai et al., 2020; Fiorella & Mayer, 2015; Tsai, 2021). Moreover, the GAME framework's focus on continuous and formative feedback within the Connectivity elements aligns with a growing body of research that underscores the critical role of timely and specific feedback in promoting student motivation and self-regulation (Hattie & Timperley, 2007; Nicol & Macfarlane-Dick, 2006). This structured application of feedback in educational assessments offers a significant improvement over broader gamification frameworks, which often lack detailed guidance on implementing these elements effectively in educational contexts (Nicholson, 2015; Hamari, 2019). The emphasis on formative feedback also aligns with current trends in educational technology, where real-time analytics and personalized feedback are increasingly being used to support student learning (Wang, 2022).

Limitations of Present Study and Suggestions for Future Research

There are limitations to this study that leave some questions unanswered. The GAME framework, while comprehensive, has yet to be empirically tested in diverse educational contexts. The reliance on existing literature for framework development means that the practical applicability and effectiveness of the framework in real-world settings remain to be fully explored. Additionally, the adaptability of the framework across different disciplines and student demographics has not been extensively examined, raising concerns about its generalizability.

Future research should prioritize comparative studies to assess the effectiveness of gamification across different educational contexts, disciplines, and demographics. Such research can identify discipline-specific impacts, such as its varying effectiveness across educational levels (e.g., undergraduate vs. graduate programs) (Seaborn & Fels, 2015; Kapp, 2012; Hamari et al., 2014). Cross-cultural comparisons are also crucial, as they can reveal how cultural backgrounds influence students' responses to gamification, helping to create more inclusive and adaptable educational strategies (Deterding et al., 2011; Van Roy & Zaman, 2023). Additionally, with the growth of online education, comparing the efficacy of gamification in online versus traditional classroom settings is increasingly important (Suh, Wagner, & Liu, 2015). Primary research is equally essential for providing empirical evidence and refining gamification strategies. Controlled experiments can isolate the specific effects of

gamification on student outcomes, while longitudinal studies can assess its long-term impact on knowledge retention and skill development (Hamari, Koivisto, & Sarsa, 2014; Van Roy & Zaman, 2018). Qualitative research, such as interviews and focus groups, can offer deeper insights into student and educator experiences with gamification, and mixed-methods approaches can combine these qualitative insights with quantitative data to create a more comprehensive understanding of gamification's impact (Nicholson, 2012; Huang & Soman, 2013). Action research, where educators iteratively implement and refine gamification strategies in their classrooms, along with technology-enhanced research exploring tools like AI and VR, can further advance the field (Kapp, 2012; Seaborn & Fels, 2015).

Conclusion

The proposed Gamified Assessment for students' Motivation and Engagement (GAME) framework offers a structured approach for designing gamified assessments that effectively enhance student motivation and engagement in higher education. This framework contributes significantly to addressing the gap in current literature regarding the design elements of gamified assessments, thus providing a valuable tool for educators aiming to improve student experiences through gamification. The GAME framework emphasizes the importance of the eight attributes in creating assessments that are not only engaging but also educationally valuable. By incorporating these elements, educators can design assessments that motivate students to perform at their best while also providing them with a deeper understanding of the subject matter. The GAME framework presents a novel approach to gamified assessment design, offering educators a structured methodology to enhance student motivation and engagement.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

In the preparation of this article, ChatGPT4o was employed to provide support in aiding summarising the research findings of the authors to be more concise. This is for the readability and language of the article. Human judgment was applied to verify the accuracy of the content and authors edited the results. The authors assume full responsibility for the content presented.

References

Alenezi, A. (2023). The impact of gamification on student engagement across learning environments. *Journal of Education for Teaching, 49*(1), 110-125.

Anderson, C. A., & Dill, K. E. (2000). Video games and aggressive thoughts, feelings, and behavior in the laboratory and in life. *Journal of Personality and Social Psychology, 78*(4), 772-790.

Bai, H., Pan, W., Hirumi, A., & Kebritchi, M. (2020). Assessing the impact of gamification in education: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education, 148*, 103-109.

Barata, G., Gama, S., Jorge, J., & Gonçalves, D. (2013). Improving student creativity with gamification and virtual worlds. *International Journal of Game-Based Learning, 3*(3), 62-76.

Bodnar, C. A., Anastasio, D., Enszer, J. A., & Burkey, D. D. (2016). Engineers at play: Games as teaching tools for undergraduate engineering students. *Journal of Engineering Education, 105*(1), 147-200.

Chapman, J. R., & Rich, P. J. (2018). Does educational gamification improve students' motivation? If so, which game elements work best? *Journal of Education for Teaching, 44*(3), 326-343.

Chou, Y. K. (2015). *Actionable gamification: Beyond points, badges, and leaderboards*. Octalysis Group.

Clark, R. C., & Mayer, R. E. (2016). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. John Wiley & Sons.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227-268.

De Freitas, S., & Griffiths, M. (2008). The convergence of gaming practices with other media forms: What potential does the future hold? *Convergence, 14*(1), 11-20.

de-Marcos, L., Domínguez, A., Saenz-de-Navarrete, J., & Pagés, C. (2014). An empirical study comparing gamification and social networking on e-learning. *Computers & Education, 75*, 82-91.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011, September). From game design elements to gamefulness: Defining "gamification". In *Proceedings of the 15th international academic MindTrek conference: Envisioning future media environments* (pp. 9-15).

Dichev, C., & Dicheva, D. (2017). Gamifying education: What is known, what is believed and what remains uncertain: A critical review. *International Journal of Educational Technology in Higher Education, 14*(1), 1-36.

Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J. J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education, 63*, 380-392.

Fiorella, L., & Mayer, R. E. (2015). *Learning as a generative activity: Eight learning strategies that promote understanding*. Cambridge University Press.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work?—A literature review of empirical studies on gamification. In *2014 47th Hawaii International Conference on System Sciences* (pp. 3025-3034). IEEE.

Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*(1), 81-112.

Higgins, J. P., & Green, S. (Eds.). (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). John Wiley & Sons.

Holstein, K., McLaren, B. M., & Aleven, V. (2021). The impact of worked examples in a digital learning game. *Educational Technology Research and Development, 69*(4), 1993-2018.

Huang, W. H. Y., & Soman, D. (2013). Gamification of education. *Research Report Series: Behavioural Economics in Action, 29*.

Huang, Y. (2022). Designing gamified learning environments: Insights from empirical research. *Journal of Educational Technology Development and Exchange, 15*(1), 103-117.

Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A formal approach to game design and game research. *Proceedings of the AAAI Workshop on Challenges in Game AI, 4*(1), 1-5.

Kapp, K. M. (2012). *The gamification of learning and instruction: Game-based methods and strategies for training and education*. Pfeiffer.

Koivisto, J., & Hamari, J. (2019). The rise of motivational information systems: A review of gamification research. *International Journal of Information Management, 45*, 191-210.

Lameras, P., Arnab, S., Dunwell, I., Stewart, C., Clarke, S., & Petridis, P. (2022). Enhancing immersive learning through gamification: Insights from augmented reality and game-based learning. *Educational Technology & Society, 25*(1), 1-14.

Lampropoulos, G., & Sidiropoulos, A. (2024). Impact of gamification on students' learning outcomes and academic performance: A longitudinal study comparing online, traditional, and gamified learning. *Education Sciences, 14*(4), 367.

Landers, R. N. (2014). Developing a theory of gamified learning: Linking serious games and gamification of learning. *Simulation & Gaming, 45*(6), 752-768.

Mayer, R. E. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLOS Medicine, 6*(7), e1000097.

Nah, F. F. H., Zeng, Q., Telaprolu, V. R., Ayyappa, A. P., & Eschenbrenner, B. (2014). Gamification of education: A review of literature. In T. Alexander (Ed.), *HCI in business: First international conference, HCIB 2014* (pp. 401-409). Springer.

Nicholson, S. (2012). A user-centered theoretical framework for meaningful gamification. *Games+ Learning+ Society, 8*(1), 223-230.

Nicholson, S. (2015). A recipe for meaningful gamification. In *Gamification in Education and Business* (pp. 1-20). Springer.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative assessment and self-regulated learning: A model and seven principles of good feedback practice. *Studies in Higher Education, 31*(2), 199-218.

Plass, J. L., Homer, B. D., & Kinzer, C. K. (2020). Foundations of game-based learning. *Educational Psychologist, 55*(4), 229-243.

PRISMA Group. (2024). PRISMA flow diagram. Retrieved from http://www.prisma-statement.org/

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54-67.

Sailer, M., Hense, J., Mayr, S. K., & Mandl, H. (2017). How gamification motivates: An experimental study of the effects of specific game design elements on psychological need satisfaction. *Computers in Human Behavior, 69*, 371-380.

Sánchez-Martín, C., Cañada-Cañada, F., & Dávila-Acedo, M. A. (2023). Gamification in physics education: Enhancing student engagement through challenges and leaderboards. *Computers & Education, 188*, 104582.

Seaborn, K., & Fels, D. I. (2015). Gamification in theory and action: A survey. *International Journal of Human-Computer Studies, 74*, 14-31.

Suh, A., Wagner, C., & Liu, L. (2015). Enhancing user engagement through gamification. *Journal of Management Information Systems, 31*(1), 251-283.

Sweller, J., Ayres, P., & Kalyuga, S. (2011). *Cognitive load theory*. Springer Science & Business Media.

Tsai, F. H. (2021). Exploring the effectiveness of multimedia on student engagement in gamified e-learning. *Educational Technology Research and Development, 69*(4), 1-16.

Van Roy, R., & Zaman, B. (2018). Need-supporting gamification in education: An assessment of motivational effects over time. *Computers & Education, 127*, 283-297.

Van Roy, R., & Zaman, B. (2023). Need-supporting gamification in education: An assessment of motivational effects over time. *Computers & Education, 192*, 104694.

Werbach, K., & Hunter, D. (2012). *For the win: How game thinking can revolutionize your business*. Wharton Digital Press.

Yildirim, S., & Demir, D. (2024). The role of instructor involvement in gamified learning environments. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2023.2023692

Contact email: ywu002@dundee.ac.uk

Utilization of Information and Communication Technologies in the Administration of Public Universities in South-East Nigeria

Udo Herbert, Michael Okpara University of Agriculture Umudike, Nigeria
Nnennaya Kalu-Uche, Michael Okpara University of Agriculture Umudike, Nigeria

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Advances in science and technology have inadvertently led to increasing interconnectedness among peoples of the world, a shift in the roles and purposes of education, as well as the redefinition of skills, capabilities and competencies required of individuals if they are to succeed in the rapidly changing workplace and society. Higher education institutions are saddled with the daunting responsibility of assuring a substantial increase in the number of youth and adults who have relevant information and communication technology (ICT), as well as digital literacy skills, whilst preparing them for jobs, careers, and professions in the rapidly evolving 21st century. This study investigated the extent to which ICTs are adopted in personnel, student and general administration of university education in South-East Nigeria. Seventy top and middle cadre university administrators were drawn in clusters from a population of 227 top and middle cadre administrators in ten public universities in South-East, Nigeria. The instrument for data collection was an 18-item researcher-developed instrument titled: ICT Utilization in University Administration (IUUA). Three research questions guided the study. Results indicated that ICTs were utilized in managing students' admission and graduation processes, as well as in some aspects of general administration. However, the study revealed that ICTs were not utilized in personnel administration in universities in South-East, Nigeria. Based on the findings of the study, it was recommended that universities procure, adopt and utilize relevant ICT gadgets and web-enabled software, for effective administration of universities in South-East, Nigeria.

Keywords: Administrators, Higher Education Institutions, Information Communication and Technologies

iafor
The International Academic Forum
www.iafor.org

Introduction

Rapid advances in science and technology in the 21st century have unintentionally led to increasing globalization, as well as a shift in the perceived roles and purposes of education. In realization of these advancements, the Nigerian government in its national policy on education (FRN, 2013), asserts that qualitative education is a key component of the nation's development and that education is a shared responsibility of the federal, state and local governments. This declaration has resulted in more people seeking tertiary/higher education in Nigeria. Tertiary education in Nigeria refers to education given after post-basic education in institutions such as universities, mono-technics, polytechnics, colleges of education, colleges of agriculture, schools of health and technology, national teachers' institute, and inter-university centres such as the Nigeria French language village, Nigeria Arabic language village, National institute of Nigerian languages, and Innovation Enterprise Institutions (FRN, 2013).

Higher education in Nigeria is, among other goals, saddled with the responsibility of preparing high-level manpower, such as surgeons, engineers, doctors, accountants, teachers, lawyers, linguists, economists, nurses, scientists, and so on, that are suitable for jobs and professions in the speedily evolving 21st-century society. The phenomenal increase in higher education enrolment has necessitated the integration of information and communication technologies (ICT) in all aspects of service delivery in higher education institutions (Egoeze, Misra, Maskeliunas & Damaservicius, 2018; Bosu, 2019; Ajah & Chigozie-Okwum, 2019).

The Nigerian national policy on information and communication technology in education stipulates that attaining qualitative education requires improving educational administration, which in turn involves the integration of ICT. The policy maintains that one of the objectives of ICT in education is to support effective and efficient ICT-enhanced administration of human resources, student registration, enrolment, and achievement. ICT refers to the diverse range of technological tools, resources, equipment, and telecommunication infrastructure that facilitate the creation, acquisition, access, transfer, storage, processing, preservation, management, organization, presentation, manipulation, security, retrieval and dissemination of data and information (FRN, 2019; Bosu, 2019).

The wide acceptance and exponential growth of ICT have changed the way we live and work, thus aiding the restructuring of hierarchies in organizations, continuous improvement in work procedures, and enabling multiple stake-holder participation in decision-making and administration (Ukanwa & Chiemeka, 2021; Indira Gandhi National Open University, 2017). ICT resources' inherent attributes of accuracy, reliability and ability to store and process large quantities of data make them suitable for educational administrative activities such as general administration, finance and accounts, and management of students' academic records and data including their admissions, learning activities, processing of results, and issuance of certificates (Bosu, 2019; Ukanwa & Chiemeka, 2021; Pohekar, 2018). The survival and success of any educational institution is largely dependent on the quality and effectiveness of such institution's administration (Onyekaba, 2021; Egoeze, Misra, Maskeliunas & Damaservicius, 2018; Ukanwa & Chiemeka, 2021).

Administration involves planning, organizing, directing, coordinating, controlling and evaluating performance in organizations. Thus, administration in educational institutions entails providing leadership and managing available human and material resources for achieving the objectives and purposes of the academic institution (Onyekaba, 2021; Bosu,

2019). For Krishnaveni and Meenakumari (2010) and Ajah and Chigozie-Okwum (2019), administrative activities in higher education institutions could be broadly classified into student administration, staff administration, resources, communication and general administration.

In student administration, ICT could be integrated into various activities such as student admission processes, course registration, attendance monitoring, learning activities, timetabling, class scheduling, result processing, and communication with parents/guardians among others (Krishnaveni & Meenakumari, 2010; Ajah & Chigozie-Okwum, 2019). ICT could also be deployed in recruiting staff, allotting duties to staff, monitoring staff attendance, scheduling leave, and appraising performance. Several aspects of general administration such as fee payment, students' transcript processing, management of library holdings, lesson planning and delivery, payroll administration, maintenance of personnel, inventory, medical records, and so on, could also be enhanced by the deployment of ICT.

Despite the advantages of ICT use in educational administration, research reports indicate that many higher education institutions in Africa, particularly in Nigeria were not leveraging on the benefits of adopting ICT in the administration of their institutions (Meenakumari & Krishnaveni, 2011; Ajah & Chigozie-Okwum, 2019; Egoeze, Misra, Maskeliunas & Damaservicius, 2018; Onyekaba, 2021). This study therefore investigated the extent to which ICT is utilized in the administration of public universities in South-East, Nigeria.

Research Questions

The following research question guided the study:

1. To what extent are ICTs utilized in personnel administration in public universities in South-East Nigeria
2. To what extent are ICTs utilized in students' administration processes in public Universities in South-East, Nigeria
3. To what extent are ICTs utilized for general administration in public universities in South-East, Nigeria

Research Design

The study adopted a descriptive survey research design to elicit information from top and middle-level administrators on the extent of implementation of information and communication technologies in the administration of various aspects of service delivery in universities in South-East, Nigeria. The sample for the study consisted of a total of 70 top and middle-level university administrators drawn in clusters from a population of 227 top and middle-level administrators in ten public universities in South-East, Nigeria. The top administrators included Vice Chancellors, Deputy Vice-chancellors, Registrars, Bursars, Directors and Deans/Provosts; while the middle cadre administrators included Heads of departments/Units.

The instrument for data collection was a 21-item, researcher-developed, instrument titled "ICT Utilization in University Administration (IUUA)". The instrument had two sections. Section one elicited information on respondents' specific roles in their institutions. Section two elicited information on respondents' perceptions of the extent of utilization of ICT in various aspects of service delivery in universities. The instruments were validated by an expert in measurement and evaluation.

To establish the reliability of the instrument, it was administered once to eight top and middle level administrators drawn from one public-owned university in South-East Nigeria. These administrators are part of the target population but were carefully excluded when data for the study was collected. The instrument had a Cronbach Alpha reliability coefficient of 0.79. The instrument was administered online using Google Forms. Respondents were sent the link to the survey by email and were required to anonymously respond to the survey. Data collected by the instrument were used to answer the research questions.

The data collected by the instrument were analyzed using Mean and Standard Deviation. Item response criterion mean of 2.50 and above was considered significant, while item means below 2.50 were considered not significant to answer the research questions.

Results

Research Question 1: To what extent are ICTs utilized in personnel administration in Public Universities in South-East Nigeria?

		Top Management (n=23)		**Middle Management (n=47)**		**Pooled Mean**	**Remark**
	Items	**Mean**	**SD**	**Mean**	**SD**		
1	Notification for meetings sent through institutional e-mails to all staff	3.33	0.76	3.04	0.93	3.19	HE
2	Meetings held through e-forum, rather than physically	2.00	0.78	2.23	1.01	2.12	LE
3	Official matters, service rules and management decisions communicated to teaching and non-teaching staff through e-circulars	2.63	0.58	2.74	0.87	2.69	HE
4	Staff work allotment and leave management carried out through web application	1.62	0.65	1.89	0.73	1.76	LE
5	Staff performance appraisal are carried out through electronic media, rather than with printed copies	1.92	1.25	1.96	0.98	1.94	LE
6	Personnel records management done through web-based institutional portal	1.83	0.82	1.96	0.72	1.86	LE
	Grand Mean					**2.26**	

Table 1: Top and Middle management perceptions of extent of ICT utilization in personnel administration in public universities in South-East Nigeria.

Table 1 shows that all items except items 1 and 3 had mean scores below 2.50, and standard deviation ranging from 0.58-1.25. This result indicates that ICT was utilized for sending notifications for meetings and communicating management decisions and official matters to staff. However, the result indicates that meetings are not held remotely. The result also indicates that ICTs are not utilized in personnel records management, staff appraisal, work allotment and leave management.

Research Question 2. To what extent are ICTs utilized in students' administration processes in public Universities in South-East, Nigeria?

		Top Management (n=23)		**Middle Management (n=47)**		**Pooled Mean**	**Remarks**
	Items	**Mean**	**SD**	**Mean**	**SD**		
1	Student admission is initiated and concluded through web-enabled services	3.71	0.46	3.36	0.79	3.54	HE
2	Students' semester results published on the institution's dedicated portal	2.67	0.82	2.47	1.18	2.57	HE
3	Parents/Guardians have access to students' result portal	2.33	0.82	2.17	1.03	2.25	LE
4	Parents/guardians connect with the institution's administrators using social media such as telegram or WhatsApp groups	2.33	0.96	2.26	0.90	2.30	LE
5	Information is disseminated to students through their personalized institutional email	2.13	0.95	2.19	0.99	2.16	LE
6	Students' requests communicated to administrative staff through institutional email rather than printed copies	1.83	0.87	1.91	0.80	1.87	LE
	Grand Mean					**2.45**	

Table 2: Top and Middle management perceptions of extent of ICT utilization for student administration in public universities in South-East Nigeria

Table 2 shows that both top and middle level administrators perceived that students' admissions were initiated and concluded through web-enabled services (Mean=3.54). However, the results show that parents/guardians did not have access to students' result portal; and that information was not communicated to students, or between students and the administrative staff via emails.

Research Question 3. To what extent are ICTs utilized for general administration in universities in South-East, Nigeria?

		Top Management (n=23)		Middle Management (n=47)		Pooled Mean	Remarks
	Items	**Mean**	**SD**	**Mean**	**SD**		
1	Students pay fees, dues and other charges through web-enabled electronic accounting programmes	3.58	0.72	3.13	0.92	3.36	HE
2	Library holdings and resources managed through online repository	2.58	0.65	2.66	0.87	2.62	HE
3	Class scheduling and attendance monitoring done using web-enabled biometric devices	1.83	0.76	1.77	0.87	1.80	LE
4	Students' take tests, and access course notes through learning management systems such as Moodle, Google Classroom, etc	2.25	0.68	2.04	0.83	2.15	LE
5	Interactive white boards and on-line learning modes are used for whole class interaction	2.25	0.90	2.06	0.92	2.16	LE
6	Information is officially dispersed to Parents/guardians through social networking services such as Telegram, WhatsApp, Facebook, X (Twitter) and LinkedIn	2.29	0.96	2.53	1.04	2.41	LE
	Grand Mean					**2.42**	

Table 3: Top and Middle management perceptions of the extent of ICT utilization for general administration in public universities in South-East Nigeria

Table 3 shows that top and middle-level administrators agreed on all items about general administration of Higher Education Institutions. The results indicate that ICT is generally utilized in administering students' fee payment (3.36) and in managing library resources (2.62). However, it is rarely used in teaching, student learning, class scheduling, or even attendance monitoring. The result also indicated that information was not officially dispersed to parents/guardians (2.42), using social networking services/social media.

Discussion of Findings

The advent of ICT and its adoption in all facets of human endeavour has enabled organizations to become more efficient and effective in their service delivery. The activities

of administrators in Higher Education Institutions are pivotal to the provision of excellent and quality services in tertiary institutions of learning. Due to the successful deployment of ICT in various aspects of human endeavours, several research reports assert that the adoption of ICT in higher education administration would improve the quality of their service delivery.

Top and middle-level administrators of public universities in South-East Nigeria agree that to large extents, ICTs were not utilized in personnel administration (grand mean = 2.26), student administration (grand mean = 2.45) and general administration (grand mean =2.42). This result aligns with Ajah and Chigozie-Okwum's (2019) observation that the adoption of ICT in Nigerian universities' administration was happening at a very slow pace. The finding also agrees with Nnamaka's (2021) finding that ICTs were not adequately utilized in the management of colleges of education in Northwest Nigeria. These results are at variance with Ukanwa and Chiemeka's (2021) submission that ICTs help educational administrations achieve their goals easily.

The results indicated that ICTs such as e-mails and e-circulars were extensively used for notifying staff for meetings and communicating service rules, management decisions and official matters to staff. However, staff work allotment, performance appraisal, personnel records and leave management were not done using web-based applications and institutional portals, nor were meetings held remotely. This finding contradicts Krishnaveni and Meenakumari's (2010) assertion that ICT was mainly integrated into staff administration in higher education.

Conclusion

Based on the results of this study, it was concluded that Information and Communication Technologies have not been fully adopted in the administration of public universities in Southeast Nigeria. This trend may have contributed to the slow and inefficient administrative service delivery in these universities. To assure effective administration and improved service delivery, public universities in South-East Nigeria, should utilize ICT tools and technologies in all aspects of student, personnel and general administration. Additionally, administrative as well as teaching staff in public universities in South-East Nigeria should be trained on the utilization of ICT tools such as Learning Management Systems which support student administration and also improve student engagement.

References

Ajah, I. A. & Chigozie-Okwum, C. C. (2019). ICT and Administrative Effectiveness of University in Nigeria: A Connect Between Leadership and Knowledge. *International Journal of Science and Technology* (STECH), 8 (2), 64-85.

Bosu, R. S. (2019). The Role and Use of ICT in Administrative Activities in Higher Education Institutions: The Views of Administrators in Higher Educational Institutions in Ghana. *International Journal of Innovative Research and Development*, 8 (12), 8-14.

Egoeze, F., Misra, J., Maskeliunas, R. & Damaservicius, R. (2018). Impact of ICT on Universities Administrative Service and Management of Students' Record: ICT in University Administration. *International Journal of Human Capital and Information Technology Professionals,* 9(2), 15-32.

Federal Republic of Nigeria (FRN) (2019). *National Policy on Information and Communication Technologies (ICT) in Education*. Abuja: Federal Ministry of Education.

Indira Ghandi National Open University (2017). Electronic governance: Role of ICT in Administration Available at: https://egyanKosh.ac.in

Krishnaveni, R. and Meenakumari, J. (2010). Usage of ICT for Information Administration in Higher education Institutions – A study. *International Journal of Environmental Science and Development*, 1, (3), 282-286.

Meenakumari, J. & Krishnaveni, R. (2011). Transforming Higher educational institution administration through ICT. *International Journal of Advanced Computer Science and Applications*, 2, (8), 51-54.

Onyekaba, M. N. (2021). Assessment of Utilization of Information and Communications Technology (ICT) Facilities in Colleges of Education in North-West Geo-Political Zone, Nigeria. *African Journal of Science, Technology & Mathematics Education (AJSTME)* 6, (1), 145-156.

Pohekar, D. (2018). Role of ICT on Universities Administrative Services and Management. *International Research Journal of Engineering and Technology* (IRJET), 5(11), 266-271.

Ukanwa. G. U. & Chiemeka, E. C. (2021). Utilization of ICT for Management and Administration in Education Sector. *International Journal of Advances in Engineering and Management* (IJAEM) 3, (3), 987-992.

Cultivating Creative Musicians: Teaching Strategies, Sources, and Challenges of Creativity in Chinese Higher Music Education

Tingyu Yan, South China Normal University, China
Hong Yu, South China Normal University, China
Jiajun Tang, University of Southern California, United States

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study conducts an in-depth investigation into the development of creativity in higher music education in China. From April 2023 to February 2024, researchers surveyed and interviewed 316 undergraduate students and 27 teachers at five institutions in Guangzhou, China, aiming to explore teaching strategies, sources, and challenges of creativity. The findings highlight the importance of traditional teaching methods; however, introducing innovative teaching approaches is crucial for activating creativity. Major sources of creativity include cultural heritage, diversity of musical genres, and technological advancements in music composition. Rigidity in curricula, limited interdisciplinary learning opportunities, and underutilization of technology are major obstacles to the development of creativity. The study suggests the use of flexible teaching strategies, integration of technology into music education, encouragement of interdisciplinary student participation, and reform of higher music education in China to address the barriers to creativity development and cultivate globally competitive and innovative musical talents, enhancing China's music education and its international competitiveness.

Keywords: Higher Music Education, Creativity Cultivation, Teaching Strategies, Creativity Challenges, Sources of Creativity

iafor
The International Academic Forum
www.iafor.org

Introduction

Creativity is defined as the ability to produce novel and valuable ideas, solutions, or artistic expressions. Theoretical frameworks such as Guilford's structure of intellect model and Gardner's multiple intelligences theory provide significant foundations for understanding and fostering student creativity (Sternberg & Karami, 2022). UNESCO's "Education 2030 Framework for Action" emphasizes that creativity is one of the core objectives of 21st-century education, urging education systems worldwide to value and promote the development of student creativity (Nwabueze & Isilebo, 2022). This far-reaching international policy provides a crucial background and solid support for our ongoing in-depth and comprehensive research. There are significant differences in the understanding of creativity from different theoretical viewpoints, and each has its own emphasis. Some of them focus on psychological processes, such as divergent thinking, which plays an important role in the field of thinking, and imagination, which is full of fantastic colors and infinite possibilities. Others focus on the profound impact of environment and culture (Glăveanu, 2020). This paper will devote sufficient and rigorous coverage and will closely integrate and contrast these various perspectives with China's special and specific circumstances.

Creativity and Music Education

The role of creativity in the field of teaching is widely reflected in many aspects, including promoting students' independent learning, fully stimulating students' imagination and deeply tapping students' creative potential. Especially in music education, creativity can produce a very significant effect, which can greatly promote students' social communication and emotional development. Cooperation and close communication in the process of music creation and performance can help students build closer and stronger social ties and deeper emotional understanding (Varner, 2020). In addition, the form of musical expression can also act as an effective way and channel of emotional catharsis, which plays an important role in helping students' emotional regulation and the maintenance and promotion of mental health.

Creativity has a very significant social nature, and its significance is not limited to the simple display of individual talent, in fact, it is generated and gradually developed in the process of social interaction and under the influence of cultural background. The unique diversity and complexity of the social environment have continuously endowed creativity with rich and varied materials and inexhaustible sources of inspiration (Dai, 2020). In the field of music education, students can effectively stimulate their own creative inspiration through active interaction with peers and teachers and can fully absorb innovative elements from a variety of different cultural backgrounds, and finally form a unique creative style. With a wide variety of music genres and diverse activity backgrounds, students are able to successfully find the right balance between tradition and innovative development. In this case, teachers must have a very wide range of music knowledge and flexible teaching methods, and according to the characteristics of different students and actual needs, carefully formulated a very personalized teaching plan.

When it comes to teaching in the classroom, creativity facilitation is most effective when the teacher creates a broad creative framework, allows time for students to try and fail and use interdisciplinary approaches and projects to expand the student's musical horizons (John, 2020). For example, drama in Music enables students to come up with their own ideas and thoughts and to discover other perspectives on Music. A teacher should create an environment that will inspire students to be creative and, at the same time, provide the

necessary direction and the proper feedback to help the students develop their creativity further. Furthermore, teachers should update their professional knowledge and skills in order to use up-to-date approaches and tools to facilitate and control students' creativity (Runco, 2021).

Education Reform and the Development of School Music Education in China

Education reform in China started in the early 1980s to attempt to bring about a qualitative change in the education system in the country, as well as make education more accessible. These broad reforms cut across basic education, higher education, vocational education and adult education. Thus, the reform has contributed to the development of curriculum differentiation and the update of approaches to teaching music. Over the course of the past few years, music education has been receiving a lot of attention as an essential part of education. Research also reveals that music education has a particularly favourable effect on student's intellectual growth and character moulding (Varadi, 2022).

In the field of music education, the key points of reform include the continuous updating of curriculum content, the continuous improvement of teaching methods and the comprehensive perfection of evaluation system (Cao, 2021). Through these reform measures, it aims to cultivate students' musical literacy and comprehensive ability, so that they can better use the knowledge they have learned in the future life and work process.

In the current era, modern technology plays an increasingly prominent and vital role in music education. Digital tools and rich resources from the Internet provide music teaching with abundant materials and convenient and efficient communication platforms (Cao, 2021). For example, using music production software and online learning platforms, students can create and learn anytime and anywhere, significantly enhancing the efficiency and effectiveness of music education (Hernández, 2020). In this process, the role of music teachers is particularly important. They need not only to impart music knowledge and skills but also to stimulate students' interest and creativity. Music teachers should continually enhance their professional qualifications and master the latest teaching methods and technologies to better guide students (Váradi, 2022). Additionally, music teachers should pay attention to students' individual differences, tailor their teaching to meet students' needs, and help each student fully realize their potential. Historical music education standards also provide a reference for modern education; the music education standards established in the United States in the early 20th century and the National Core Arts Standards released in 2014 both emphasize the comprehensive development of students' understanding and performance abilities in music (Mantie, 2023).

The Study

This study aims to explore effective strategies for stimulating student creativity in higher music education in China, analyze the main sources of student creativity, and identify and address the current challenges to creativity development. Accordingly, the study poses the following three main research questions and corresponding hypotheses:

Research Question 1: Which specific teaching methods effectively stimulate students' creativity?

Hypothesis 1: Project-Based Learning (PBL), Digital Audio Workstations (DAW), and collaborative composition enhance creativity.

Research Question 2: What are the main sources of student creativity?

Hypothesis 2: Traditional cultural heritage, cross-cultural exchanges, and modern music technology are key sources of creativity.

Research Question 3: What are the main obstacles to fostering student creativity and how can they be overcome?

Hypothesis 3: Lack of teacher training, rigid evaluation systems, and uneven resource distribution are barriers; these can be overcome with targeted strategies.

Methodology

Participants

This study involved participants from five higher music education institutions in Guangzhou, China, totaling 343 individuals. Among them were 316 students, encompassing both undergraduates and graduates, aged between 18 to 23, with a gender distribution that was relatively balanced. Specifically, the student participants were distributed by academic year as follows: 80 freshmen, accounting for 25.3% of the total; 75 sophomores, representing 23.7%; 85 juniors, making up 26.9%; and 76 seniors, constituting 24.1%. The teacher participants consisted of 27 professors, associate professors, and lecturers, all of whom possessed extensive teaching experience and diverse professional backgrounds. These five institutions were selected based on their representativeness and influence in the field of music education, ensuring the broad applicability and representativeness of the research results.

Data Collection

Data collection occurred from April 2023 to February 2024, utilizing various methods to ensure the comprehensiveness and diversity of the data. The primary data collection methods included surveys and semi-structured interviews. Separate sets of questionnaires were designed for students and teachers. In addition, The interview outlines included detailed views and suggestions on current teaching methods, personal experiences and insights into creativity development, and specific recommendations for improving teaching strategies and addressing challenges.

Data Analysis

Data analysis was divided into quantitative and qualitative parts. Quantitative analysis was performed using SPSS software, encompassing descriptive statistics and inferential statistics, to identify similarities and differences among students and teachers regarding teaching strategies, sources of creativity, and the challenges faced. Qualitative analysis employed content analysis, beginning with the transcription of interview recordings, followed by coding and thematic analysis using NVivo software. Throughout the analysis process, major themes and sub-themes were refined through repeated comparison and induction, revealing deep insights and experiences of students and teachers in creativity cultivation.

Ethical Considerations

The study strictly adhered to academic ethical standards. Before data collection began, all participants signed informed consent forms, clearly understanding the purpose of the study, methods of participation, and their rights. All data were anonymized to ensure the privacy of the participants. Additionally, all data collected during the study were stored in a secure database, accessible only to the research team.

Through these methods, this study aims to comprehensively and in-depth explore the current state, strategies, and challenges of creativity cultivation in higher music education in China, ultimately providing theoretical support and practical guidance for related educational reforms.

Results

Research Question 1: In China's Higher Music Education, Which Specific Innovative Teaching Strategies Are Effective in Stimulating Student Creativity?

The study identified several specific innovative teaching strategies that have been proven to effectively stimulate students' creativity, thus partially supporting Hypothesis 1.

First, interdisciplinary learning, although not explicitly mentioned in Hypothesis 1, was found to significantly enhance students' creative thinking abilities. 66% of students gave high ratings to interdisciplinary courses (M= 4.31, SD = 1.04), and 76% of teachers supported offering more interdisciplinary courses (M= 4.33, SD = 1.08). One student stated, "Through interdisciplinary learning, I can combine music with other fields, creating works with greater depth and breadth." A teacher noted, "Interdisciplinary courses not only enrich students' knowledge structures but also stimulate their innovative potential."

Second, the integration of technology played a significant role in teaching, consistent with Hypothesis 1's "use of Digital Audio Workstations (DAW) and music production software in teaching methods." 70% of students believed that the application of digital tools and music production software in courses helped them explore new creative avenues (M= 4.22, SD = 1.07), and 80% of teachers used technology to facilitate creative projects and observed its positive impact (M= 4.37, SD = 1.09). Students commented, "Using music production software allows me to express my creativity more freely." Teachers emphasized, "Modern technology provides students with unprecedented creative possibilities, enabling them to better utilize their imagination."

Furthermore, collaborative projects are widely recognized for fostering student creativity, which aligns with Hypothesis 1 on "Collaborative Composition and Performance." Sixty-seven percent of students emphasized the importance of collaborative projects (such as group composition and performance) in creating a creative environment (M = 4.25, SD = 1.09). Seventy-seven percent of teachers observed that these projects facilitate peer learning and the exchange of ideas, which are crucial for the development of creativity (M = 4.31, SD = 1.07). Students noted, "By collaborating with classmates, I learned many new ideas, and the process became more enjoyable for everyone." Teachers added, "Collaborative projects significantly enhance students' teamwork and creativity, with very noticeable results."

Lastly, experiential learning opportunities significantly promoted students' creative applications, although not explicitly mentioned in Hypothesis 1, it remains an effective strategy. 63% of students highly valued experiential learning opportunities, such as workshops, masterclasses, and real-world music projects (M= 4.21, SD = 1.06). Students shared, "Attending masterclasses was incredibly beneficial; I could learn directly from experts." Teachers pointed out, "Experiential learning allows students to continuously explore and innovate in practical settings, enhancing their creative abilities."

Research Question 2: What Are the Main Sources of Student Creativity in Higher Music Education in China?

According to the data presented in Table 1, the family environment is recognized as a crucial factor influencing the origins of creativity education, accounting for 54.11% of the overall influence. Among different academic years, the impact of the family environment is most pronounced for freshmen, at 78.75%, while it is comparatively lower for seniors, at 35.53%. School curricula and teacher guidance rank as the second and third most influential factors, respectively, with 45.57% and 39.24%. These factors also exert a particularly higher influence on freshmen, at 63.75% and 53.75% respectively. Other sources such as extracurricular activities, games, and toys show a gradually diminishing impact across all academic years. Notably, the influences of museums, outdoor activities, psychological support, global perspectives, and innovative competitions are minimal, with total percentages not exceeding 10%. This indicates that the predominant sources of creativity education for students are rooted in traditional educational methods from family and school, with lesser impact from non-traditional sources.

Topics	Freshman	Sophomore	Junior	Senior	Grand Total
Family Environment	63 (78.75%)	45 (60.00%)	36 (42.35%)	27 (35.53%)	171 (54.11%)
School Curriculum	51 (63.75%)	39 (52.00%)	30 (35.29%)	24 (31.58%)	144 (45.57%)
Teacher Guidance	43 (53.75%)	33 (44.00%)	27 (31.76%)	21 (27.63%)	124 (39.24%)
Extracurricular Activities	40 (50.00%)	31 (41.33%)	25 (29.41%)	20 (26.32%)	116 (36.71%)
Games and Toys	33 (41.25%)	26 (34.67%)	21 (24.71%)	17 (22.37%)	97 (30.70%)
Books and Reading	21 (26.25%)	17 (22.67%)	14 (16.47%)	11 (14.47%)	63 (19.94%)
Cooperation	19 (23.75%)	15 (20.00%)	12 (14.12%)	10 (13.16%)	56 (17.72%)
Internet and Technology	15 (18.75%)	12 (16.00%)	10 (11.76%)	8 (10.53%)	45 (14.24%)
Museums	7 (8.75%)	5 (6.67%)	4 (4.71%)	3 (3.95%)	19 (6.01%)
Outdoor Activities	5 (6.25%)	4 (5.33%)	3 (3.53%)	2 (2.63%)	14 (4.43%)
Psychological Support	4 (5.00%)	3 (4.00%)	2 (2.35%)	2 (2.63%)	11 (3.48%)
Global Perspective	2 (2.50%)	1 (1.33%)	1 (1.18%)	1 (1.32%)	5 (1.58%)
Innovation Competition	1 (1.25%)	1 (1.33%)	1 (1.18%)	1 (1.32%)	4 (1.26%)

Table 1: Number and Percentage of Students by Grade Level Perceiving the Most Influential Sources of Creativity Education

Additionally, the study identifies several key areas that are primary sources of student creativity in higher music education in China, which lend partial support to Hypothesis 2.

Firstly, traditional culture and musical heritage are indeed significant sources of student creativity (M= 4.32, SD = 1.14), which aligns with Hypothesis 2. 72% of students and 79% of teachers report that through the study and integration of elements of Chinese traditional music, students gain rich inspiration and creativity in their composition and performance. A sophomore student elaborated, "In my creative process, I frequently draw from the pentatonic scale of Chinese traditional music, which not only gives my work distinctive characteristics but also deepens my understanding of Chinese culture."

Secondly, cross-cultural musical exchanges and diverse musical styles are also significant sources of student creativity (M = 4.29, SD = 1.10), which aligns with Hypothesis 2. 79% of students indicated that exposure to and learning from different musical genres, whether Western classical, modern pop, or other world music styles, significantly enhance their compositional abilities and innovative thinking. A senior student remarked, "I enjoy blending classical music with electronic music; this cross-genre creation is very engaging and challenging." A teacher said that "We encourage students to engage with and learn from various musical genres, which not only enriches their musical knowledge but also stimulates their innovative thinking."

Moreover, the application of modern music technology (such as electronic music and sound design) is also a significant source of student creativity (M= 4.24, SD = 1.11), which further supports Hypothesis 2. 68% of students believe that the use of Digital Audio Workstations (DAW), music production software, and various digital instruments not only makes the music creation process more convenient and efficient but also greatly stimulates their innovation in sound design and music production. A junior student noted, "Using DAW software allows me to quickly experiment with different sounds and effects, greatly enhancing my creative efficiency." A teacher said that "Modern technology offers students limitless creative possibilities; they can achieve unprecedented musical expressions through these tools."

Finally, although interdisciplinary learning was not explicitly mentioned in Hypothesis 2, this study found that interdisciplinary learning and collaboration also have a significant impact on student creativity (M = 4.27, SD = 1.12). 63% of students reported that interdisciplinary learning and collaborations with other disciplines, such as visual arts, literature, and technology, enrich their creative materials and ways of thinking. A senior student mentioned, "Participating in interdisciplinary projects has taught me many new creative methods, greatly aiding my musical compositions."

Research Question 3: What Are the Main Obstacles to the Development of Creativity in Higher Music Education in China, and How Can These Obstacles Be Overcome?

The study identifies several major obstacles that impede the cultivation of student creativity in higher music education in China and proposes strategies to overcome these challenges, aligning partially with the contents of Hypothesis 3.

Firstly, the rigidity of the curriculum is identified as a primary barrier to the development of student creativity, resonating with the part of Hypothesis 3 that concerns the rigidity of the evaluation system. 64% of students feel that the current curriculum settings are too inflexible, limiting their creative growth (M= 3.78, SD = 1.14). Similarly, 71% of teachers share this

perspective (M= 3.85, SD = 1.10). A junior student commented, “The curriculum is structured too rigidly, restricting our chances for free creation.” A faculty member pointed out, “The present course design does not sufficiently account for the individual developmental needs of students, which curtails their innovative potential.” To surmount this barrier, educators recommend the addition of elective courses and more flexible scheduling.

Secondly, the limited opportunities for interdisciplinary learning also constrain students' creativity. Although this point is not explicitly mentioned in Hypothesis 3, its impact is significant. 66% of students report scant opportunities for cross-disciplinary learning (M= 3.76, SD = 1.13). Moreover, 73% of teachers believe there is a need for more interdisciplinary learning projects (M= 3.79, SD = 1.09). A sophomore student reflected, “We seldom have the chance to engage in interdisciplinary projects, which limits many creative possibilities.” A teacher noted, “Interdisciplinary learning is essential for fostering creativity, yet we currently lack sufficient resources and opportunities.” To tackle this issue, educators suggest strengthening collaborations with other disciplines and organizing interdisciplinary seminars and projects.

Additionally, the insufficient use of technology represents another significant barrier, aligning with the point of Hypothesis 3 regarding the uneven distribution of teaching resources. 65% of students perceive a shortfall in the availability and utilization of technological resources at their institution (M= 3.81, SD = 1.12). 74% of teachers also see the need to enhance the integration of technology in teaching (M= 3.87, SD = 1.11). A senior student stated, “Our school’s technological equipment and software are not updated frequently enough, which affects our creative output.” To overcome this obstacle, teachers recommend enhancing the upgrading and training of technological equipment.

Lastly, the teaching philosophies and methods of instructors also need enhancement, which corresponds with the concern of Hypothesis 3 concern about the lack of teacher training and professional development opportunities. 61% of students believe that some teaching methods employed are overly traditional and lack flexibility (M= 3.77, SD = 1.11). 69% of teachers also acknowledge the necessity to refresh their teaching philosophies and methodologies (M = 3.82, SD = 1.10). A freshman remarked, “Some teachers employ outdated teaching methods that fail to inspire our creativity.” An associate professor observed, “Teachers need to continually evolve and improve to better facilitate student innovation.” To address this, educators advocate for enhanced professional development and updated teaching strategies for teachers.

Discussion

Effectiveness of Teaching Strategies

The study draws a clear conclusion that interdisciplinary learning, technology integration, collaborative projects, and experiential learning are highly effective in fully stimulating students' creativity. The effects and influences of these strategies are multi-dimensional. They not only greatly broaden the scope of students' knowledge coverage, but also build a rich and diverse platform for students to explore in a variety of different situations and freely express their creativity. Integrating with other fields of learning, students’ creativity is promoted in a professional way through the use of music. This is an affirmation of Runco’s (2022) findings on how interdisciplinary learning enhances creativity. Nevertheless, it is necessary to point out that the application of interdisciplinary learning in China is somewhat restricted

compared to European and American countries. For students to benefit from interdisciplinarity, further reforms are not only desirable but also imperative.

New technologies, for example, DAWs and diverse music production software, have increased the effectiveness of creation and opened new opportunities for music production. This is in agreement with the study done by Jahnke and Liebscher (2020), who pointed out that technology has the potential to add a lot of value to the creativity of students.

Nevertheless, this study also identified that the application area and intensity of technology in music learning require extension and improvement. For example, there are some areas and schools where the understanding and implementation of progressive technology in music have not fully developed. However, when technology is combined with conventional teaching techniques, it can be seen that there is a need for further research and enhancement to make this process more effective and to help deliver music education in a more efficient manner.

Group work, where students are jointly involved in the composition and performance of a group show, enhances students' communication and collaboration, which in turn provokes creativity. Thus, this study is in line with the work of Brauer and Beausaert (2024), who pointed out that collaboration is the key to innovation. However, it should be noted that this study also learned that in China, collaborative projects also encounter a sequence of difficulties in the specific implementation process. For example, the relative lack of resources cannot provide sufficient support for the smooth implementation of the project; The cooperation mechanism is not perfect, which leads to problems such as poor communication and unclear division of labor in the cooperation process. Students participating in the master class not only significantly improved their technical skills, but also gained new creative inspiration. This is consistent with the research conclusion of Sengupta and Blessinger (2022).

Although experiential learning has shown obvious advantages in cultivating creativity, its popularity and coverage in China's higher music education still need to be further improved. Many students have not had the opportunity to participate in these experiential learning activities that can stimulate creativity, and some colleges and universities face many practical difficulties in carrying out such activities. Therefore, in order to cultivate students' creativity more effectively, we need to make more efforts to promote and perfect the application of experiential learning in higher music education.

Main Sources of Creativity

The study draws a clear conclusion that cultural heritage, diverse musical genres, modern music technology, and interdisciplinary learning are key sources of student creativity. When students devote themselves to the study of traditional Chinese music elements, they can carry out innovative activities based on the inheritance and development of traditional culture. This aligns with Zhou's (2022) research. For example, students who incorporate the pentatonic scale from traditional Chinese music into their compositions not only create distinctive works but also deepen their understanding of Chinese culture.

Exposure to and study of different music genres, such as Western classical music, modern popular music, and other world music genres, significantly enhance students' creative abilities and innovative thinking. This finding is consistent with Bartleet et al.'s (2020) research. For example, a study found that students who learned African drumming integrated

its unique rhythms into their compositions, significantly enhancing the diversity and creativity of their music. However, compared to international studies, this research found that Chinese students still face challenges in accessing diverse music genres due to resource constraints and insufficient curriculum offerings.

Advancements in modern music technology have made the music creation process more convenient and efficient. Research shows that students using music production software experience significant improvements in creative freedom and expressive capabilities, consistent with Cayari's (2021) findings. For example, using DAW software, students can quickly experiment with different sounds and effects, greatly enhancing their creative efficiency.

Integrating knowledge from other disciplines as well as cooperating with other disciplines, for example, art, English, or technology, significantly expands the material student has at their disposal and changes their paradigm of work. Studies definitely indicate that there are numerous advantages to ID learning. It has not only resulted in a significant expansion of students' knowledge sphere but also in the rather intensive development of students' innovative potential. This conclusion is in very good agreement with the findings of Oudenampsen et al. (2023).

Challenges and Strategic Solutions

Although the present study outlined a number of effective practices in teaching and learning as well as a range of sources of creativity that were both varied and rich, the study was also successful in pinpointing a number of significant issues: all the issues with the curriculum; lack of interdisciplinary; lack of integration of technology; and the fact that teachers' philosophies and practices could use improvement. The curriculum at present is not very flexible, and this results in the corresponding limitation of the creative potential of students. This is in line with the observations made by John (2020), where it was established that the application of flexibility in the management of curriculum can go a long way in enhancing the creativity of the students.

One major disadvantage is that there are not many carriers in which students can engage in interdisciplinary learning; hence, the creativity of the students is more or less confined. According to similar studies, more efforts should be made on cooperation and exchange with other disciplines, and there should be more interdisciplinary seminars and related projects held, which can really help expand students' vision and fully awaken their creativity (Mantie, 2023).

In addition, there are deficiencies in the provision and utilization of technological resources in schools, which affects the innovation efficiency of students. This aligns with Kormos's (2022) research. To address this, enhancing the updating and training of technological equipment will enable teachers and students to proficiently use modern technology for creative purposes, significantly improving teaching effectiveness and students' creative abilities. Lastly, some teachers' traditional and inflexible teaching methods limit students' creative development. The research suggests that enhancing professional development and training for teachers, and updating educational philosophies and methods, can better guide students in innovation, consistent with Pimental's (2023) findings.

Conclusion

This study examines the development of creativity in Chinese higher music education in depth. Through the investigation and interview of teachers and students in five universities in Guangzhou, it is clear that traditional teaching methods have a certain importance, innovative teaching methods are the key to activating creativity, and the sources and main obstacles of creativity are pointed out. Finally, suggestions such as flexible teaching strategies, integration of science and technology, interdisciplinary participation and educational reform are put forward to solve obstacles, cultivate outstanding music talents, promote the development of Chinese music education and enhance its international competitiveness.

Funding

The research was financially supported by the Guangdong Province Outstanding Young Scientific Research Talent International Training Program for Postdoctoral Fellows, the Guangdong Higher Education Association '14th Five-Year Plan' 2024 Annual Higher Education Research Project, and the Guangdong Provincial Department of Education 2023 Annual Education Science Planning Project (Higher Education Special).

References

Bartleet, B. L., Grant, C., Mani, C., & Tomlinson, V. (2020). Global mobility in music higher education: Reflections on how intercultural music-making can enhance students' musical practices and identities. *International Journal of Music Education, 38*(2), 161-176.

Brauer, R., Ormiston, J., & Beausaert, S. (2024). Creativity-Fostering Teacher Behaviors in Higher Education: A Transdisciplinary Systematic Literature Review. *Review of Educational Research*. https://doi.org/10.3102/00346543241258226

Cao, H. (2021). Innovation and practice of music education paths in universities under the popularity of 5G network. *Wireless Communications and Mobile Computing, 2021*(1), 3570412.

Cayari, C. (2021). Popular practices for online musicking and performance: Developing creative dispositions for music education and the Internet. *Journal of Popular Music Education, 5*(3), 295-312.

Hernández, A. M. (2020). Online learning in higher music education: Benefits, challenges and drawbacks of one-to-one videoconference instrumental lessons. *Journal of Music, Technology & Education, 13*(2-3), 181-197.

Jahnke, I., & Liebscher, J. (2020). Three types of integrated course designs for using mobile technologies to support creativity in higher education. *Computers & Education, 146*, 103782.

John, V. (2020). Musical Identity, creativity and pedagogy: A narrative inquiry into secondary music student teachers' perception of their own creativity and its impact on their developing classroom practice within a changing educational landscape in Wales (Doctoral dissertation, Cardiff Metropolitan University).

Kormos, E. (2022). Technology as a facilitator in the learning process in urban high-needs schools: Challenges and opportunities. *Education and Urban Society, 54*(2), 146-163.

Mantie, R. (2023). What should one expect from a sociology of music education? *Action, Criticism & Theory for Music Education*.

Nwabueze, A. I., & Isilebo, N. C. (2022). Modern trends in educational development. In *International and comparative education: Cross-cultural approach* (pp. 545-558).

Pimental, M. (2023). Innovating education through design thinking: A case study of problem-solving educators.

Runco, M. A. (2022). Positive creativity and the intentions, discretion, problem finding, and divergent thinking that support it can be encouraged in the classroom. *Education Sciences, 12*(5), 340.

Sengupta, E., & Blessinger, P. (2022). Introduction to innovative approaches in pedagogy for higher education classrooms. In *Innovative approaches in pedagogy for higher education classrooms* (Vol. 42, pp. 3-9). Emerald Publishing Limited.

Sternberg, R. J., & Karami, S. (2022). An 8P theoretical framework for understanding creativity and theories of creativity. *The Journal of Creative Behavior, 56*(1), 55-78.

Váradi, J. (2022). A review of the literature on the relationship of music education to the development of socio-emotional learning. *Sage Open, 12*(1), 21582440211068501.

Varner, E. (2020). General music learning is also social and emotional learning. *General Music Today, 33*(2), 74-78.

Zhou, H. M. (2022). Musical poetics in instrumental music: China's intangible cultural heritage in the information age. *Heritage Science, 10*(1), 87.

Contact email: tingyuyan@m.scnu.edu.cn

The Impact and Challenges of Artificial Intelligence Technologies on Universities in Southwestern Nigeria

Aderinsola E. Kayode, Durban University of Technology, South Africa
Adedoyin T. Odumabo, Trinity University, Nigeria

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Advancements in Artificial Intelligence (AI) have led to significant changes in the education sector, creating new opportunities and challenges for teaching, research, and learning anytime and anywhere. The purpose of this study is to evaluate the impact and challenges of using artificial intelligence technology on universities in Southwestern Nigeria. A sample size of 120 Lecturers and 30 students were selected at each university using purposive sampling approaches and well-structured questionnaires distributed face-to-face and online. The questionnaire was distributed to six public and private universities in Nigeria's south-western zone, and 752 out of 900 copies were returned, indicating an 83.6% response rate. The data was captured in Microsoft Excel and SPSS packages, and it was analysed using frequency and percentage distributions. The findings revealed that adopting AI technologies for both learning, research, and teaching activities has a significant impact on teacher automated grading, feedback loops for teachers, virtual facilitators, chat campus questioning for students, personalized learning, adaptive learning, AI-powered anti-cheating, and data accumulation and personalization. However, the key barriers to the implementation of artificial intelligence technology are strategy, organizational maturity, data governance, and infrastructure of necessary IT in the campuses. In conclusion, the study recommends the use of many AI-tools for successful teaching, research, and learning in higher education.

Keywords: Artificial Intelligence Technologies, Adoption, Benefits, Obstacles, Nigeria, Universities

iafor
The International Academic Forum
www.iafor.org

Introduction

Artificial intelligence (AI) refers to intelligence demonstrated by machines rather than people, which mimic human intelligence, allowing them to better assist our tasks, and increase efficiency (Khatri, Pandey, Penkar & Ramani, 2020; Owoc, Sawicka & Weichbroth, 2019). When compared to earlier industrial revolutions' linear processes, it's boosting the fourth Industrial revolution's speed and scope at an unprecedented and exponential rate (Chaka, 2023). AI is defined as the study of "intelligent agents": any device that senses its environment and takes actions to maximize its chances of succeeding at some goal. The term "artificial intelligence" is used colloquially when a computer duplicates "cognitive" functions that humans associate with other human minds, such as "learning" and "problem-solving." Medical diagnosis, remote sensing, computer science, scientific discovery, and robot control are all examples of applications for artificial intelligence (Arakpogun, et al., 2021). One exciting aspect of AI is its ability to learn and make judgments on its own without human intervention or control. It uses algorithms that allow it to learn through natural language processing. Today, artificial intelligence has become an integral aspect of the technology industry, providing solutions for many of the most complex problems in computer science (Butcher, 2011). However, many artificial intelligence applications are deeply ingrained in the architecture of every business and educational sector (Lim & Lee, 2024; Jibril, et al., 2018).

Intelligent technology, by definition, is a strategy that employs knowledge to achieve a certain goal efficiently. Currently, intelligent technologies include multi-agent, machine learning, ontology, semantic and knowledge grid, autonomic computing, cognitive informatics, and neural computing (Akinnuwesi, Odumabo & Aribisala, 2020). The rapid breakthroughs in these sectors have already resulted in significant changes in education, creating new opportunities and challenges to teach and learn anytime and anywhere by introducing new techniques and systems that aim to promote innovative teaching and, eventually, improve learning outcomes (Judijanto Atsani & Chadijah 2024; Owoc, Sawicka & Weichbroth, 2019; Kulkarni, 2017).

It is worth emphasizing that private universities now play an important role in higher education (Green, 2024; Popenici & Kerr, 2017), and they must compete fiercely to attract prospective students. Their position is increasingly dependent on the quality of education and the managerial skills of university administration (Ajadi, 2010; Popenici & Kerr, 2017). In both circumstances, implementing intelligent technology seems to be necessary if one considers their competitiveness and progress (Aroyo & Mizoguchi, 2003). Yet, the level of its implementation is still quite low.

On the other hand, there are a few recorded cases that provide insight into the areas where AI approaches have been deployed in higher institutions of learning (Sagenmuller, 2020). In particular, intelligent technologies are gradually being deployed in private universities (Ajadi, 2021). However, to the best of our knowledge, relatively little research has examined the benefits and challenges of implementing AI technologies in university-developed settings (Owoc, M. L., A. Sawicka, & P. Weichbroth, 2019). The purpose of this study is to evaluate the impact and challenges of using artificial intelligence technology on universities in Southwestern Nigeria.

This paper is organized as follows: Section 2 studies a literature review on artificial intelligence (AI) in the education sector, introducing the basic concepts, benefits, and issues

associated with its adoption and use by public and private Universities. Section 3 describes the materials and methods used in this project. Section 4 describes the results and interpretation while finally, Section 5 describes the conclusion, recommendation, and future research work. A questionnaire for the evaluation of the impact and challenges of AI technology adoption and use by public and private Universities in Southwestern, Nigeria is presented in the appendix section.

Literature Review

Artificial intelligence (AI) has altered the way lecturers, teachers, and trainers interact with students in educational environments. Using AI technology, instructors may personalize learning experiences for students based on their specific needs and talents. This level of customization not only increases student engagement but also improves learning results (Popenici & Kerr, 2017). Furthermore, AI can help educators' grade assignments and provide feedback promptly. This enables better utilization of their time. Automation of routine tasks frees up educators to focus on more complex aspects of teaching. In addition, AI can analyse data from student interactions to identify areas where additional assistance is required. It recognizes patterns in student performance and allows educators to intervene early, which may help to avert academic problems. Moreover, AI can facilitate communication between educators and students. In real-time, by giving immediate feedback and answering queries. This feature promotes a collaborative learning environment. It fosters active involvement among students. The incorporation of AI technology into educational environments offers several benefits for lecturers, teachers, and trainers. By employing AI tools efficiently, educators can increase the learning experience for students and boost overall academic performance (Shahzad, Xu, Lim, Yang & Khan, 2024; Odumabo, Asokere & Ogunfeyimi, 2023; Popenici & Kerr, 2017).

AI Tools for and by Lecturers

1. Personalized Learning: AI-powered adaptive learning systems can tailor educational content to the specific needs of students. It makes personalized recommendations and resources based on students' performance and learning styles.

   Benefits: It helps address the varied learning paces and types within a classroom. It improves student engagement and outcomes by delivering tailored content.

2. Automated Grading and Assessment: AI systems can efficiently and accurately grade multiple-choice and fill-in-the-blank assessments. AI can help evaluate essays and written responses by utilizing natural language processing (NLP) techniques.

   Benefits: It reduces educators' time spent grading, allowing them to focus more on interactive teaching. It offers uniform and unbiased grading.

3. Intelligent Tutoring System Role: AI-powered tutoring systems can assist students with supplementary information and explanations on specific topics. Its offers real-time feedback and advice, akin to one-on-one tutoring sessions.

   Benefits: It helps students outside of regular classroom hours. It helps struggling students to keep up with the coursework.

4. Predictive Analytics: Analyse student data to forecast performance and identify individuals who are at risk of falling behind. It aids in early intervention by identifying which students require further assistance.

   Benefits: It increases student retention rates. It encourages proactive rather than reactive teaching practices.

5. Virtual classrooms with AI teaching assistants: AI-powered virtual teaching assistants can handle basic questions and administrative duties. Manages online classrooms and provides quick support to enable remote study.

   Benefits: It increases the efficiency of organizing online and hybrid classes. This allows instructors to devote more time to curriculum development and student interactions.

6. Enhanced Learning Materials: AI can help generate interactive and engaging learning materials like quizzes, flashcards, and simulations. It supports the creation of multimedia content that appeals to a variety of learning styles.

   Benefits: It enhances the dynamic and engaging nature of learning. Visual and interactive aids help to convey complicated subjects.

7. Administrative Support Role: Automate administrative duties like scheduling, enrolment, and attendance tracking. AI chatbots and automated emails help to streamline communication with students and parents.

   Benefits: It reduces administrative burden on instructors. It ensures the timely and efficient management of educational processes.

8. Professional development for educators' role: AI-powered systems can recommend professional development courses and resources based on an educator's profile and preferences. It provides tailored learning paths to help educators improve their skills.

   Benefits: It provides instructors with the most up-to-date instructional methods and technologies. It promotes continued professional development.

9. Improving Collaboration: AI solutions can help students and educators collaborate more effectively by using intelligent matching and project management tools. It encourages group work and peer-to-peer learning by suggesting the best groupings based on student data.

   Benefits: It encourages a collaborative learning atmosphere. It enhances the social learning experience.

10. Content Curation and Creation Role: AI can assist in collecting appropriate educational content from a variety of sources, saving educator's time when developing lesson plans. It helps create quizzes, assignments, and other learning activities depending on the curriculum.

    Benefits: It ensures that the content is current and relevant. It reduces the workload associated with class planning and content development.

Materials and Method

The methodology and approach adopted in this paper are described below. In this section, the research questions are highlighted, and the study area, the sampled population, and the research techniques used are discussed.

Research Questions

To realize the purpose of this research study, three (3) research questions are formulated as follows:

- What is the level of adoption of AI technologies by universities in the study area?
- What are the benefits associated with the adoption of AI technologies by universities in the study area?
- What are the challenges and the constraining features to the successful adoption and use of AI technologies by universities in the study area?

Data Source and Presentation

This study is empirical research that investigates the level of adoption, benefits, and challenges of AI technologies in universities in the Southwestern part of Nigeria. The instrument for data collection was a well-structured questionnaire titled, "The Usage Impact of Artificial Intelligent Technologies Adoption on Universities in Southwestern, Nigeria" with three (3) parts. The first part provides vital bio-data information about each respondent while the second part provides information on the assessment of the adoption of Artificial Intelligent technologies in universities. The third part assesses the impacts of Artificial intelligence technologies on Universities in the Southwestern part of Nigeria while the fourth part investigates the challenges of using Artificial intelligence technologies in the study area.

The questionnaire was validated and tested for reliability using the Pearson Product Moment Correlation. A Cronbach alpha reliability coefficient (α) of 0.89 was obtained, an indication that the instrument was reliable for data collection. In all, 900 copies of the questionnaire were administered to the six (6) public and private universities in the southwest geo-political zone of Nigeria while 752 copies were returned which represents a respondent rate of 83.7%.

A total of hundred and twenty (120) lecturers and fifty (50) students were surveyed in each university. Microsoft Excel and SPSS were used to capture and analyse the data obtained from the duly-filled copies of the questionnaire while frequency, mean and percentage distributions were the descriptive techniques used. The descriptive survey was adopted to obtain the opinion of a representative sample of the target population to be able to infer the perception of the entire population.

Results and Interpretation

The results of the research on the trends of adoption of Artificial Intelligence Technologies and the impacts and challenges associated with the adoption and use of Artificial Intelligence Technologies on Universities in Southwestern Nigeria are presented and discussed in this section.

Trends of Adoption of Artificial Intelligence Technologies by Universities in Southwest Nigeria

The analysis of the findings for research part II question 1 is presented in Figure 1. The responses obtained from 900 respondents in this research study indicated that out of the six (6) universities in the study area, five (5) universities have already fully adopted and one partially adopted the technology and using it which represents a 90% adoption rate. This endorses the report by Owoc, Sawicka, and Weichbroth that many higher education institutions have implemented Artificial Intelligence Technologies in their universities. However, technologies are gradually being deployed in private universities to meet up with the quality of education and the managerial skills of university administration.

The analysis of the findings for research part II question 2 is presented in Figure 2. The responses indicated that six (6) universities used Artificial Intelligence Technologies services such as personalized learning, complete courseware, and automated grading system while only five (5) used virtual assistants.

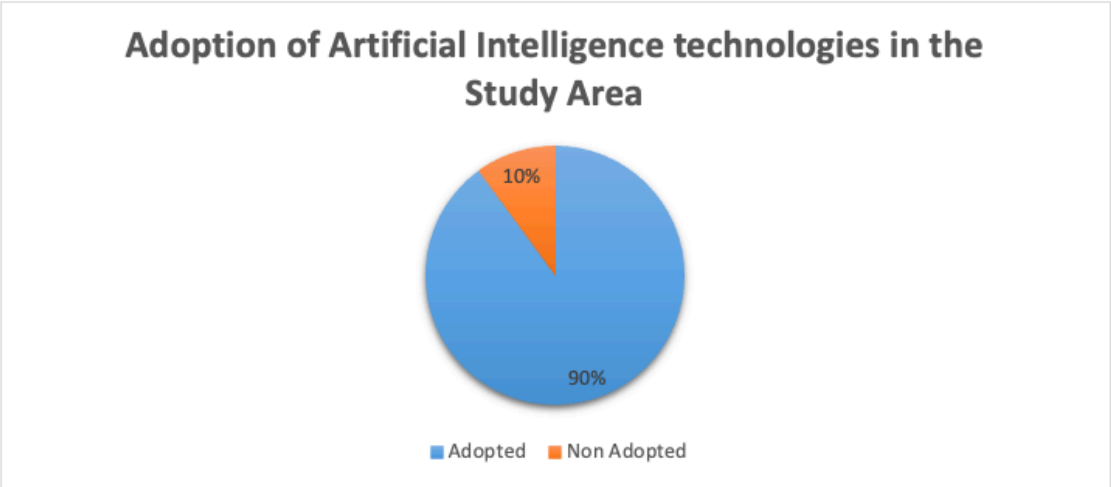


Figure 1: Adoption of Artificial Intelligence Technologies in Nigerian Southwestern Universities

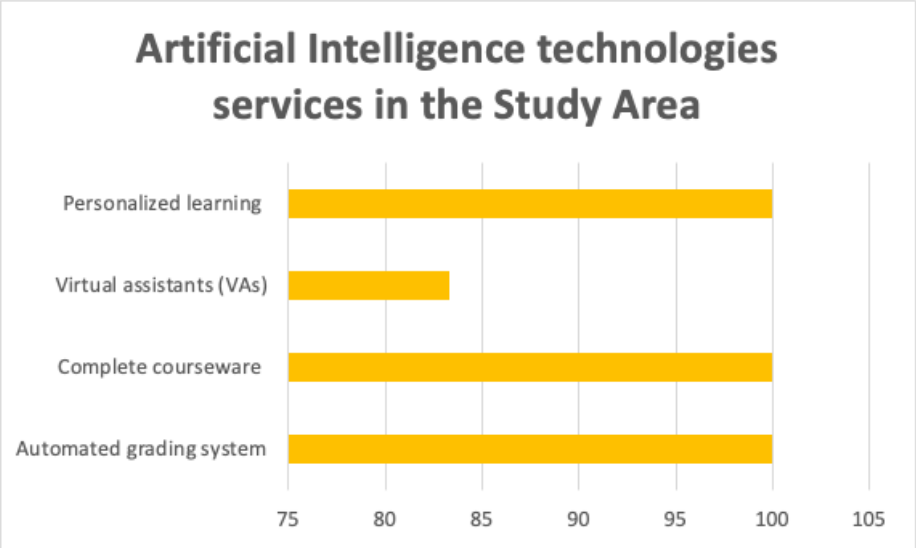


Figure 2: Artificial Intelligence Technologies Services in Nigerian Southwestern Universities

The result of the outcomes obtained from research question part III is presented in Table 1. The foremost benefits resulting from the use of Artificial Intelligence Technologies include Personalized Learning/ computer-assisted tutoring which is the most important factor that drives most Southwestern Universities in Nigeria to adopt AI. The remaining is followed by chat campus questioning for students, teacher automated grading, adaptive learning, AI-powered anti-cheating, virtual facilitators, feedback loops for teachers, and data accumulation and personalization in that order. This result is buttressed by Owoc, Sawicka, and Weichbroth who identified computer-assisted tutoring as the major benefits of adopting Artificial Intelligence Technologies in education higher learning and the high and dynamic student demand of chat campus. UNESCO 2019 support identified computer-assisted tutoring as the major benefits of adopting Artificial Intelligence Technologies in education higher learning and the high and dynamic student demand of chat campus education.

Serial No	**Benefits of Artificial Intelligence technologies in the Study Area**	**% of Respondents**
1	Teacher Automated Grading	**97.1**
2	Feedback Loops for Teachers	**76.7**
3	Teacher Virtual Facilitators	**81.5**
4	Chat Campus Questioning For Students	**97.5**
5	Personalized Learning	**97.7**
6	Adaptive Learning	**88.0**
7	AI-Powered Anti-Cheating	**85.0**
8	Data Accumulation and Personalization	**75.3**

Table 1: Benefits of Artificial Intelligence Technologies in Nigeria Southwestern Universities (N = 752)

The analysis of the results obtained for the research question part IV in this study as presented in Table 2, some challenges presently affecting Universities using artificial intelligence technologies in the study area have been recognized. The key barriers to the implementation of artificial intelligence technology are strategy, organizational maturity, data governance, and infrastructure of necessary IT on the campuses. This result is supported by the work of Arakpogun, Elsahn, Olan, and Elsahn who acknowledged these concerns comprise the intensification of current structural inequalities, governance, and regulation, as the key challenges faced by using artificial intelligence technologies in Africa.

Owoc, Sawicka, and Weichbroth who identified content adaptability and flexibility as the major challenges of adopting Artificial Intelligence Technologies in education. UNESCO 2019 report identified strategy as one of the major challenges of using Artificial Intelligence Technologies in education.

Serial No	Challenges of Artificial Intelligence technologies in the Study Area	% of Respondents
1	Strategy	**87.4**
2	Infrastructure	**95.0**
3	Organizational Maturity	**85.8**
4	Data Governance	**84.4**

Table 2: Challenges of Artificial Intelligence Technologies in Nigerian Southwestern Universities (N = 752)

Conclusion, Recommendation and Future Work

Artificial intelligence (AI) has transformed the way lecturers interact with students and do research in the educational sector. With the aid of AI technologies, lecturers can effectively carry out their work well and faster. Hence, AI helps lecturers to better assist our tasks, increase efficiency, and fuel economic progress.

This study recommends the use of many AI tools for successful teaching, research, and learning in higher education. Implementing AI technologies for both learning, research, and teaching activities has a significant impact on lecturers' automated grading, feedback loops for teachers, virtual facilitators, chat campus questioning for students, personalized learning, adaptive learning, AI-powered anti-cheating, and data accumulation and personalization. However, the key barriers to the implementation of artificial intelligence technology are strategy, organizational maturity, data governance, and infrastructure of necessary IT on the campuses.

Based on the results obtained from this research work, the following recommendations are made. The AI technologies can help universities to:

1) Help educators' grade assignments/examinations and provide feedback promptly.
2) Facilitate communication between educators and students. In real-time, by giving immediate feedback and answering queries.
3) Instructors may personalize learning experiences for students based on their specific needs and talents.
4) Analyse data from student interactions to identify areas where additional assistance is required.
5) Educators can increase the learning experience for students and boost overall academic performance.
6) Automation of routine tasks frees educators to focus on more complex aspects of teaching and research.
7) Discourage anti-cheating and copying among the students.
8) Promotes a collaborative learning environment that will foster active involvement among students.
9) It recognizes patterns in student performance and allows educators to intervene early, which may help to avert academic problems.

Future research work can examine how the limiting factors to the efficacious adoption of artificial intelligence technologies in Nigerian universities can be accomplished easily without acquiring additional expenses.

Acknowledgement

The researchers express their sincere appreciation to the Management of Durban University of Technology for the funding grant that allowed for the publication of this article. Thanks to the Trinity University, Yaba Lagos, Nigeria for support during the writing full paper and to those participants in universities who gave their time to participate in the study.

References

Ajadi, T.O. (2010). *Private Universities in Nigeria–the Challenges Ahead.* Private Universities in Nigeria–the Challenges Ahead, 1(7): p. 1-10.

Akinnuwesi, B.A, Odumabo, A. & Aribisala, B.S. (2020). *Knowledge Grid: An Intelligent System for Collaboration and Knowledge Management in Nigerian Universities.* Data Science Journal 19: p. 1-16.

Arakpogun, E.O., et al. (2021). *Artificial intelligence in Africa: Challenges and opportunities.* The fourth industrial revolution: Implementation of artificial intelligence for growing business success, p. 375-388.

Aroyo, L. and R. Mizoguchi (2003). *Authoring support framework for intelligent educational systems.* Proccedings of AI in Education, AIED, p. 362-364.

Butcher, N. (2011). *ICT, Education, Development, and the Knowledge Society,* URL:http://www. gesci. org/assets/files/ICT,% 20Education,% 20Development,% 20and% 20th e% 20Knowledge% 20Society. 281: p. 29.

Chaka, C. (2023). *Fourth industrial revolution—a review of applications, prospects, and challenges for artificial intelligence, robotics and blockchain in higher education.* Research and Practice in Technology Enhanced Learning p. 002-002.

Green, F. (2024). Private schools and inequality. *Oxford Open Economics*, *3*(Supplement_1), i842-i849.

Jibril, U., et al. (2018). *Introduction to artificial intelligence: Applications and benefits to human life.* Int J Innov Res Adv Stud, 5(3): p. 89-99.

Judijanto, L., Atsani, M. R., & Chadijah, S. (2024). Trends In The Development Of Artificial Intelligence-Based Technology In Education. *International Journal of Teaching and Learning*, *2*(6), 1722-1723.

Khatri, S., Pandey, D. K., Penkar, D., & Ramani, J. (2020). Impact of artificial intelligence on human resources. In *Data Management, Analytics and Innovation: Proceedings of ICDMAI 2019, Volume 2* (pp. 365-376). Springer Singapore.

Kulkarni, A. (2017). *AI in education: Where is it now and what is the future.* Lexalytics, 2019.

Lim, S. C. J., & Lee, M. F. (2024). Rethinking education in the era of artificial intelligence (AI): Towards future workforce competitiveness and business success. In *Emerging Technologies in Business: Innovation Strategies for Competitive Advantage* (pp. 151-166). Singapore: Springer Nature Singapore.

Odumabo, A., M. Asokere, and O. Ogunfeyimi (2023). *A Parent-Student Control Web-Based Learning Management System (PaSELS).* International Journal of Applied Research and Technology, 12(10).

Owoc, M.L., A. Sawicka, and P. Weichbroth (2019). *Artificial intelligence technologies in education: benefits, challenges and strategies of implementation*. in *IFIP International Workshop on Artificial Intelligence for Knowledge Management*. Springer.

Pedro, F., et al. (2019). *Artificial intelligence in education: Challenges and opportunities for sustainable development.*

Popenici, S.A. and S. Kerr (2017). *Exploring the impact of artificial intelligence on teaching and learning in higher education.* Research and practice in technology enhanced learning, 12(1): p. 22.

Sagenmuller, I. (2020). *How artificial intelligence helps higher education management*. U-Planner. https://www. u-planner. com/en-us/blog/artificial-intelligence

Shahzad, M. F., Xu, S., Lim, W. M., Yang, X., & Khan, Q. R. (2024). Artificial intelligence and social media on academic performance and mental well-being: Student perceptions of positive impact in the age of smart learning. *Heliyon*, *10*(8).

Contact emails: aderinsolaK@dut.ac.za
adedoyin.odumabo@trinityuniversity.edu.ng
aderinsola.kayode@trinityuniversity.edu.ng

Teacher Self-Efficacy and Emergency Online Teaching and Learning During COVID-19

Tim Dolighan, Ontario Tech University, Canada
Michael Owen, Brock University, Canada

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This mixed methods study sought to measure and understand teacher efficacy and experience of teaching online one year into the transition to emergency remote online teaching during the COVID-19 pandemic. This study builds on our earlier work (Dolighan & Owen, 2021) that measured teachers' sense of efficacy for teaching online at the initial stages of the pandemic. We examined the impact of prior experience teaching online, experience teaching online during the pandemic, and access to online training on teacher self-efficacy as they adapt to online learning in the context of the pandemic. What became clear was that teaching remotely online under emergency measures is different from normal online teaching. The results of the study found teachers' collaboration with colleagues to solve issues and collaboratively learn impacts teacher efficacy. We also found that access to technical and pedagogical support resources impacted teachers' sense of efficacy and experience teaching online. Our study makes recommendations for structuring teacher professional development to address the challenges and opportunities of designing effective online teaching and learning contexts that builds capacity in schools to leverage OT&L for emergency remote learning, blended learning and eLearning modes of education.

iafor
The International Academic Forum
www.iafor.org

Introduction

While the COVID19 pandemic is past us, lessons learned from the transitions to Emergency Remote Teaching and Learning (ERT&L) may help shape our policy and practical approaches to online learning in emergency situations such as wildfires, floods, or another pandemic. Our paper focuses on teachers' self-efficacy in the transition to ERT&L during COVID19. We sought to understand teacher efficacy and experience of teaching online one year into the transition to emergency remote online teaching during the pandemic. We examined the impact of prior experience teaching online, experience teaching online, and access to online training on teacher self-efficacy in the context of the pandemic. We found that:

- teaching remotely online under emergency measures differs from "normal" online teaching.
- teachers' collaboration with colleagues to solve issues and collaboratively learn positively affected teacher efficacy.
- access to technical and pedagogical support resources advanced teachers' sense of efficacy and their experience teaching online.

Our learning can be used to structure teacher professional development to address the challenges and opportunities of designing effective online teaching and learning contexts that build capacity in schools to leverage Online Teaching & Learning (OT&L) for emergency remote learning, blended learning, and eLearning modes of education.

COVID19 and Modifications to the Teaching Environment

In the 2020-2021 school year, the pandemic challenged teachers, administrators and school districts to maintain an effective learning environment for students and teachers while addressing the public health emergency. In a Canadian school district, Face-to-Face (f2f) classrooms were divided into cohorts to reduce class sizes and ensure social distancing protocols. School districts established virtual schools, staffed with teachers who chose, for personal or health reasons, to teach virtually or were placed in virtual schools to meet staffing requirements. Boards adopted hybrid learning models that involved f2f classes with some students attending remotely. As coronavirus case numbers rose and schools transitioned a second time to emergency remote online (ERT), the need for real-time and ongoing support for online teaching and training in basic online pedagogy and design skills increased. Our research sought to understand the impact the pandemic on teacher self-efficacy for teaching online in the context of an emergency (ERT&L[1]).

Teacher Self-Efficacy

Teaching self-efficacy is a construct that represents teachers' confidence in their ability to facilitate student learning through the development of students' knowledge, abilities, and values and dynamic interaction of the person, environment and behavior (Bandura, 1989). Self-efficacy beliefs are correlated with the effort people are willing to expend to attain a goal and how persistent they are in the face of adversity and recover from setbacks (Bandura, 1986, 1997). High self-efficacy amongst teachers correlates with elevated levels of student engagement (Martin et al., 2012).

[1] Note: We use ERT and ERT&L interchangeably.

Online Teaching and Learning Versus Emergency Remote Teaching and Learning

In the context of the pandemic, teacher efficacy has been studied to measure how teachers have managed the transition to emergency online teaching. Pressley (2021) reported elementary teachers who taught virtually had lower self-efficacy than teachers who taught face-to-face during the pandemic while Dolighan and Owen (2021) found that teachers who reported prior experience teaching online had low self-efficacy during the initial stages of the pandemic. Others examined how transitioning to online teaching increased teacher stress and burnout, which are associated with lower self-efficacy (Sokal et al., 2020; Westphal et al., 2022; Ozamiz-Etxebarria et al., 2023).

Research shows that effective online learning involves intentional design, planning of instruction, learning activities and assessment that are structured for the online environment (Means et al., 2014; Hodges et al., 2020). Effective online learning recognizing that learning is a social and a cognitive process while striving to build a learning community (Barbour et al., 2020; Garrison, 2016). As teachers transitioned to online learning during the pandemic, there were no time and few resources in place to consider online course design. Face-to-face learning communities were separated by the remote mode of learning and the social element of learning eroded by separation imposed by the pandemic measures (Sokal et al., 2020).

Collaborative Teacher Professional Learning (PL)

Effective collaborative online teacher learning involves active social and cognitive presence (Garrison, 2017). Darling-Hammond et al. (2017) describe effective teacher PL as both collaborative and active in a way that allows teachers to "transform their teaching and not simply layer new strategies on top of the old …" (p. 7). Garrison (2017) proposed a Community of Inquiry (CoI) model that is purposeful, collaborative and trust worthy to ensure that professional learning is not done in isolation and is influenced through experiences with the physical world and interactions with others. Online collaborative learning frameworks offer models to design online learning opportunities for students while teachers learn the technology tools they are using (vanOostveen, 2019). Garrison (2017) explains that interaction and collaboration in online learning environments support a constructivist view of learning. VanOostveen et al. (2019) propose that learner-centred collaborative online learning environments for professional learning can change teachers' beliefs about learning by changing teachers' online learning experience to incorporate constructivist aspects of learning and provide opportunities to experience new pedagogies. Collaborative inquiry focuses on the needs of the learner and employs a learner-driven approach through collaborative knowledge construction (vanOostveen et al., 2019).

Traditional modes of professional development require professional activity days or release time for teachers. Much professional development (PD) focuses on information disseminated from administrators to "passive" teacher audiences (Darling-Hammond et al., 2017). The CoI framework (Garrison, et al., 2000) provides an understanding of how computer mediated communication can support learning online and enable the implementation of effective online pedagogy. Lock et al. (2017) suggest that CoI supports the design and facilitates self-regulatory learning in online environments, a key component of effective online learning (Cho & Schen, 2013). Hughes et al. (2021) argue that teacher PL can be optimized if teachers are agents of their own learning. Online PL offers an ongoing and sustainable way to collaborate and learn that does not require specific times and designate places to learn.

One lesson emerging from COVID19 is that school districts must be prepared to transition to remote teaching and learning. Teachers and school boards need to prepare for emergencies arising from climate change, societal and inter-state conflict, as well as public health crises. The distinction between ERT&L and OT&L is a second lesson that emerged from the COVID19 experience of educational institutions. ERT&L, as experienced by teachers and students during the pandemic, did not integrate effectively the intentionality of instructional design principles that are important to effective OT&L. Research shows that effective online learning results from intentional instructional design and planning that considers how both synchronous and asynchronous modalities are used to enhance student learning in the online environment (Branch & Dousay, 2015; Martin et al., 2019). Issues of agency, responsibility, flexibility, and choice are key elements (Bozkurt & Sharma, 2020) as are planning and designing with the goal of creating a learning community. The social support and teaching strategies that exist in face-to-face settings often are not transferred to online teaching environments (Corry & Stella, 2018). Marshall et al. (2021) examined teachers' experience of teaching during the pandemic and identified many of the concerns and barriers teachers faced are more issues that related to dealing with the impact of the pandemic than challenges associated with a normal transition to online teaching. Teachers reported having difficulty providing adequate instruction with the appropriate amount of rigor yet lacking the ability to hold students accountable. For teachers, the loss of control of the learning environment was a factor in their sense of efficacy for emergency remote teaching online (Marshall et al., 2021). In Ontario, the provincial government and school boards set policies aimed at reducing student stress, which reduced student accountability during the pandemic (Ontario, 2020). Dolighan and Owen (2021) found that teachers' sense of efficacy was lowest for student engagement during the pandemic. During the second transition to ERT&L, school boards were unprepared to effectively "pivot" to online learning in an emergency, similar to challenges reported during the first wave of COVID19 (Barbour et al., 2020).

Supporting Teachers Teaching and Building Online Learning Environments

Teacher self-efficacy for managing learning in ERT&L environments was tied to their beliefs about technology and how students learn. Research identifies persistent beliefs about the inferiority of online learning and attitudes about pedagogy and learning online as barriers to effective teaching in online environments (Kilgour et al., 2019; Northcote et al., 2015; Northcote et al., 2019; Hodges et al., 2020). Changing teachers' attitudes and beliefs regarding the use of technology in teaching environments involves addressing personal factors such as confidence or self-efficacy and pedagogical knowledge on the use of educational technologies and beliefs about technology and student learning. Being required to use multiple forms of educational technology during the pandemic-induced transition to online learning reinforced the need for and importance of effective and targeted teacher professional learning (PL). Targeted PL and virtual, on-demand support for online instructional design enhance teacher use of resources and helps promote self-efficacy for online teaching (Beach, 2018; Dolighan & Owen, 2021). Effective professional development is ongoing, is continually updated, and extends the professional knowledge and beliefs of teachers (Tondeur et al., 2017). Effective teacher PL enables internal changes in knowledge, attitude, and beliefs and fosters a culture of collaboration and inquiry that sustains change (Donohoo & Katz, 2017). Dolighan & Owen (2021) found that using the Learning Management System (LMS) in everyday teaching practice prior to the pandemic was associated with higher teacher efficacy for online teaching in the first stages of COVID19. Being prepared to transition to online learning, therefore, involves developing a strategy to build online teaching capacity that values online teaching as a viable mode of effective

education as well as integrating online teaching pedagogy and use of technology in ways that build efficacy for ERT&L.

Research Questions

Our study sought understand teacher efficacy one year into the transition to emergency remote online teaching during the COVID-19 pandemic. We argue that prior experience teaching online and access to online training builds greater self-efficacy amongst teachers as they adapted to online learning during the pandemic; collaboration with colleagues to solve issues and collaboratively learn positively affects teacher efficacy; and having access to technical and pedagogical support from technological support teams enhances teachers' sense of efficacy. We asked four research questions:

RQ1. How confident do teachers feel in preparing, conducting, and evaluating online courses?

RQ2. Is there a difference in online teaching self-efficacy a year later into the pandemic compared to the initial transition?

RQ3. In what ways do teaching assignments, the choice to teach virtual or face-to-face and willingness to continue teaching online impact teacher self-efficacy?

RQ4. In what ways do experience with online teaching, collaborating with colleagues, and training, resources and support from the school board influence teachers reported self-efficacy for online teaching?

Emerging from these questions, we hypothesized that:

- There is a positive relationship between levels of online teaching efficacy and years of online teaching experience.
- Teachers' sense of self-efficacy for teaching online will be higher than during the initial transition to emergency remote online teaching.
- Teachers who a) chose the virtual school placement and b) are willing to continue teaching virtually, will have significantly higher levels of online teaching efficacy.
- Teachers who collaborate with colleagues and access technical and pedagogical design support contacts will have higher levels of online teaching efficacy.

Methods

To answer these research questions, we invited teachers at an urban school district in Ontario, Canada to participate in the study. Following ethics approvals, email invitations were sent to all teachers to complete a web-based survey using Microsoft Forms. Out of 1631 teachers employed at the board, 265 (16.3%) responded. Of the respondents, 88% reported teaching $\leq$ 5 years online and 59% reported $\leq$1 year of online teaching experience, mostly during the first year of the pandemic. The researchers administered the Teachers' Sense of Efficacy for Online Teaching (TSEOT) survey (Dolighan & Owen, 2021), which was based on the Teacher Sense of Efficacy Survey (Tschannen-Moran & Wolfolk, 2000) and the Michigan Nurse Educators' Sense of Efficacy for Online Teaching instrument (Robinia & Anderson, 2010). The TSEOT showed a Cronbach alpha of .963 with our sample (n=236).

To complement the quantitative survey, we administered a semi-structured qualitative questionnaire designed to delve into teachers' experience of teaching online during the pandemic and to identify the successes and problematic issues associated with learning to teach online in the context of the pandemic. Questions were:

1) Describe the strategies for online teaching you feel worked to promote student engagement and student learning.
2) What do you feel you need to learn to teach online effectively?
3) How do you feel the pandemic impacted online teaching and learning?
4) Is there anything you would like to add regarding your experience teaching during the COVID-19 pandemic?

Data Analysis

Study questions were assessed by calculating means and standard deviations of the TSEOT survey scores (Horvitz et al., 2015; Robinia & Anderson, 2010; Tschannen-Moran et al., 2001) on four measures: *student engagement, classroom management, online instruction strategies,* and *computer skills*. The Pearson correlation coefficient was used to determine relationships between interval variables. Analysis of variance (ANOVA) was used to assess differences of means of online teaching efficacy scores. An alpha of .05 was used for all tests.

Responses to the semi-structured open-ended questionnaire were coded and thematically grouped to identify themes and patterns (Glaser, 1992) that reflected teachers' challenges and success teaching online. The data from the quantitative survey measured the self-efficacy of teachers. The qualitative and quantitative data were triangulated to identify the challenges and barriers that teaching staff encountered as they engaged online pedagogy and gained experience teaching in online environments (Cresswell & Miller, 2000).

Quantitative Survey Results

Our study found that there is a positive relationship between levels of online teaching efficacy and years of online teaching experience (Horvitz et al., 2015; Robinia & Anderson, 2010; Tschannen-Moran & Woolfolk Hoy, 2001). Teachers' sense of self-efficacy for teaching online was higher compared to the initial transition to emergency remote online teaching in the spring of 2020 (Dolighan & Owen, 2021). Significant positive correlations were found with having taken an online Additional Qualifications (OCT, n.d.) and/or Professional Development (PD) sessions for online teaching; being placed in or choosing a virtual placement; regularly collaborating with colleagues; a willingness to continue to teach online; and the use of LMS and the subscale *Use of technology and computers.* There were no significant correlations with using a board learning management system or using virtual tech support and overall higher levels of efficacy.

Teachers who taught in primary and junior division had lower self-efficacy for the subscale student engagement than did secondary teachers. Teachers who were placed or chose virtual teaching had higher efficacy than those who taught face-to-face. Teachers who reported experience teaching online, prior online training, taken an online AQ course or regular collaborations with colleagues scored higher on perceived efficacy in terms of student engagement, instructional strategies, and online classroom management (Table 1).

Scale	*Mean*	*SD*	Min	Max
Student Engagement	5.23	1.44	1.25	9
Online Instructional Strategies	5.77	1.51	1.25	9
Online Classroom management	5.95	1.36	1.50	9
Use of computers and technology	6.58	1.35	1.88	9
Overall TSEOT score	23.54	5.16	6.37	36

Table 1: Teachers' Sense of Efficacy for Online Teaching

Our study found a positive relationship between levels of online teaching efficacy and online teaching experience (Table 2). Experience teaching online correlated with higher confidence; however, 88% of respondents reported ≤ 2 of experience online, most would have been teaching online during the pandemic. Teachers who chose virtual school placement had significantly higher levels of online teaching efficacy and those who chose virtual school placement had higher efficacy than those who were placed in the virtual school. Those teachers who indicated they would continue to teach online given the choice have significantly higher levels of online teaching efficacy. Finally, teachers who reported experiences of collaborating with colleagues and accessing technical and pedagogical design support training have significantly higher levels of online teaching efficacy.

	Subscale Student Engagement	Subscale Online Instruction	Subscale Online Classroom Management	Use of Computers and Technology
Teaching Assignment n=265	r=.144, p=.019*			
Placed in or chose virtual n=61	r=-.282, p=.028*	r= -.321, p=.012*	r= -.326, p=.010*	r= -.309, p=.016*
Yrs. teaching online n=244	r= .214, p=.001**	r= .198, p=.002*	r= .148, p=.021*	r=.186, p=.004*
Taken online AQ, PD N=263	r= .208, p=.001**	r= .144, p=.019*		
Had online training N=262	r= .165, p=.008*	r= .145, p=.019*	r= .138, p=.025*	r= .156, p=.011*
Collaborate with colleagues n=263	r= .157, p=.011*	r=.161, p=.009*		r=.186, p=.002*
Would continue to teach online N=264	r= .481, p=.001**	r= .497, p=.001**	r= .386, p=.001**	r= .394, p=.001
Using LMS N=259				r=.183, p=.003*

* Correlation is significant at the .05 level
** Correlation is significant at the .001 level

Table 2: Pearson Correlation

Semi-structured Questionnaire Results

Through the TSEOT, participants described what they felt were the most pressing issues regarding professional learning and support for teachers designing and implementing online learning environments. Responses to the TSEOT survey (n=233) were coded and organized by themes that emerged from the responses. The data were merged and compared with the semi-structured questionnaire.

To gain insight into teachers' experiences teaching online during the second wave of COVID19, participants who identified as continuing to teach online in the 2020-2021 school year were asked to provide details of their experiences of teaching online. Thirty individuals were invited to a semi-structured interview. Nineteen participated. Eight were "secondary in-school", three were "secondary virtual", two were "elementary in-school," and six were "elementary virtual." Like the TSEOT survey respondents, most (17/19) respondents had ≤2 years of online teaching experience. Participants described strategies that promoted student engagement and learning online, identified what they needed to learn, and how they felt the pandemic affected teaching and learning online. Data from the questionnaire were collated, analyzed using grounded theory methodology (Strauss & Corbin, 1998) and compared to determine focus categories. Responses were coded and organized into categories. Nine themes emerged from the data analysis (Table 3). Reponses were assessed as positive or negative sentiment based on how the statement reflected aspects of their experience.

Themes	Frequency	Positive sentiment	Negative Sentiment
Assessment for online learning	22	8	14
Home support for families	9	-	9
Online instruction	12	3	9
Personal growth and learning	3	3	-
Stress, anxiety and exhaustion	26	-	26
Student engagement	71	25	46
Time to learn and prepare for teaching	56	-	56
Training resources and support	96	1	95
Use of technology	49	11	38
Total	344	50	293

Table 3: Qualitative response themes

Analysis

Respondents overwhelmingly reported a need for more time and resources in order to teach online effectively (Table 3). Respondent 13 reflected the toll that a lack of time and resources made on them and their professional practice:

> Some resources were sent out by the board, but you literally had no time to go through everything. It all seemed so overwhelming. I tried to be the best online teacher, burnt myself out at the beginning and then learned that I don't need to recreate everything myself and learned to use resources that were created by others online.

Teachers who reported collaborating with colleagues often-to-regularly had a higher sense of efficacy than those who did not collaborate. Teachers who reported doing online training also had higher self-efficacy measures. The transition to emergency remote online teaching required a different approach to how training and access to resources for online teaching was done.

We found a significant positive relationship between levels of online teaching efficacy and years of online teaching experience. Experience teaching online correlated with higher confidence, even for respondents whose only experience teaching online was during the pandemic. A lack of online teaching experience seemed not to be a barrier and teaching in the virtual setting had positive influences. Positive attitudes and willingness to teach online were associated with increased efficacy and capacity to learn to teach online effectively.

Teachers collaborated to solve problems, learned how to use online technology, and created learning experiences for students. Significant correlations were found with teachers who regularly collaborated with colleagues; teachers who would continue to teach online and the dependent variable measure of the overall TSEOT scores, t=2.092, p=.042 (Table 2). The only subscale that showed a significant relationship with *Collaborating with colleagues* was *Instructional strategies*, t=2.493, p=.016 (Table 2). Teachers felt more efficacious when sharing instructional strategies and solving technology problems associated with instruction for the online setting. Our findings that higher efficacy for online teaching was associated with teachers who collaborated regularly with colleagues aligns with the positive influence of supportive culture on teachers' use of technology (Jung et al., 2019). For example, one teacher described the importance of sharing and planning with grade partners:

> I pushed through to the end of the year with the support of 2 fabulous teaching partners, and there's another key element ... I collaborated with OUTSTANDING grade partners. We split the planning on heavy subjects … so we could share polished lessons and activities. That was … a major support to my teaching. (Respondent 11)

Our study (Table 2) reported that teachers who are willing to continue teaching virtually, if given the choice, have significantly higher levels of online teaching efficacy. Teachers' *willingness to teach online* showed a significant correlation with all subscales and overall TSEOT score. The results of the regression test showed that all but the relationship with *Online classroom management* subscale scores transfer to the larger population.

Teachers who reported experiences of collaborating with colleagues and accessing technical and pedagogical design support contacts had significantly higher levels of online teaching efficacy. Chan et al. (2021) also found a sense of belonging and connectedness and collaboration with colleagues to learn and solve problems were associated with teacher well-being. A major issue that resulted from the challenges and struggles of suddenly transitioning to online teaching due to the pandemic was the reinforcement of the view that online teaching and learning is inherently inferior to face-to-face instruction. Some observers associated the remote instruction offered in spring 2020 as typical of OT&L, validating their perception that online teaching is not as effective as teaching face-to-face (Hodges et al., 2021). However, understanding the difference between ERT and OT&L is an important step toward countering the stigma that online learning is inferior to face-to-face learning (Hodges et al., 2021). Experience teaching online correlates with higher self-efficacy. In the second phase of COVID19, the lack of online teaching experience seemed to be less of a barrier to learning to teach online effectively than expected. One teacher who had 1.5 years teaching online during

the pandemic described learning to use the affordances of Zoom to benefit students, "The use of the Zoom chat [meant] students could [send a] private message to me, alleviating the anxiety of answering questions in front of a class, creating a safe space" (Respondent 3).

Teachers who responded to the semi-structured questionnaire reported positive influences from that teaching in the virtual setting. A positive attitude and willingness to continue teaching online were associated with increased efficacy and capacity to learn to teach online effectively. Yet, while we also identified concerns and troublesome issues (Perkins, 2006) that teachers experienced adapting to ERTL, we identified teachers who overcame barriers and demonstrated that sound pedagogy is part of online learning. Higher efficacy scores of "virtual teachers" (Table 2) suggests that the daily experience of online teaching was closer to actual non-emergency online teaching than the transition to emergency remote that occurred in the second year of the pandemic. Given the higher sense of self-efficacy for online teaching in the teachers who indicated they would continue to teach online and those who chose the virtual school, having a positive attitude and willingness to learn offers a potential for peer leadership for online teaching and learning.

Stress, anxiety, and exhaustion was a dominant theme that emerged from teachers' experience teaching online in the pandemic even though no specific survey question addressed teacher sense of well-being. Pressley and Ha (2022) linked teacher efficacy to stress and anxiety levels. Under normal circumstances, teaching online can be stressful and exhausting (Horvitz et al., 2015: Northcote et al., 2015). Mandated online instruction, pandemic restrictions, and personal and family health concerns compounded the stresses teachers experienced while teaching online in both phases of the pandemic (Pressley & Ha, 2022). One teacher describes the struggle of teaching from home and supporting her own children,

> teaching during the pandemic was extremely difficult on our family unit. We had three boys ages 5, 7 and 9 and … my husband worked full time. We were fortunate to have jobs during the pandemic, but mentally, we struggled to keep our family happy and engaged in school. (Respondent 13)

The most common experience reported by teachers was being unprepared to teach in an online setting due to lack of training, resources and support. Respondent 144 reflects the overwhelming feeling associated with the job demands, "Not enough time to learn the variety of apps, techniques, tools, and skills as well as plan and prepare for content delivery, assessment & evaluation, IEP planning etc. ... OVERWHELMING!" If teachers are unaware of resources that were in place or felt there was not enough time to prep and learn online teaching, their experience of stress, anxiety and exhaustion increased. These factors negatively affected teachers' sense of efficacy.

Our findings highlighted areas of teacher concern with online teaching and demonstrated aspects in which training, support and personal experience can improve the capacity and confidence of teachers teaching online and particularly engaging in emergency remote online teaching (Hodges et al., 2020).

Discussion

We show the need to develop evidence based, collaborative PL strategies for building capacity for online teaching and ERT&L. What took place during the pandemic was an

emergency measure that was different from non-emergency online learning and hindered teachers and students from transitioning to effective online learning (Marshall et al., 2021). Attitudes that viewed online learning as inferior to f2f were reinforced by restrictive academic measures hindered teachers' perceived self-efficacy for online teaching (Dolighan & Owen, 2021; Marshall et al., 2021). Teachers who were willing to teach online had higher self-efficacy scores (Table 2). Those who identified connections between professional growth and their experience teaching online during the pandemic revealed positive attitudes associated with overcoming challenges of learning to teach online. Respondent 15 noted "the pandemic caused many teachers … to 'dive in' and learn to use technologies and platforms…" Developing positive attitudes toward online learning happens when teachers see students learning and being successful in online learning environments (Horvitz et al., 2015).

Job related stress expressed by teachers is evident from the qualitative data. Frustration, stress and exhaustion were created by living with the pandemic outside of teaching (Merrill, 2020). The need to train staff for transitions to ERT&L is evident from the experience of teachers' frustration trying to adapt to teaching online. Building capacity for using technology as a regular part of teaching in f2f classrooms could make the transition to online in an emergency smoother and build resiliency in the education system.

Participants described successes teaching online when they integrated effective pedagogy with technology. Those who identified concerns and frustrations with the use of technology focused on not being able to engage students. This study supports the need to provide teachers with technology training that meets their immediate needs in the transition to ERT&L. The successes described by teachers reveal learning how to use new technology and build online teaching skills was most effective when integrated with effective pedagogy that makes use of the multitude of technology tools. Teachers who described success engaging students and fostering learning described using technology as a tool for students to work in groups, collaborate, and develop self-regulatory learning skills (Lock et al., 2017). The tools that enabled pedagogically sound online learning can be learned in the context of sound pedagogy and interaction through ongoing teacher PL.

Our study revealed concerns with instructional strategy and online assessments. Marshall et al. (2021) recommended that digital learning days be incorporated into the school year. Future transitions to emergency remote learning would not be as drastic if teachers experienced how integrating technology can enhance learning face-to-face. Thus, teachers' familiarity with digital learning would support emergency remote transition preparedness (Marshall et al., 2021). We found that using existing technology as platforms for digital learning experiences can be effective in ERT&L situations (Dolighan & Owen, 2021). Using LMS platforms offer ways to organize daily learning goals, tasks and assignments that students can access anywhere, anytime and should be the same f2f or remote. Other researchers show that incorporating aspects of blended learning develop self-regulatory learning skills for students and help teachers be more familiar with how technology can assist student development of these skills (Barbour et al., 2013; Lock et al. 2017; Stevens, 2020).

Training, resources, and support was the most frequently referenced theme among participants in this study. Yet, there is a lacuna in the research on how administration can provide effective training and teacher PL opportunities to integrate current learning management systems for face-to-face and online learning (Dolighan & Owen, 2021). Our study revealed the lack of time to learn and prepare to teach online as a significant challenge, while Hughes et al. (2021) argue that online teacher PL provides a flexible way to meet and

use valuable time for learning new technologies. School administrators can support ERT&L training and capacity building by supporting collaborative teams learning online. While more research needs to be done regarding the perspective and experience of administrators during the pandemic, fostering positive attitudes towards online learning can be a good start for support that builds capacity and recognizes the need to be prepared. Online teaching requires a commitment to ongoing professional learning (Darling-Hammond et al., 2017).

We learned that teachers were collaborating with colleagues and directing their own learning for online teaching. Creating a collaborative learning environment and supporting ongoing PL are important as educators engage with online teaching and learning. Online learning platforms for PL provide frameworks on which teachers could scaffold online learning and create flexibility to learn and manage their time (Garrison, 2017). When learning is collaborative and shared collective efficacy increases (Donohoo & Katz, 2017). We found that teachers who collaborated with colleagues had higher personal efficacy, which helped build collective efficacy and confidence teaching in a digital space (Donohoo & Katz, 2017).

Our findings demonstrated the impact of stress, anxiety and exhaustion in the emotional responses of teaching staff to the lack of time to learn and prepare to teach online. The emotional element evident in teachers' description of their experience revealed a sense of being overwhelmed and overworked due to restrictions and changing teaching environment arising from the pandemic. Descriptions of exhaustion and stress affecting teachers' ability to work echo Pressley and Ha (2022), who found teacher exhaustion and stress levels directly impact teachers' sense of efficacy. Related themes of *time to learn and prep* and *training, resources and support* identified mental health and well-being as an area for further research.

Conclusion

Our recommendations are based on teachers' experience and can help build capacity for effectively transitioning to ERT&L. Future research needs to include the experiences and perspectives of administrators and support staff in determining effective strategies for ERT&L preparedness. While we focused on teachers' experience of reaching and learning, effective ERT&L strategies should include student perspectives. Finally, future research should consider how to build collective capacity to transition to remote teaching and learning that involves the entire school community.

References

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological review, 84(2), 191.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1989). Regulation of cognitive processes through perceived self-efficacy. Developmental psychology, 25(5), 729.

Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning.Educational psychologist, 28(2), 117-148.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Bandura, A., Freeman, W. H., & Lightsey, R. (1999). Self-efficacy: The exercise of control.

Barbour, M. K., & LaBonte, R. (2015). State of the nation: K-12 e-learning in Canada.

Barbour, M., Archambault, L., & DiPietro, M. (2013). K–12 online distance education: Issues and frameworks. American Journal of Distance Education, 27(1), 1–3.

Barbour, M. K. (2022). Introducing a Special Collection of Papers on k-12 online learning and Continuity of Instruction after Emergency Remote Teaching. *TechTrends*, 1-3.

Barbour, M. K., LaBonte, R., Hodges, C. B., Moore, S., Lockee, B. B., Trust, T., ... & Kelly, K. (2020). Understanding pandemic pedagogy: Differences between emergency remote, remote, and online teaching. State of the Nation: K-12 e-Learning in Canada.

Branch, R. M., & Dousay, T. A. (2015). Survey of instructional design models. Association for Educational Communications and Technology. https://aect.org/survey_of_instructional_design.php

Bozkurt, A., and R. C. Sharma. (2020). "Emergency Remote Teaching in a Time of Global Crisis Due to CoronaVirus Pandemic." Asian Journal of Distance Education 15 (1): i–vi. Accessed 24 March 2022. http://asianjde.org/ojs/index.php/AsianJDE/article/view/447

Corry, M., & Stella, J. (2018). Teacher self-efficacy in online education: a review of the literature.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. Theory into practice, 39(3), 124-130.

Darling-Hammond, L., Hyler, M. E., & Gardner, M. (2017). Effective teacher professional development. Learning Policy Institute. https://files.eric.ed.gov/fulltext/ED606743.pdf

Dolighan, T., & Owen, M. (2021). Teacher efficacy for online teaching during the COVID-19 pandemic. Brock Education Journal, 30(1), 95-95.

Donohoo, J., & Katz, S. (2017). When teachers believe, students achieve. The Learning Professional, 38(6), 20-27.

Garrison, D. R. (2016). E-learning in the 21st century: A community of inquiry framework for research and practice. Routledge.

Glasser, B. (1992). Basics of grounded theory analysis: Emergence vs forcing. Mill Valley, CA.

Gosselin, K. P., Northcote, M., Reynaud, D., Kilgour, P., Anderson, M., & Boddey, C. (2016). Development of an evidence-based professional learning program informed by online teachers' self-efficacy and threshold concepts. Online Learning Journal, 20(3), 178-194. doi:10.24059/olj.v20i3.648

Hodges, Charles, Moore, S., Lockee, B. Trust, T., and Bond. A. (2020). The Difference Between Emergency Remote Teaching and Online Learning. Educause Review. Friday, March 27, 2020.

Hodges, C. B., Moore, S. L., Lockee, B. B., Aaron Bond, M., & Jewett, A. (2021). An instructional design process for emergency remote teaching. In Radical Solutions for Education in a Crisis Context (pp. 37-51). Springer, Singapore.

Horvitz, B. S., Beach, A. L., Anderson, M. L., & Xia, J. (2015). Examination of faculty self-efficacy related to online teaching. Innovative Higher Education, 40(4), 305-316.

Lock, J., Eaton, S. E., & Kessy, E. (2017). Fostering self-regulation in online learning in K-12 education. Northwest Journal of Teacher Education, 12(2), 2.

Marshall, D.T., Shannon, D. M., & Love, S. (November 2020). How teachers experienced the COVID-19 transition to remote instruction. Phi Delta Kappan 102(3):46-50 DOI:10.1177/0031721720970702

Martin, N. K., Sass, D. A., & Schmitt, T. A. (2012). Teacher efficacy in student engagement, instructional management, student stressors, and burnout: A theoretical model using in-class variables to predict teachers' intent-to-leave. Teaching and Teacher Education, 28(4), 546-559.

Mason, J. (2020, September 24). This isn't what we meant by hybrid learning: Let's get real. This is two jobs. We Are Teachers.https://www.weareteachers.com/this-isnt-hybrid-learning/

Means, B., Bakia, M., & Murphy, R. (2014). Learning online: What research tells us about whether, when and how. Routledge.

Merrill, S. (2020, March 19). Teaching through a pandemic: A mindset for this moment. Edutopia.

Moorhouse, B. L., & Kohnke, L. (2021). Thriving or surviving emergency remote teaching necessitated by COVID-19: University teachers' perspectives. The Asia-Pacific Education Researcher, 30(3), 279-287.

Nelson, T., & Slavit, D. (2008). Supported teacher collaborative inquiry. Teacher education quarterly, 35(1), 99-116.

Northcote, M. T., Reynaud, D., Beamish, P., Martin, T., & Gosselin, K. P. (2011). Bumpy moments and joyful breakthroughs: The place of threshold concepts in academic staff development programs about online learning and teaching. ACCESS: Critical Perspectives on Communication, Cultural & Policy Studies, 30(2), 75-89.

Northcote, M., Gosselin, K. P., Reynaud, D., Kilgour, P. & Anderson, M. (2015). Navigating the learning journeys of online teachers: Threshold concepts and self-efficacy. Issues in Educational Research, 25(3), 319-344. http://www.iier.org.au/iier25/northcote.pdf

Ontario College of Teachers (OCT) (nd). What is an Additional Qualification? . \https://help.oct.ca/hc/en-us/articles/360024794314-What-is-an-Additional-Qualification-AQ

Ontario Ministry of Education (August 13, 2020). Policy/Program Memorandum 164 https://www.ontario.ca/document/education-ontario-policy-and-program-direction/policyprogram-memorandum-164

Ozamiz-Etxebarria N, Legorburu Fernnadez I, Lipnicki DM, Idoiaga Mondragon N, Santabárbara J. (2023). Prevalence of Burnout among Teachers during the COVID-19 Pandemic: A Meta-Analysis. Int J Environ Res Public Health. 2023 Mar 10;20(6):4866. doi:10.3390/ijerph20064866. PMID:36981775; PMCID:PMC10049404.

Perkins, D. (2006). Constructivism and troublesome knowledge. Overcoming barriers to student understanding: Threshold concepts and troublesome knowledge, 1, 33-47.

Pressley, T. (2021). Returning to teaching during COVID-19: An empirical study on elementary teachers' self-efficacy. Psychology in the Schools, 58(8), 1611-1623.

Pressley, T., & Ha, C. (2022). Teacher Exhaustion during COVID-19: Exploring the Role of Administrators, Self-Efficacy, and Anxiety, The Teacher Educator, 57:1, 61-78, DOI:10.1080/08878730.2021.1995094

Robinia, K. A., & Anderson, M. L. (2010). Online teaching efficacy of nurse faculty. Journal of Professional Nursing, 26, 168–175.

Stevens, M. (2020). Expertise, complexity, and self-regulated engagement: Lessons from teacher reflection in a blended learning environment. Journal of Online Learning Research, 6(3), 177-200.

Sokal, L., Trudel, L. E., & Babb, J. (2020). Canadian teachers' attitudes toward change, efficacy, and burnout during the COVID-19 pandemic. International Journal of Educational Research Open, 1, 100016.

Taimur, S., Sattar, H., & Dowd, E. (2021). Exploring Teachers' Perception on Successes and Challenges Associated with Digital Teaching Practice During COVID-19 Pandemic School Closures. Pedagogical Research, 6(4), em0105. https://doi.org/10.29333/pr/11253

Tondeur, J., Van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: a systematic review of qualitative evidence. Educational technology research and development, 65(3), 555-575.

Tschannen-Moran, M., & Hoy, A. W. (2001). Teacher efficacy: Capturing an elusive construct. Teaching and teacher education, 17(7), 783-805.

Westphal A, Kalinowski E, Hoferichter CJ, Vock M. (2022). K-12 teachers' stress and burnout during the COVID-19 pandemic: A systematic review. Front Psychol. 2022 Sep 2;13:920326. doi:10.3389/fpsyg.2022.920326. PMID:36118449; PMCID:PMC9479001.

Navigating STEM: Challenges Faced by Nigerian Female Secondary School Students

Chika Judith Abolle-Okoyeagu, Robert Gordon University, United Kingdom
Ojotule Onoja, Robert Gordon University, United Kingdom
Chioma Onoshakpor, Robert Gordon University, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The persistent gender disparities in Science, Technology, Engineering, and Mathematics (STEM) fields stand as a significant barrier to realizing the United Nations' Sustainable Development Goals (SDGs), particularly those related to gender equality (SDG5), quality education (SDG4), and decent work in Nigeria. This paper examines the depth and implications of gender imbalances within STEM and underscores the multifaceted benefits of addressing this issue for broader societal progress. Leveraging a qualitative approach through content analysis of 139 secondary school students in Nigeria, we uncover the root causes behind the underrepresentation of women in STEM, using a theoretical framework of social context and social environment to form the basis of our analysis. Our sample was gotten from female secondary school students in both public and private schools in Nigeria. Our findings reveal that family influence play a significant role in the choice of STEM education for the girl child. Therefore, we recommend that encouraging girls' involvement in STEM subjects from the home front, as this is crucial, in dismantling cultural barriers and stereotypes for the girl child. This could be done through intentional role modelling and signposting to careers in STEM. We argue that by eliminating gender disparities in STEM, not only can women be propelled to the forefront of innovation, but can accelerate global efforts to meet the SDGs, fostering a more equitable and prosperous world.

Keywords: Gender, Stem Education, Sustainable Development Goals, Girls in Stem, Nigeria

iafor
The International Academic Forum
www.iafor.org

1. Introduction

The field of STEM which have long been vital to technological advancement and economic growth have historically been dominated by men, leading to significant gender disparities that have been a point of discussion and concern for decades [1]. STEM fields which play an important role in the progression and realisation of the UN SDGs also hold answers to most global challenges, and as the world traverses towards a more sustainable future, its knowledge and associated innovative solutions would be beneficial. Thus, promoting and advocating a global all-inclusive gender participation in STEM fields is imperative for the realisation of the SDGs.

Equal access to STEM is not just a societal essential for development but also the fifth target of UN SDGs with its mission statement, ‘‘Achieve gender equality and empower all women and girls’’ (United Nations, 2015). However, global statistics reveal that women are still underrepresented in STEM fields [2], which interestingly is much worse for third world countries, particularly Nigeria that ranks a lowly Index [3].

Traditionally, societal norms and cultural biases have played a significant role in influencing gender disparities in STEM as a good portion of the society still associate STEM disciplines with men, and this misconception invariably discourages girls from pursuing these careers [4]. In Nigeria, STEM fields are perceived as masculine professions which dates back to historical biases and community customs that discouraged or excluded women from pursuing education and careers in these areas [5]. Degradingly, these societal expectations regularly direct women towards disciplines considered more 'appropriate' for their gender, such as nursing or teaching. This historical challenge set the stage for long-standing gender imbalances in STEM.

A key factor that contributes to gender disparities in STEM is the educational environment in Nigeria [6]. From school age, girls often receive subliminal messages that STEM subjects are for boys, and this prejudice can be observed in various forms, ranging from gendered toys and activities to the representation of scientists and engineers predominantly as males in the media. Studies have shown that these stereotypes play a big role in adversely influencing the interest and curiosity of young girls from pursuing STEM subjects from an early age, a phenomenon known as the ‘‘pipeline problem’’ [7].

In Nigeria, another reason for the poor gender disparity in STEM is religion. Religion plays a significant role in Nigerian society and can influence various dimensions of life, including education [8]. This can be particularly notable in regions with strong religious identities, e.g., northern parts of Nigeria with numerous religious schools which prioritize religious teachings and do not place a strong emphasis on STEM subjects.

Another issue that has aggravated this gender disparity in Nigeria, is the lack of female representation. Due to the low number of women in these fields, young girls have very few models to inspire them to pursue careers in STEM. This lack of visibility inadvertently reinforces the stereotype that STEM is not a field for women and with fewer women in these fields, young girls have fewer role models to inspire them to pursue STEM careers. [9] also argues that this issue is directly worsened by the gender pay gap. Regardless of the comparable requisite educational qualifications, trainings and relevant experiences possessed by women in STEM, their male counterparts earn far more. This situation isn’t only

demoralising but ultimately makes it tough for women to attain financial independence and feel motivated in their professions.

Tackling gender disparities in STEM in Nigeria is a complicated challenge that would require a versatile approach in changing societal perceptions, providing support and opportunities for women in STEM fields, and creating an enabling environment enshrined in equality diversity and inclusion. While progress has undoubtedly been achieved thus far, there is still a lot to be done to achieve gender equality in STEM. An in-depth understanding of the effect of gender disparities in STEM is fundamental to fostering inclusivity and leveraging diverse perspectives essential for meeting the SDGs. Understanding the roots and implications of these disparities is crucial for fostering an inclusive and equitable environment in STEM disciplines. Therefore, this study critically analyses and presents the outcomes of a research study carried out to understand the reasons for these gender disparities in Nigeria.

2. Literature Review

The literature review is in two parts. Firstly, we discuss gender stereotypes and Nigerian Education and then we adopt a theoretical framework to help better understand the implications this has on the advancement of STEM education in Nigeria.

2.1 Gender Stereotypes and Nigerian Education

The discourse on students' participation in STEM-related education and how this influences their choice of career is well documented in the literature, and the call to achieving Sustainable Development Goals 4 – which is Quality Education can be useful in addressing this perceived gap [10]. In Nigeria, the girl-child has an already low educational entry and attainment level as fewer girls are seen enrolling in schools than boys [11]. In fact, according to [12], the gender gap widens as girls move up into tertiary education. Interestingly, there are regulations in Nigeria to support equal and free education for males and females, such as Section 18 of the Nigerian Constitution, the Child Rights Act 2003, the Universal Basic Education (UBE) Act 2004, and Article 17 of the African Charter. Despite these great policy initiatives, the level of attainment of girl-child education remains low as majority of the girls drop out before finishing their junior secondary school education.

The literature has tried to explain some of the reasons behind these anomalies and how the policy initiatives have not helped Nigeria achieve SDG4 which can be connected to the achievement of SDG5 which is gender equality. According to [13], "*gender stereotypes are roles or a pattern of behaviour placed on a particular sex by the society, mostly beliefs, illogical ideas and false phrases"*. As a result of patriarchy, girls are exposed to more traditional caring roles and kitchen roles, while boys are exposed to more roles that give them the power to dominate [14] . To differentiate between sex and gender, sex is more biological, while gender reflects more of the socially constructed realities of individuals [14] (under review). These constructed realities have implications for the kinds of subjects enrolled in by males and females, educational opportunities, literacy rates, STEM careers, etc. A person groomed as a domesticated career is most likely to choose school subjects that can highlight these attributes, while a person groomed as a provider is more likely to choose subjects that are more analytical in nature [15].

From a theoretical perspective, the Eccles's Expectancy-Value Theory (EVT) (Eccles, 1983, 2009; 2020) [16], can be used for studying the intricate gendered factors contributing to these

perceived disparities as evidenced in the number of enrolled pupils in STEM education which ultimately affects their career choice. This theory suggests that achievement-related choices consist of two categories: expectancy for success and subjective task value. Expectancy of Success refers to expectations by the students and how this can be influenced through childhood and adolescence experiences such as gender stereotypes and socio-cultural factors. Second are the subjective task values, which suggest that due to the different perceived values of enrolling in school and into STEM subjects, the choice for schooling and the choice of subjects will remain subjective. The next section uses a framework to help better understand the factors affecting STEM persistence in Nigeria.

2.2 Theoretical Framework

The theoretical model of factors affecting STEM persistence by [17] see Figure 1 below, is used to demonstrate the interplay between several factors to achieve the desired educational outcomes within a particular country or context. This framework has been used in various contexts such as in the Gulf Cooperation Council (GCC) states [18] to discuss the factors influencing STEM student participation in the region. This study will pay attention to the social context and social environment in Nigeria and how this influences STEM education.

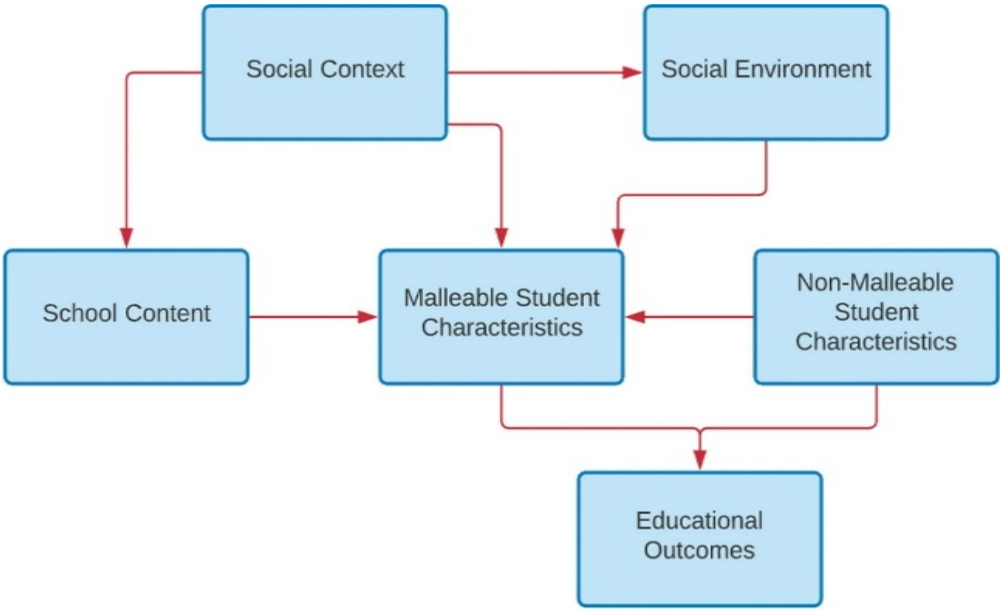


Figure 1. Theoretical model of factors affecting STEM persistence. Source: [17]

2.2.1 Social Context: include the socio-cultural factors that builds up the constructed realities of males and females in Nigeria. In a patriarchal society such as Nigeria, it is expected that a girl should be seen, not heard and therefore positioned to be inferior to boys [19]. These social norms and believes have been culturally transmitted through generations during the process of socialization. Socialization simply means the process by which children and young adults learn from others around them [20], and according to [21], the pattern of socialization available in Africa seems to allow boys more privileges than the girls.

Cultural Stereotypes also shape how STEM subjects and career are perceived. For example, [13] identified occupations such as; Engineering, Medicine, Law, Computer Science, and Skilled trades, as being more befitting for boys in Nigeria while for girls, Nursing, Secretarial

work, and Catering services are more suitable. This invariably means that this stereotypical career choice of girls means an avoidance of science-based courses, particularly mathematics.

2.2.2 Social Environment according to the framework includes role models, mentors, and an influence from family members that could possibly influence the choices of choosing STEM subjects in schools. The mother who is most likely not in a STEM career due to passed on generational stereotypes, is responsible in providing role models for their daughters, while the father's responsibility is demonstrating to their sons what it means to 'be a man' (World Bank Report, 2005). The cultural stereotypes prevalent in Nigeria create an image of 'science is for males' picture in the minds of young people reducing any form of interest from females [13]. As suggested by [10], there is a correlation between interest in a subject choice and what the stereotype is, impacting over what the young child believes to be true or normal. Another area where role modelling influences subject choice is in the visual images used as instructional materials [22]. It is argued [23] that these instructional materials and textbooks plays a key role in forming the motivation for young peoples' career. These factors continue to present a shortage of role models in STEM careers ultimately influences the choice of females choosing STEM subjects and careers.

3. Methodology

The study is aimed at identifying the most important factors hindering girls' participation in STEM education in Nigeria. The study will employ a qualitative method in investigating the perceived barriers hindering the participation of girls in STEM education in Nigeria to identify the most significant barriers. This approach will provide a holistic understanding of the social and environmental factors influencing female engagement in STEM education.

To understand the barrier to STEM education from the viewpoint of students, the simple random probability sampling technique was used to select the research participants from different secondary school in Nigeria. Using this method minimises sampling bias as the viewpoint of both male and female students were collected from different schools across the southern and northern part of Nigeria. The selection criteria were based on the class of students (Junior Secondary School one to Senior Secondary School three) and age range 13-20 years.

A structured questionnaire was administered to collect quantitative data from 130 students on their perception of STEM education barriers. The questionnaire analyses 5 dimensions (interest, parent influence, exposure to STEM, mentorship, role of teachers) consisting of 10 questions. The survey included Likert-scale, multiple choice, and open-ended questions to capture wide perspectives.

Having a spread of sample across the different region in Nigeria was a challenge as this stage of the research, but considering this will be an on-going process, that limitation would be covered in the future. The responses from the questionnaire were first analysed using descriptive statistics such as the frequencies, percentages, means values to summarise the students' perceptions of the barriers to girls' engagement in STEM education. Narrative content analysis was adopted in identifying the predictors of perceived barriers.

A key ethical consideration in data collection was to get informed consent of participants by making clear the study objectives, procedures, risks, and benefits. Measures were

implemented to ensure the confidentiality and anonymity of participants identities and responses.

4. Results and Findings

Demographic Data

Out of the 139 responses received, 89 (64%) were from the female student and 50 (36 %) came from the male students. Student within the age range 10-13 gave the highest response of 47.5 %, while the 41.7% responses came from students with the age range 14-16 and only 10.8% were from students between 17-19 years. We gather insights from students attending both private and public secondary schools to have a broad view of the challenges of STEM students in Nigeria. The response from private secondary school is 75.5 %, which is three times the responses from students in public schools. There was also a geographical spread of the students across five geopolitical zones in Nigeria that completed the survey. The southeast had the highest share of 49.6 %, southern region 27.3 %, western region 18.7 % and Northern Nigeria 4.3 %.

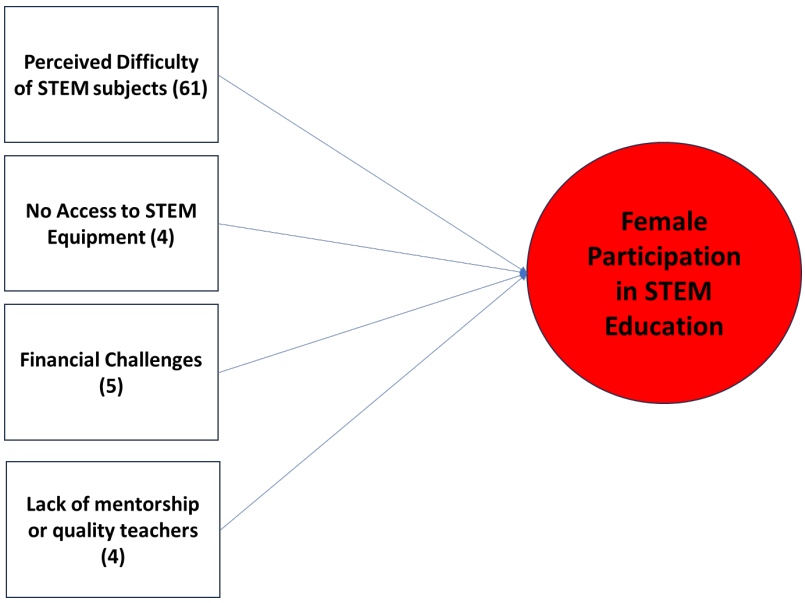


Figure 2. Threat to Female Students' Participation in STEM Education.

The responses of 74 female students to the open question "What would you say is the biggest challenge you face or have faced in pursuing a STEM subject?", suggests the 'perceived difficulty in STEM subjects' with 61 respondents is the most significant threat to their participation in STEM. Other identified themes such as, "No Access to STEM Education", "Financial Challenges", and "Lack of mentorship or quality teachers", were at the average of four responses.

The "perceived difficult" in STEM also emerged as the most significant barrier when the students were asked, "If you had/have any hesitations in choosing a STEM subject, what are they?". It is unclear at this stage of the research, whether the "perceived difficulty" is intrinsically motivated or is something the students' have been made to belief.

Considering that these findings are based on self-reporting by students already in secondary school, these "perceived difficulty" could be connecting to the way STEM subjects are

taught. Despite only four respondents mentioned the lack of teachers and mentors as their challenge, this could be the experiences of other students across the country.

While most of the challenges mentioned by the students appear to be extrinsically motivated, the inherent causes of these challenges are still under investigation. The influence of parent was mentioned by one student who said, “I love science because my parents are engineers”. Another student said, “my father won’t approve of me going to arts”. These two responses show the parent has a strong influence in the career path their children follow. This aligns with the social environmental factors as suggested by the theoretical framework, see section 2.2.2.

The reason the ‘perceived difficulty in STEM subjects” appear to be very significant is unclear at this stage of the study but the responses suggest there are underlying factors that may have created such perceptions in the minds of the students.

To understand these “perceived difficulty” we got the viewpoints of the students on, “How do you think STEM education could be improved to attract more students?” Interestingly, “investment in STEM equipment”, “STEM campaigns”, “Teaching and mentorship” and “funding and accessibility” emerged as the most important themes. These solutions all appear to be external. It appears only external factors can be identified from the viewpoints of the students. The students may not even be aware of any intrinsic bias they may have or have learned from the environment about STEM subject.

The idea that “it is difficult”, suggest they may have experience something easy or have been made to believe STEM subjects are difficult.

Table 1. Which STEM field are you currently involved in or interested in?

Gender	Arts	Engineering	Mathematics	Science	Technology
Female	9.0%	4.5%	10.1%	70.8%	5.6%
Male	10.0%	26.0%	20.0%	38.0%	6.0%
Total	9.4%	12.2%	13.7%	59.0%	5.8%

The current engagement of the students in STEM shows the female student are mostly participating in sciences (70.8%), while the percentage share of other STEM areas is relatively low. For the male, their current participation in STEM tend to spread across all areas, even though science with 38.0% is the highest, there was significant participation in engineering and mathematics, at 26.0% and 20.0 % respectively. This result suggests although the female participation in STEM tend to be within certain area while males are exploring and engaging widely in different aspects.

Table 2. Encouragement from teachers or educational institutions

Gender	Not at all Influential	Slightly Influential	Moderately Influential	Highly Influential	Extremely Influential
Female	5.6%	2.2%	10.1%	19.1%	62.9%
Male	8.0%	4.0%	40.0%	24.0%	24.0%
Total	6.5%	2.9%	20.9%	20.9%	48.9%

In Table 2, in comparison with the males, the female participation in STEM extremely depends on the encouragement they get from their teachers and schools. This strongly aligns with the findings of [19] and how the educational system uses instructional materials to re-enforce the STEM is meant for boy's narrative unknowingly.

Table 3. Access to resources (e.g., laboratories, technology, etc.)

Gender	Not at all Influential	Slightly Influential	Moderately Influential	Highly Influential	Extremely Influential
Female	20.2%	11.2%	14.6%	20.2%	33.7%
Male	20.0%	10.0%	34.0%	24.0%	12.0%
Total	20.1%	10.8%	21.6%	21.6%	25.9%

From Table 3, access to STEM resources like laboratories and technology are important in influencing the choice of STEM for both male and female students.

Table 4. Perceived difficulty of the subject

Gender	Not at all Influential	Slightly Influential	Moderately Influential	Highly Influential	Extremely Influential
Female	18.0%	11.2%	22.5%	22.5%	25.8%
Male	18.0%	14.0%	20.0%	22.0%	26.0%
Total	18.0%	12.2%	21.6%	22.3%	25.9%

'Perceived difficult" in STEM appears to be a problem for both genders with about 48% indicating it is highly to extremely influential to their currently STEM studies.

Table 5. Influence from family

Gender	Not at all Influential	Slightly Influential	Moderately Influential	Highly Influential	Extremely Influential
Female	20.2%	6.7%	13.5%	18.0%	41.6%
Male	14.0%	10.0%	22.0%	22.0%	32.0%
Total	18.0%	7.9%	16.5%	19.4%	38.1%

Family influence play a significant role in the choice of STEM education as 41.6% of the female students reported to be extremely influenced by their family. This value was only 32.0 % for the male students. This finding aligns with the influence of cultural stereotypes as enforced from the family unit as indicated in the theoretical framework [19] and how STEM subjects and careers are shaped from the family. The literature suggests that occupations such as; Engineering, Medicine, Law, Computer Science, and Skilled trades, are being shaped as being more befitting for boys than for girls in Nigeria [15] while for girls, Nursing, Secretarial work, and Catering services are more suitable. This invariably means that this stereotypical career choice of girls might mean an avoidance of science-based courses, particularly mathematics.

5. Conclusion and Recommendations for Policy and Practice

As mentioned earlier, the STEM gender disparities in Nigeria are multifaceted and would require a collective effort to address. The future of STEM in Nigeria depends on harnessing the full potential of all genders, which necessitates continued efforts in education, policymaking, religious and cultural change.

Encouraging girls' involvement in STEM subjects is crucial, necessitating prioritized programs to dismantle cultural barriers and stereotypes at all levels of government. Moreso the complex relationship between religion and STEM education in Nigeria requires careful navigation to balance respect for religious beliefs with the promotion of scientific literacy, vital for advancing STEM education in Nigeria especially in the northern regions. Policy changes should encourage organizations to increase women's representation in STEM through measures like gender quotas. Professional networks like the Association of Professional Women Engineers of Nigeria and Nigeria Women in STEM can provide essential support, mentorship, and advocacy for gender equality in STEM. Increased research into gender disparities informs policies, while government initiatives, such as scholarships and mentorship programs, demonstrate commitment to gender equality. However, there is a need for more research and data collection focused on girls in STEM fields in Nigeria, covering enrolment rates, graduation rates, employment statistics, career trajectories, and other factors influencing participation. This study is also limited in uncovering institutional biases that could influence women’s enrolment in STEM subjects, this could serve as an area for future research.

References

[1] Adejumo, O. O., Adejumo, A. V., & Aladesami, T. A. (2020). Technology-driven growth and inclusive growth- implications for sustainable development in Africa. *Technology in Society*, *63*, 101373. https://doi.org/10.1016/j.techsoc.2020.101373

[2] Cimpian, A., & Markman, E. M. (2009). Information learned from generic language becomes central to children's biological concepts: Evidence from their open-ended explanations. Cognition, 113(1), 14–25. https://doi.org/10.1016/j.cognition.2009.07.004

[3] Aderemi, H. O., Hassan, O. M., Siyanbola, W. O., & Taiwo, K. (2013). Trends in enrolment, graduation and staffing of science and technology education in Nigeria tertiary institutions: A gender participation perspective. *Educational Research and Reviews*, *8*(21), 2011-2020.

[4] Liani, M. L., Nyamongo, I. K., Pulford, J., & Tolhurst, R. (2021). An intersectional gender analysis of familial and socio-cultural drivers of inequitable scientific career progression of researchers in Sub-Saharan Africa. *Global health research and policy*, *6*, 1-16.

[5] Psaki, S., Haberland, N., Mensch, B., Woyczynski, L., & Chuang, E. (2022). Policies and interventions to remove gender-related barriers to girls' school participation and learning in low-and middle-income countries: A systematic review of the evidence. *Campbell Systematic Reviews*, *18*(1), e1207.

[6] Yusef, N. (2008). Education and development in a globalized environment: The case of Northern Nigeria. *African research review*, *2*(3), 130-145.

[7] Olutayo, M. O., & Adebayo, A. V. (2021). Navigating the Gendered STEM Path: Understanding Women's Experiences in Higher Education Institutions. *Journal of Management & Social Sciences*, *10*(1).

[8] Sumarni, W., Faizah, Z., Subali, B., & Wiyanto, W. (2020). The Urgency of Religious and Cultural Science in STEM Education: A Meta Data Analysis. *International Journal of Evaluation and Research in Education*, *9*(4), 1045-1054.

[9] Adeosun, O. T., & Owolabi, K. E. (2021). Gender inequality: determinants and outcomes in Nigeria. *Journal of Business and Socio-economic Development*, *1*(2), 165-181.

[10] Dele-Ajayi, O., Bradnum, J., Prickett, T., Strachan, R., Alufa, F., & Ayodele, V. (2020, October). Tackling gender stereotypes in STEM educational resources. In *2020 IEEE Frontiers in Education Conference (FIE)* (pp. 1-7). IEEE.

[11] Ifegbesan, A. (2010). Gender-stereotypes belief and practices in the classroom: The Nigerian post-primary school teachers. *Global Journal of Human Social Science*, *10*(4), 29-38.

[12] Kayan-Fadlelmula, F., Sellami, A., Abdelkader, N., & Umer, S. (2022). A systematic review of STEM education research in the GCC countries: Trends, gaps and barriers. *International Journal of STEM Education*, *9*, 1-24.

[13] Ogwuche, O. C., Adikwu, V. O., & Ossai, O. V. (2020). Gender stereotype and women empowerment in nigeria: he need for a paradigm shift in role of counsellors and school psychologists. *Journal of the Nigerian Council of Educational Psychologists*, *11*(1).

[14] Onoshakpor, C., James, I., Ibukun, T., & Irene, B. (2023). Gender Marginalization and Entrepreneurial Motivation in the Global South.

[15] Obioma, I. F., Hentschel, T., & Hernandez Bark, A. S. (2022). Gender stereotypes and self-characterizations in Germany and Nigeria: A cross-cultural comparison. Journal of Applied Social Psychology, 52(8), 764-780.

[16] Wigfield, A., Tonks, S., & Klauda, S. L. (2009). Expectancy-Value Th eory. In *Handbook of motivation at school* (pp. 69-90). Routledge.

[17] van den Hurk, A., Meelissen, M., & van Langen, A. (2019). Interventions in education to prevent STEM pipeline leakage. *International Journal of Science Education*, *41*(2), 150-164.

[18] Kayan-Fadlelmula, F., Sellami, A., Abdelkader, N., & Umer, S. (2022). A systematic review of STEM education research in the GCC countries: Trends, gaps and barriers. International Journal of STEM Education, 9, 1-24.

[19] Ofoha, D. (2013). Gender stereotypes and girl-child education in Nigeria.

[20] Okoroafor, E. C., & Njoku, J. C. (2012). Effective parenting and socialization for value re-orientation in contemporary Nigeria. *International Journal of Development and Management Review*, *7*(1).

[21] Akaneme, I. N., & Ngwoke, D. U. (2010). Effect of cognitive restructuring intervention program on achievement orientation of schooling adolescents. *Journal of the Nigerian Academy of Education*, *6*(11), 1-11.

[22] Salman, M. F., Yahaya, L. A., & Adewara, A. A. (2011). Mathematics education in Nigeria: Gender and spatial dimensions of enrolment. International Journal of Educational Sciences, 3(1), 15-20.

[23] Famolari, D. (2014). With a clear gender gap in the science, technology, Engineering and math (STEM). *Retrieve on*, *3*(03), 2015.

Contact emails: j.abolle-okoyeagu@rgu.ac.uk
t.onoja@rgu.ac.uk
c.onoshakpor1@rgu.ac.uk

Personality and Level of Mental Health on Career Adaptability Among University Students

Mariani Omar, Sultan Azlan Shah University, Malaysia
Nurul Nadirah Shaharuddin, Sultan Azlan Shah University, Malaysia
Masitah Ab Jalil, Sultan Azlan Shah University, Malaysia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The socialization that occurs during undergraduate education contributes to how faculty members understand their work as students. Thus, the nature of undergraduate student socialization deserves attention, has highlighted a wide range of important concerns and issues such as the changing academic achievements, career adaptability, and the experience of demographic groups in the academy. The research objective was to examine the relationship between personality, mental health, and career adaptability among university students. The quantitative survey methodology with random sampling employed data collection of 200 students at Sultan Idris Education University in Perak, Malaysia. The data of the study were collected by using the Career by using Big Five Inventory Scale, Depression Anxiety Stress Scales, and Career Adapt-Ability Scales and the personal information form. The results indicated a significant personality in gender (P=0.002), different educational background (P=0.000) and different majors (P=0.014). The students' career adaptability of females is lower than the mental wellness males (P <0.05). The total score and ten factors' score of correlated with career adaptability negatively (r=-0.217; -0.336). Therefore, it's crucial to promote positive mental health and fostering personality traits associated with career adaptability that can enhance students' capacity the career decision-making. In conclusions, university students' career adaptability in the different groups, and take more consideration to the female students, junior students and student's major. The implication of study suggested on personality traits as a basic training between specific mental health dimensions and career adaptability to provide target support for students' career development and well-being in campus.

Keywords: Personality, Mental Health, Career Adaptability

iafor
The International Academic Forum
www.iafor.org

Introduction

To qualify in a university is the dream of every student. However, due to various psychosocial and developmental changes that occur in their life, they suffer from mental health problems. In addition, Mohd Suhaimi and Mohd Haazik (2017) stated that the existence of university students who came from different backgrounds caused them to go through various challenging socialization processes. This is because most Public Institutions of Higher Learning viewing mental health issues as an issue that needs to be prioritised and addressed to students. Thus, nothing can change other than the university students have to adapt to these changes in order to prepare themselves before entering more challenging professional career opportunities, perceptions and career responses (Uehara et al. 2010; Tahrir, et al., 2023; Nafi & Sahid, 2023).

According to Pfeiffer and Shamsuddin (2013), the excessive stress experienced by these students can affect their physical and mental health. However, there is no denying that all students in higher learning institutions also often suffer from mental health problems such as stress, depression and anxiety. This is further reinforced from a study done by Andrews and Wilding (2004), which showed that stress, anxiety and depression can affect student achievement in schools, colleges, and universities (Aris Safree & Mariam Adawiah, 2011). Some studies in Malaysia found that these psychological problems are continuously contribute to lower academic achievement among students of higher learning institutions (Sherina et al. 2003; Yasin &Dzulkifli 2011; Zaid et al. 2007). However, the results from Yusoff (2021), and Joseph, Rosli, & Ismail (2023) unreflected the mental health problems in academic achievement and mental health awareness among students.

Personality

Personality according to the five-factor theory of personality consists of the factors of conscientiousness, agreeableness, openness to experience, extroversion, and neuroticism. Conscientiousness is referred as the tendency to show self-discipline, to act with a sense of duty and to target success. Individual with a high level of conscientiousness prefer to act planned rather than showing spontaneous behavior. Individuals with low level of conscientiousness are generally careless people who have difficulty in getting organized and they have a low sense of mission (Stangor & Walinga, 2018). Persons with high levels of conscientiousness tend to be reliable, punctual, efficient, and they generally get better grades in school (Wagerman & Funder, 2007). Agreeableness is a tendency to be helpful, reliable, compassionate, and cooperative. Individuals with high agreeableness are people who prefer collaboration to competition, are reliable, friendly and have high social adaptation. Those with low levels of this trait are suspicious, competitive and hostile (Back et al., 2006).

Moreover, trait personality openness to experience is defined as attitudes of imagination, intellectual curiosity, flexibility, independent thinking, creativity, discovering innovations (Burger, 2006). Individuals with a high level of openness to experience value art, adventure, unusual ideas, curiosity and different experiences (Stangor & Walinga, 2018). They are also likely to change jobs more often and to try different careers (Schultz & Schultz, 2016). Extroversion is characterized by being energetic, optimistic, friendly, social and sociable. Individuals with a high level of extroversion are considered to be those who like to be with people, like to talk and prove themselves in groups. Individuals with low extroversion levels are quiet, distant and shy. Neuroticism has been described as a tendency to experience frequent changes in emotions, getting stressed easily, anger and anxiety. Individuals with a

high level of neuroticism may interpret ordinary situations as threatening, and may have trouble thinking clearly, making decisions, and dealing with stress effectively (Back et al., 2006, Stangor & Walinga, 2018; Daud et al., 2020).

According to Eysenck (1979) personality traits have a significant impact on the academic performance of students. Previous studies showed that personalities of academically intelligent and genius students are different and hard to predict (Rosadah, 2004; Eysenck, 1979). Personality differences are influenced by gender, types of school and school location. In addition, Mohd Zuri et al. (2010) stated that each student has a different personality and career inclinations (Kamilah & Radin 2019) and the influence of personality has to do with academic achievement (Daud, Muhamad & Yunus, 2020).

Mental Health

Mental health issues are the main key to human well-being. Mental health, according to the World Health Organization, is a condition of well-being in which each person full fills his or her own potential, can cope with typical factors of life, can work successfully and fruitfully, and can contribute to her or his community. Traditionally, healthcare providers have been able to accurately assess an individual's well-being by looking at their substance miss use, anxiety, distress, and depression. Hence, mental health is described as a state of complete physical, mental, and social well-being rather than the absence of psychiatric diseases. Healthy physical and mental contribute to development of religion, race and country. Being Healthy requires support from healthy physical, mental and social factors, able to function vigorously and free from any disease that is harmful to humans. The health aspect is one of the main focus of Malaysian government in ensuring to ensure a healthy community. Mental health is as important as physical health that able to affect a person's life. Mental health can be seen both negatively and positively. When they are affected by mental health problems, they need the help of others to deal with this problem (Mustaza & Kutty, 2021). Mental health can affect a person's daily life or future especially university students (Mohamad et al., 2023).

Furthermore, personality was conducted examines the level of mental health (Yusoff, 2021). This is due to the fact that the nature of an individual will affect their adaptability in the career field they want to pursue and mental health and motivation (Najwa, 2023). In addition, personality is also one of the factors that influence a person's behavior. According to Rosse et al. (1998). Among this personality traits are openness to experience, extraversion, neuroticism, conscientiousness and agreeableness. This model was chosen and applied in this study has valid framework and able to explain the personality traits (Lim Leung & Bozionelos, 2004; Fawehinmi, 2016) and career adaptability and mental health (Mohamad Sahide et al., 2022; Nafi & Sahid, 2023).

According to Spengler, Bluetein and Strohmer (1090) mental health and career problems are something that should not be taken lightly by undergraduates at all levels of study. In addition, students have problems in making career decisions because they are not clear about their interests, so they cannot identify their own interests, abilities and personalities, as well as the career realm (Ali et al. 2023). This problem occurs due to inability of students to make decisions related to their demanded career as the effect of absence of realism, lack of interest, self-sufficiency and personality as well as lack of knowledge about the career realm. This view is in line with the opinion of by Lidgren and Fiks (in Zarina Md. Asip, 1989) who believe that students who are able to explore, understand and interact with the world of reality

alone can reduce the anxiety of career and future challenges that are increasingly great in nature (Rahim & Thursday, 2023).

In addition, through education, it is also possible to produce people who are of good quality and proficient in applying some intellectual, spiritual, emotional and physical elements to career adaptability. Education is not only considered as fundamental or primary process in life but continuous efforts and improvements can create a comprehensive and balanced human capital to become an ethical citizen and become the main catalyst. Although efforts continue to be carried out but there is no denying that there are still obstacles and obstacles in achieving the country's aspiration of producing graduates who get the right jobs. Among the obstacles are the moral problems, disciplines, and weaknesses of students in academic (Zahari & Omar, 2021; Zulkefli, 2016; Zulkipli, 2009).

Personality and mental health among undergraduates in Public Institutions of Higher Learning impacts the level of mental health in Malaysia which is at an alarming level (Kang et al., 2023). This is further strengthened according to the Institute of Public Health (2017) reporting that one in five teenagers suffered from depression, two out of five teenagers suffered from anxiety and one in 10 teenagers experience mental distress. Although many studies have investigated how personality could predict mental health, few studies have investigated how they may relate to dimensions of mental health as mental health is the concept. To identify how personality traits are associated with dimensions of mental health, we first produce three underlying factors of big five factors and investigate how personality traits are related to dimensions of mental health.

Career Adaptability

Career adaptability resources that individuals refer to while structuring their careers as concern, control, curiosity and confidence. These career adaptability resources are the self-regulating power or capacity that individuals use to cope with change (Savickas & Porfeli, 2012). Careers are classified as intermediaries between an individual's life and society outside. It is important for the students to realize that their present life has improved thanks to the past efforts and that their present experiences and works will shape the future (Tahrir et al., 2023). Career as an individual relationship with the organization of employment. The rapid development leads to unusual employment norms to new terms such as 'career without borders' which is said to be more in line with this 21st century and industrial 4.0. However, the main determinant at this point is the career market that can drive the economy in line with global knowledge as well as technology (Nizam & Sulaiman, 2019).

Therefore, in order to develop career adaptability resources, it is necessary to determine the variables related to and affecting career adaptability. Many research reletad with this requirement have been made in Malaysia. Career adaptability was found to be related to personality traits determined in the five-factor personality theory (Savickas & Porfeli, 2012; Ali et al., 2023). Personality traits affect an individual's career development, adaptation to career transitions, career development tasks and coping with career crises (Abdul Muhid, et al., 2021). The objective of the study was to identify whether the personality traits and level mental health on career decision-making status together predicted the whole career adaptability, concern, control, curiosity and confidence dimensions among of Malaysian university students.

Method

This research utilized quantitative method which used a type of survey that involves a large number of respondents who have participated in this research.

Instruments

The instrument is divided into four parts which are part A, part B, part C and part D. Part A is related to the demographics of respondents includes information such as gender, faculty of education, class level and career decision-making status and level of confidence in career decision. Part B is related to the personality traits (BPT) by Bacanlı, Ilhan and Slan (2009), based on the five factor personality theory. The five independent factors such as extroversion, agreeableness, conscientiousness, neuroticism, and openness to experience. Part C was measuring the level of mental health (Depression Anxiety Stress Scale-21 (DASS21) is a short version (21 item). The DASS-21 consists of three self-report scales: depression, anxiety, and stress. Each scale contains 7 items. Recommended cut-off scores for conventional severity labels (normal, mild, moderate, severe) are as follows (scores need to be multiplied by Depression: Normal: 0-9; Mild: 10-13; Moderate: 14-20; Severe: 21-27. Anxiety: Normal: 0-7; Mild: 8-9; Moderate: 10-14; Severe: 15-19. Stress: Normal: 0-14; Mild: 15-18; Moderate: 19-25; Severe: 26-33. Part D measured Career Adapt-Abilities Scale (CAAS). The four scales measure the concern, control, curiosity, and confidence. Confirmatory factor analysis (CFA) was applied on the data to determine the appropriateness of the 4- factor structure of the Malaysian-adapted from samples of Malaysian high school and university students (Hamzah et al., 2022).

This research was conducted at Sultan Idris Education University (UPSI). UPSI was established on 1 May 1997 under the Order of Sultan Idris Education University, 1997. UPSI is located at Tanjung Malim, Perak Darul Ridzuan, Malaysia. UPSI has two campuses, namely the Sultan Abdul Jalil Shah Campus and the Sultan Azlan Shah Campus which is based on the leadership of education based on historical glory and spearheading global change. University Pendidikan Sultan Idris is an important public institution of higher learning in the history of national education.

The Data Collection Procedure

The data collection procedure in this study was carried out in a graded manner so that the study runs smoothly, organized and straightforward. At the beginning of the study, the procedure taken by the reviewer was to cover the selection of the theme that became the main focus of the study. At the same time, the reviewer has also requested the truth via email from the owner of the instrument that was found to be suitable for application in this study. After that, the researcher began to circulate the research questions to the respondents online by using Google Form. The distribution of the research question was also circulated with a link sharing for respondents to answer the questionnaires a research instrument that consists of a set of questions for the purpose of gathering information from respondents through survey applied to students who volunteered to participate in the study and collected by the researchers. Applications took 30 to 35 minutes.

Data Analysis

Information from respondents is analyzed, the researcher has used statistical analysis methods, namely descriptive statistics to answer the research questions stated at the beginning of the research. The first method which is descriptive statistics is aimed at describing the characteristics of variables in the form of frequency, percentage, min and standardized allowance. Then, the linearity assumption was tested by determining the correlation coefficients between variables using the Pearson Correlation Analysis technique.

Results

The research findings for descriptive analysis are to summarize the demographic information of the respondents, namely gender, age, faculty, service status, service period, and academic qualifications. The results showed that as many as 200 respondents, n=79 males and 121 females.

Personality Relationship With Career Adaptability

The Pearson correlation results shown in Table 3 found that all personality trets from Consent r (123) = .154, and openness r (123) = .125, had an insignificant relationship with the caring dimensions. While the personality tret extraversion r (123) = -.294, and neuroticism r (123) = -.333, shows a negatively significant relationship to the caring dimensions. However, the dimensions show a significant relationship to the dimensions of conscientiousness r (123) = .000, p<0.05.

Table 1: Pearson Correlation Between Personality and Career Adaptability

Dimensions	1	2	3	4	5	6	7	8	9
Extraversion	-								
Agreeableness	.303**	-							
Conscientiousness	.587**	.543**	-						
Neuroticism	.751**	.307**	.546**	-					
Openness	.484**	.514**	.667**	.410**	-				
Concern	-.294**	.154*	.000	-.333**	.125	-			
Control	-.307**	.098	-.056	-.380**	.051	.967**	-		
Curiosity	-.294**	.154*	.000	-.333**	.125	1.000**	.967**	-	
Confidence	.318**	.114	-.015	-.381**	.095	.983**	.981**	.983**	-

**k<0.01
*k<0.05

In addition, the results of the control dimensions found that the personality tret Concern r (123) = .098, p<0.005, and openness r (123) = .051, p<0.005 indicates an insignificant value. While extraversion r (123) = -.307, p<0.05, conscientiousness r (123) = -.056, p<0.005 and Neuroticism r (123) = -.380, p<0. indicates a negatively insignificant relationship to the dimensions of the Control. Next, the curiosity dimension indicates some significant personality traits and among them are the consensus r (123) = .154, p<0.05 and openness r (123) = .125, p<0.05. However, there is also a negatively insignificant relationship to the personality tret Extraversion r (123) = -.294, k<0.01 and also Neuroticism r (123) = -.333, p<0.05. Finally, the confidence dimension also shows a significant relationship with the personality traits Extraversion r (123) = .318, agreeableness r (123) = .114, p<0.05 and openness r (123) = .095, p<0.05.

The Relationship Between Personality and Mental Health

Table 4, the results of the Pearson correlation between personality and mental health, the dimension for mental health stress against the personality trait of concern was r (123) = .072, p<0.05, conscientiousness r (123) = .044, p<0.05, and Neuroticism r (123) = .010, p<0.005 showed a significant relationship.

Table 2: Pearson Correlation Between Personality Trait and Mental Health

Dimensions	1	2	3	4	5	6	7	8	9
Concern	-								
Extraversion	.303**	-							
conscientiousness	.543**	.587**	-						
Neuroticism	.307**	.751**	.546**	-					
Openness	.514**	.484**	.667**	.410**	-				
Stress	.072	-.012	.044	.010	.240**	-			
Anxiety	-.038**	.007	.000	.019	.076	.525**	-		
Depression	-.008	-.058	-.101	-.070	-.131	.295**	.466**	-	

* p<0.01
**k<0.05

Discussion

Based on the results of the research, it is found that there were consistent. The research results showed that personality of students today range at a simple stage to a high stage. The results of the research found that the Big Five personality remain relatively stable throughout most of one's lifetime. They are influenced significantly by genes and the environment, with an estimated heritability of 50%. This suggests that university students exhibit average or moderate levels of openness, conscientiousness, extraversion, agreeableness, and neuroticism, without any extreme tendencies toward either end of the spectrum. In other words, they may not score exceptionally high or low on any particular trait. The findings of this research provided a positive indication of the mental health of the students. Students are often subjected to various factors, including academic pressures, social challenges, and transitions to adulthood. Therefore, assessing their mental health using tools like the DASS-21 can provide valuable insights into their psychological well-being. researchers and mental health professionals can gain valuable insights into the prevalence and severity of depression, anxiety, and stress within this population. This information can inform the development of targeted interventions and support services aimed at promoting mental well-being among university students.

Conclusion

In conclusion, this research has proven that there was a relationship between students' personality traits and level of mental health on career adaptability consisting of sub-constructs concern, control, curiosity and confidence be at a high level. This shows that students at universities have been exposed to a variety of career adaptability skills that can help in assessing their abilities and qualifications before entering the career field. The advantages of students in understanding the career direction they want to pursue are very helpful in researching related to the scope of their careers and also the background of the company they want to apply for. The increase in career adaptability among public university students can indirectly increase the effective involvement of graduates in the economy and reduce the unemployment rate in the country. Therefore, graduates need to understand the

current employment scenario and the current economic development and market in an effort to reduce the unemployment rate among students. Career tendencies are usually shaped by a number of factors that affect individuals such as motivation, needs and environment as well as social support. Career adaptability among students is found to vary according to personality traits. Students with a personality trait that has shown at a satisfactory level have the potential to face various challenges and obstacles that will be faced in determining their career path. The results of this research can be used in planning applied studies aimed at improving career adaptability in career development centers of universities.

Limitations, Implications for Future Theoretical and Applied Research

This research has some limitations due to the participants of this research are university students willing to participate in the study, involved 200 university students. Thus, the findings of this research cannot be generalized to a wider population. In future studies, it is recommended to use methods such as cluster and proportional sampling in sample design. In future research, it is recommended to work with universities in different cities and with different sample groups. The interrelation between personality traits, level of mental health and career adaptability can be examined in sample groups of working adults. The personality traits, whose interrelation with career adaptability were examined in this study, were limited to the personality traits suggested by the five-factor personality theory. In future studies, it is recommended to examine the interrelations between different personality structures and career adaptability. This research offers some implications for current career counselling practices, along with theoretical and applied research in the future.

Acknowledgements

I would like to express my appreciation to University Sultan Azlan Shah (USAS) had given me opportunity for sponsorship and my undergraduate students and all individuals for guidance and support throughout this project.

References

Abd Malik, N. H. M., Ismail, N., Zahrin, S. N. A., & Sham, F. M. (2018). Relationship between love for Knowledge and Personality of excellent Muslim towards the transformation of human capital. E-Jurnal Penyelidikan dan Inovasi, 5(1): 94-106.

Abdul Muhid et al. (2021). Big Five Personality Test for State Islamic Senior High School Students in Indonesia. *International Journal of Instruction*, 14(2): 483-500.

Ali, N. M., Borhanuddin, R. I., Salleh, S. M., Nor, R. M., Noor, H. M., Kamaruddin, K., & Mokhlas, H. (2023). Kebolehpasaran Graduan Penilaian Daripada Perspektif Majikan Dan Graduan: Satu Pendekatan Kualitatif. *Journal of Education*, *8*(50) (*In Malay*).

Aripin, S., & Jamaluddin, S. (2017). Kesepaduan Personaliti Dalam Kalangan Pelajar Sarjana Muda Pendidikan UiTM di Malaysia. JuKu: Jurnal Kurikulum & Pengajaran Asia Pasifik, 3(1): 1-21 (*In Malay*).

Back, M., Schmukle, S., & Egloff, B. (2006). Who is late and who is early? Big Five personality factors and punctuality in attending psychological experiments. Journal of Research in Personality, 40: 841–848.

Barrick, M. R., & Mount, M. K. (1991). The Big Five Personality dimensions and job performance: a meta-analysis. *Personnel psychology*, *44*(1): 1-26.

Basir, N. H. M., Razali, M. K. A. M., Azwar, E., Suresh, K., Amri, E. N. A. T., & Ali, N.A.N. (2021). Mental Health Status Screening Among Residential College University Students. Malaysian Journal of Public Health Medicine, 21(3): 106-112.

Bonaccio S., Reeve, C. L. & Lyerly, J. (2016). Academic entitlement: Its personality and general mental ability correlates, and academic consequences. Personality and Individual Differences, 102: 211-216.

Brown & Associates (Eds.), Career Choice and Development (4th ed., pp. 149- 205). San Francisco, CA: Jossey Bass.

Daud, W. R. W., Muhamad, T. A., & Yunus, M. M. (2020). Hubungan dan Pengaruh Personaliti Big Five kepada Sikap Terhadap Sukan dalam Kalangan Pelajar Pintar Cerdas Akademik (The Relationship and Influence of Big Five Personality on Attitude towards Sports among Academically Gifted Students). Jurnal Pendidikan Malaysia (Malaysian Journal of Education), 45(1): 41-51 (*In Malay*).

Fawehinmi, O. O. (2016). The relationship between self-esteem, proactive personality and social support on career adaptability among undergraduate students (Doctoral dissertation, Masters Thesis, Universiti Utara Malaysia).

Hamzah, H., Perveen, A., Ramlee, F., & Shazanna, S. (2022). Malay Translation and Validation of Career Adapt-Abilities Scale for Higher Learning Institution Students in Malaysia. Journal of Academic Research in Business and Social Sciences, 12(6): 1673-1690.

Kamilah, C.N. & Aishah, R. S. (2019). Tret Personaliti (extraversion, agreeableness, conscientiousness, dan openness) Mendorong Kecenderungan Keusahawanan pelajar Teknik dan Vokasional. Satu kajian di Kolej Vokasional Daerah Kuala Terengganu. Journal of Global Business and Social Entrepreneurship, 5(15): 35- 45 (*In Malay*).

Kang, W., Steffens, F., Pineda, S., Widuch, K., & Malvaso, A. (2023). Personality traits and dimensions of mental health. Scientific reports, 13(1): 7091.

Maggiori, C., Rossier, J., & Savickas, M. L. (2017). Career Adapt-Abilities Scale–Short Form (CAAS-SF) construction and validation. *Journal of Career Assessment*, *25*(2): 312-325.

Mohamad, M. S., & Mohamed, M. H. (2020). Jenis personaliti dan Tahap Kesihatan Mental dalam kalangan Mahasiswa di Institusi Pengajian Tinggi. *Jurnal Personalia Pelajar*, *23*(1): 37-44 (In Malay).

Mohamad, M. S., Divaghar, K., Rahim, K. M., Fauziah, I., Manisah, M. A., & Kausalya, D. (2023). Hubungan di antara Jenis Personaliti dengan Tahap Kesihatan Mental dalam kalangan Bekas Banduan di Malaysia. e-BANGI, 20(1): 297-305 (*In Malay*).

Mohamad Sahide, N. B., Mohd Pauzi, H., & Awang Noh, N. (2022). Isu dan Literasi Kesihatan Mental dalam kalangan Remaja. *Malaysian Journal of Social Sciences and Humanities*, 7(8): e001688 (*In Malay*).

Mustaza, M. S. A., & Kutty, F. M. (2021). Personaliti Grit dan Kesejahteraan Subjektif Pelajar Universiti. *Malaysian Journal of Social Sciences and Humanities*, 6(9): 129-142.

Nafi, S. N. M., & Sahid, S. (2023). Persepsi, Sikap dan Tanggapan Ibu Bapa Terhadap Bidang Kerjaya Keusahawanan. *Malaysian Journal of Social Sciences and Humanities (MJSSH)*, *8*(7): e002360-e002360 (*In Malay*).

Najwa, K. (2023). Hubungan Kesihatan Mental Dengan Motivasi Dalam Kalangan Palapes Universiti Utara Malaysia:(The Relationship of Mental Health and Motivation among Palapes in Universiti Utara Malaysia). *Jurnal Pembangunan Sosial*, *26*: 113-138 (*In Malay*).

Nawi, N. H. M., & Nawi, N. H. M. (2016). Hubungan antara Tret Persoanaliti Kehematan, Keterbukaan pada Pengalaman, Ekstraversi dan Kepatuhan Dengan Prestasi kerja Dalam Kalangan Pemimpin Penduduk Dalam Sekoleh-Sekolah Prestasi Tinggi. Di Malaysia. *Jurnal Psikologi Malaysia*, 30(1): 102-112 (*In Malay*).

Nizam, S. N., & Sulaiman, W. S. W. (2019). Pengaruh Personaliti terhadap Kebolehsuaian Kerjaya dalam Kalangan Pemimpin Mahasiswa. *Jurnal Wacana Sarjana*, 3(3): 1-10 (*In Malay*).

Porfeli, E. J., & Savickas, M. L. (2012). Career Adapt-Abilities Scale-USA Form: Psychometric properties and relation to vocational identity. *Journal of Vocational Behavior*, 80(3): 748-753.

Rahim, Mohd Amirul Rafiq Abu, and Umi Maisarah Kamis. "Mengatasi Salah Tanggap Dan Memahami Peluang Pekerjaan Graduan PhD." *Views* 11 (2023): 23 (*In Malay*).

Renn, K. A., & Smith, B. R. (2023). Ecological Models in Higher Education Research: Overview and synthesis. *New Directions for Higher Education*, 2023(204): 11-22.

Sadownik, A. R. (2023). Bronfenbrenner: Ecology of human development in ecology of collaboration. In (Re) theorising More-than-parental Involvement in Early Childhood Education and Care (pp. 83-95). Cham: Springer International Publishing.

Samsul, A. (2016). Kesepaduan personaliti dalam kalangan pelajar sarjana muda pendidikan IPTA di Malaysia/Samsul Aripin (*Doctoral dissertation, University of Malaya*).

Savickas, Mark L. (1997). Career adaptability: An integrative construct for life-span, life-space theory. *The career development quarterly,* 45 (no. 3): 247-259.

Savickas, M. L. (2002). Career construction: A developmental theory of Vocational Behavior. In D.

Savickas, M. L., & Porfeli, E. J. (2012). Career Adapt-Abilities Scale: Construction, reliability, and measurement equivalence across 13 countries. *Journal of Vocational Behavior*, *80*(3): 661-673.

Savickas, M. L., & Porfeli, E. J. (2012). Career Adapt-Abilities Scale: Construction, reliability, and measurement equivalence across 13 countries. *Journal of Vocational Behavior*, 80(3): 661-673.

Spengler, P. M., Blustein, D. L., & Strohmer, D. C. (1990). Diagnostic and treatment overshadowing of vocational problems by personal problems. Journal of Counseling Psychology, 37(4): 372.

Stangor, C., & Walinga, J. (2018). Introduction to Psychology-1st Canadian Edition, B.C.: BCcampus. Erişim adresi htt s: entextbc ca/introductionto sychology

Tahrir, N. F., Nasir, N. A. M., & Radzali, N. S. A. A. (2023). Kebolehpasaran Pelajar Selepas Menjalani Latihan Industri bagi Program Diploma Teknologi Maklumat Politeknik Sultan Idris Shah: Era Pascapandemik. *Research and Innovation in Technical and Vocational Education and Training*, *3*(1): 023-029 (*In Malay*).

Tolentino, L. R., Garcia, P. R. J. M., Lu, V. N., Restubog, S. L. D., Bordia, P., & Plewa, C. (2014). Career adaptation: The relation of adaptability to goal orientation, proactive personality, and career optimism. *Journal of Vocational Behavior*, *84*(1): 39-48.

Wagerman, S., & Funder, D. (2007). Acquaintance reports of personality and academic achievement: A case for conscientiousness. Journal of Research in Personality, 41: 221–229.

Wang, N., Yan, Z., Cheng, D., Ma, X., & Wang, W. (2024). Career adaptability and academic achievement among Chinese high school students: A person-centered longitudinal study. *Journal of Youth and Adolescence*, *53*(3): 718-731.

Yusoff, R. M. (2021). Survey of Mental Health Level among students in Bayan Baru Community College. *Journal of Social transformation and Education*, 2(3): 131-139.

Zahari, Z., & Omar, M. K. (2021). Pendekatan Kebolehsuaian Kerjaya dalam kalangan Pelajar Kolej Vokasional di Selangor. *Malaysian Journal of Social Sciences and Humanities*. 6(1): 52-60 (*In Malay*).

Zulkefli, N. A. (2016). Kesan tret personaliti terhadap prestasi kerja di kalangan pegawai Jabatan Kemajuan Masyarakat di Negeri Kelantan (masters). Universiti Utara Malaysia. Diambil dari http://etd. uum. edu. my/ 6441: https://etd. uum. edu. my/6441/1/s818903 01a.pdf (*In Malay*).

Zulkipli, N. Y. (2009). Hubungan personaliti dengan pencapaian akademik dalam kalangan pelajar di Universit Malaysia Terengganu (*In Malay*).

Contact emails: mariani@usas.edu.my
nadirahsharuddin@gmail.com
masitahabjalil@usas.edu.my

Teaching 21st-Century Skills in the EFL Classroom From Saudi EFL Teachers' Perspectives

Khalid Abdullah Alshihri, Najran University, Saudi Arabia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The 21st-century language classroom goes beyond simply teaching and learning grammar and vocabulary. This study explored EFL teachers' perceptions of integrating 21st-century skills into their classrooms. This study adopted survey research. The sample of the study consisted of (49) teachers who were teaching at the secondary school level in Najran City, Saudi Arabia, during the academic year 2023-2024. The findings showed that EFL teachers are aware of these skills and practice them to a moderate extent in their teaching contexts. Additionally, results indicated that a high percentage of EFL teachers use technology as a tool for learning in their classrooms. Based on statistical analysis, there are no significant differences between the means of the participants' responses attributed to the two variables: years of experience and educational qualification.

Keywords: Professional Development, 21st-Century Skills, EFL Saudi Teachers

iafor
The International Academic Forum
www.iafor.org

Introduction

Education is essential in developing the knowledge, skills, attitudes, and values that enable people to contribute to and benefit from an inclusive and sustainable future. Education needs to aim to do more than prepare young people for the world of work; it needs to equip students with the skills they need to become active, responsible, and engaged citizens.

The 21st century demands the explicit integration of learning strategies, digital competencies, and career abilities. Handayani (2017) stated that school education is no longer about a traditional classroom where teachers as the only source of knowledge, on the contrary, students should be equipped with 21st-century skills for a successful future. According to Ledward and Hirata (2011), 21st-century skills are a blend of content knowledge, specific skills, expertise, and literacies necessary to succeed in work and life.

Foreign language (FL) education in the 21st-century needs to adapt to the evolving needs of students to prepare them effectively for functioning in the modern world. The ways we learn, teach languages, and communicate have radically changed due to globalization and digitization (Fandino, 2013; Faulkner & Latham, 2016). In other words, a key element of successful change is 21st-century education that focuses less on knowledge and emphasizes improving the quality of teaching and learning processes.

English cannot be treated as a simple linguistic skill. Instead, English should be regarded as a global language that people can use to express their local identities and to communicate intelligibly with the world (Crystal, 2006). As a consequence of this new perspective, Eaton (2010) states that today's EFL classroom should no longer be focused on grammar, memorization and learning from rote. Rather, it should be conceived of as a space to learn to use language and cultural knowledge as a means to connect to others around the world.

Schools, especially EFL classrooms, should offer students opportunities to develop creativity, critical thinking, collaboration, self-direction, and cross-cultural skills. There is a consensus that there exists a significant contrast between the skills taught to students in schools and those required for life and work in today's knowledge-based society. The current English language curriculum is no longer deemed sufficient to adequately prepare students for the rapidly evolving world of technology (Alemi & Daftarifard, 2010).

In today's context, it is pivotal for teachers to play a crucial role in developing citizens with the 21st-century skills mentioned above for a well-functioning society. EFL (English as a Foreign Language) teachers, in particular, have a responsibility to incorporate these skills into their lessons, as English has evolved into the language for international and even national communication. Unlike in the past, language learners are now required to use the language for more complex purposes, such as international communication and collaboration, presenting complex ideas, and interpreting fast-changing information (Pardede, 2012). Hence, teachers in the 21st century should possess the knowledge, skills, and competencies necessary for both their careers and society. Saavedra and Opfer (2012) argued that teachers need to have 21st-century skills themselves to be able to teach such skills, manage effective teaching and learning practices, and help students apply the knowledge they acquire in their daily lives.

Previous studies have shown that teacher competence in 21st-century skills is crucial for improving the quality of teaching and learning (Amr, 2020; Aristiawan & Herman, 2021;

Paschal & Gougou, 2022). However, there is still insufficient specific research on 21st-century skills among EFL teachers (Alamri, 2020; Alghamdi, 2022). These findings suggest the need for further studies on 21st-century education in Saudi Arabia, particularly in EFL contexts.

Statement of the Problem

There is growing concern among academics, employers, and educators about whether the skills being taught today are relevant for individual and social development, and whether educational institutions can keep up with the demands of the changing world. Therefore, it is essential for teachers to have strong competencies in translating 21st century skills to students through a more systematic teaching process.

In Saudi Arabia, there is an increasing emphasis on 21st-century skills-based teaching among educators, including teachers and school administrators. The Ministry of Education in the Kingdom of Saudi Arabia (MOE) has made various efforts to help teachers integrate 21st-century skills into their teaching. This is aimed at improving the educational process, educational outcomes, and creating alignment between students' qualifications and the requirements of the modern job market.

Since 21st-century skills are a new addition to the Saudi education system, there have been few studies on this topic. According to these studies (Halvorsen, 2018; Albahlal, 2019; Alharbi, 2022; Alowayyid, 2023), one common obstacle to integrating these skills in language classrooms is that language teachers might not have a clear understanding of what 21st-century skills include and how they are taught alongside the other language skills. Therefore, the current study aims to determine to what extent English language teachers in secondary schools integrate 21st-century skills into their classes.

Research Questions

This research aims to address the following questions:

- To what extent do secondary school EFL teachers integrate 21st-century skills into their classrooms?
- Are there statistically significant differences, at a significance level of 0.05, between the means of EFL teachers' responses regarding their teaching practices as influenced by variables such as years of experience, educational qualification, and training on 21st-century skills?

Literature Review

The curriculum-based, discipline-focused, and teacher-centered classical education approaches of the 20th century have been replaced by student-centered approaches. These new approaches emphasize lifelong skills and take into account each student's differences. One of the most important approaches is constructivism, which has been influenced by scholars and scientists such as Dewey, Piaget, Vygotsky, Bruner, and Glasersfeld in the 21st century (Sirin, 2008).

Constructivism is a cognitive learning approach that is based on the idea of reconstructing one's mind. According to this approach, knowledge is transferred, prior knowledge is reinterpreted, and new knowledge is created (Erdem & Demirel, 2002). In this context,

project-based learning (PBL) can facilitate this process, offering new opportunities for teachers and students to develop and enhance their skills (Basbay, 2010). Baysura et al. (2016) define project-based learning as an instructional strategy that helps students acquire new skills while exploring real-world issues, creating original works, and preparing their own courses and performances. PBL also aids students in developing their subject-matter knowledge, problem-solving abilities, and self-directed learning.

21st-century pedagogy is a broad concept that describes the methods, techniques, practices, and skills needed for an effective teaching approach. It is multi-dimensional because it recognizes the diverse and evolving needs of learners, teachers, and society (Johnson, 2019). This fact is underlined by the diagram below (Paschal & Gougou, 2022).

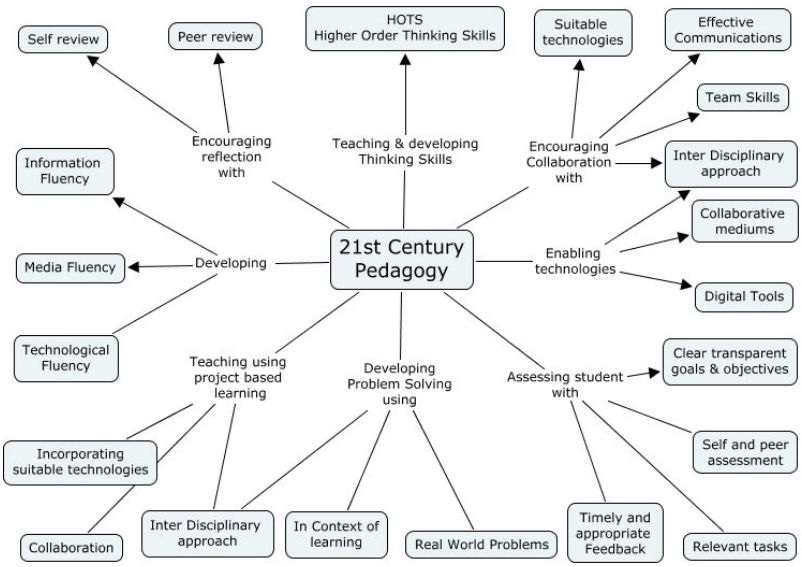


Figure1. A Diagram of 21st Century Pedagogy

Educational planners, theoreticians, and researchers worldwide have been working on developing frameworks for necessary skills for 21st-century students to succeed in both local and global societies. Several frameworks have been created, including the Partnership for 21st-Century Skills (P21) in 2006, the EnGauge Framework in 2003, the Assessment and Teaching of 21st-Century Skills Framework (ATC21S) in 2010, and the Cambridge Life Competencies framework in 2018. These frameworks are key tools for educators, teachers, and researchers to address questions about 21st-century innovation and learning skills, such as what to do, how to implement, and when to apply (Eker & Bedir, 2023).

Idrizi (2022) argues that in 21st-century language classrooms, teaching grammar and vocabulary is no longer enough. In addition to these language skills, learners must also develop essential competencies and skills crucial for the modern era. These skills, referred to as 21st-century skills, include critical thinking, collaboration, communication, and creativity.

As stated by Eaton (2010), the main focus in EFL classrooms today should not be on grammar, memorization, and rote learning. Instead, they should be seen as environments where students can learn to use their language and cultural background to communicate with people from around the world. A more technologically advanced, learner-centered, and collaborative approach is more appropriate. Teachers can benefit from new and innovative frameworks and techniques as part of this reconceptualization of the EFL classroom. With technology becoming increasingly common in the twenty-first century, there has been a

significant increase. In order to succeed in the twenty-first century, Harshbarger (2016) suggests several essential elements. One of these is explicit teaching. Teachers must have a thorough understanding of noncognitive components such as academic mindsets, behaviors, perseverance, social skills, and learning strategies. Additionally, they must provide students with clear instructions on how to improve their 4Cs (communication, collaboration, creativity, and critical thinking) within the context of a globalized society.

Several previous studies have highlighted the importance of incorporating 21st-century skills into EFL (English as a Foreign Language) classrooms. For example, a study conducted by Fandino (2013) aimed to encourage Colombian EFL teachers to integrate 21st Century Skills into their teaching practices. The results indicated that teachers should critically analyze what the 21st-century movement offers in order to enhance their teaching methods. Similarly, Albahlal (2019) examined the integration of 21st-century skills into English language learning within an EFL context. The findings emphasized the significance of 21st-century skills in educational systems, particularly in the domain of English language learning.

In a study conducted by Alamri (2020), it was found that female EFL students in Saudi Arabia had a positive opinion of their teachers' application of 21st-century skills. Another study by Amr (2020) looked into the incorporation of 21st-century skills into the 12th-grade Palestinian curriculum and found that English for Palestine 12 tends to reduce the importance of incorporating these skills. Aristiawan & Herman (2021) aimed to investigate the methods used by EFL teachers to apply the 21st-century skills included in the 2013 curriculum, revealing that teachers' poor application of these skills presents a challenge. Furthermore, Paschal & Gougou (2022) studied English teachers' experiences in Ivory Coast using 21st-century skills in ELT, and the results showed that teachers' practices were being positively influenced by 21st-century pedagogy, leading to increased learning engagement.

Method

According to Soland et al. (2013), measuring 21st century competencies can be carried out through surveys. Therefore, this study adopted survey research.

Participants

The participants of this study were 49 EFL male teachers working in public secondary schools in Najran city, Saudi Arabia, during the second semester of the academic year 2023-2024. Informed consent was obtained from all the participants. The demographic background of the participants is presented in Table 1.

Table 1: Demographic Background of the Participants

Variables		F	%
Educational Qualification	Bachelor and less	38	77.6
	Higher studies MA/PhD	11	22.4
Training on 21st - century skills	Yes	43	87.8
	No	6	12.2
Years of Experience	Less than 5 years	13	26.5
	From 5 to 10 years	14	28.6
	More than10 years	22	44.9
Total		49	100

Instrument

A questionnaire developed by Hixson et al. (2012) to measure 21st century skills was used. The study instrument has a high degree of reliability, improving on reliable measures from previous studies (std. alpha > .90, inter-item correlations > .58). The survey questionnaire comprises 48 items divided into eight categories measuring teachers' 21st century skill practices. Each category has two parts. The first part presents the definition of the related 21st century skill. In the second part, there are 5-point Likert scale items scored from 1 'Almost never' to 5 'Almost daily'.

Data Analysis

The statistical software (SPSS) version (23) was used for the analysis of quantitative data. Descriptive statistics such as mean, percentage and standard deviation were computed to analyse the data of the first question. Multiple analysis of variance was also used to answer the second question.

Table 2: Interpreting the Values of Arithmetic Averages

Description	Averages
very low	From 1 to 1.80
Low	From 1.80 to 2.60
Moderate	From 2.60 to 3.40
High	From 3.40 to 4.20
Very high	From 4.20 to 5.00

Result

1. Results Related to the First Question

To answer the first question: "To what extent do secondary school EFL teachers integrate 21st century skills into their classrooms?", the responses of the participants were analyzed. The results are presented in Table 3.

Table 3: Mean Scores for Each 21st Century Skills

	Mean	Std.
Sub-skills of the scale		
Collaboration Skills	3.37	.927
Using Technology as a Tool for Learning	3.36	.969
Communication Skills	3.31	.862
Creativity And Innovation Skills	3.23	1.012
Self-Direction Skills	3.01	1.11
Critical Thinking Skills	3.01	.914
Global Connections	2.95	1.006
Local Connections	2.92	1.046
Mean score of the whole scale	**3.15**	**.922**

Table 3 shows the mean score for the whole scale as well as the mean scores for each of the scale's subskills. EFL teachers practice these skills in their classrooms to a moderate degree, as indicated by the mean score of the entire scale (M=3.15). Results indicate that these skills were somewhat incorporated into teachers' teaching practices. This table indicates that "Collaboration Skills" (M=3.37) is the 21st century skill that teachers incorporate into their lessons the most. Collaboration Skills are ranked higher than Using Technology as a Tool for Learning (M=3.36). On the other hand, "global connections" (M=2.95) is the skill that teachers use the least in their classes, followed by "local connections" (M=2.92).

2. To answer the second research question, Are there statistically significant differences at the level of significance (0.05) between the means of EFL teachers' responses regarding teaching practices due to the variables; years of experience, educational qualification and training on 21st century skills?

Multiple analysis of variance was used to show the significance of the differences between the means of the participants' responses, and Table 4 shows this:

Table 4: Multiple Analysis of Variance Results According to Demographic Variables

Source	dependent variable	type i sum of squares	df	mean square	F	sig.
Years of experience	critical thinking skills	1.108	2	.554	.682	.511
	collaboration skills	1.243	2	.621	.858	.431
	communication skills	.191	2	.095	.151	.860
	creativity and innovation skills	.044	2	.022	.021	.979
	self-direction skills	.359	2	.179	.143	.868
	global connections	.665	2	.332	.322	.726
	local connections	.576	2	.288	.254	.777
	using technology as a tool for learning	.132	2	.066	.066	.936
Educational qualification	critical thinking skills	.420	1	.420	.516	.476
	collaboration skills	.141	1	.141	.195	.661
	communication skills	.596	1	.596	.946	.336
	creativity and innovation skills	.094	1	.094	.090	.765
	self-direction skills	.006	1	.006	.004	.947
	global connections	1.315	1	1.315	1.276	.265
	local connections	1.481	1	1.481	1.304	.260
	using technology as a tool for learning	.013	1	.013	.013	.909
Training on 21st century skills	critical thinking skills	2.838	1	2.838	3.493	.068
	collaboration skills	7.685	1	7.685	10.609	.002
	communication skills	7.168	1	7.168	11.373	.002
	creativity and innovation skills	3.033	1	3.033	2.903	.095
	self-direction skills	3.549	1	3.549	2.821	.100
	global connections	1.286	1	1.286	1.247	.270
	local connections	.511	1	.511	.450	.506
	using technology as a tool for learning	1.075	1	1.075	1.079	.305
Error	critical thinking skills	35.744	44	.812		
	collaboration skills	31.874	44	.724		
	communication skills	27.733	44	.630		
	creativity and innovation skills	45.958	44	1.045		

	self-direction skills	55.353	44	1.258
	global connections	45.357	44	1.031
	local connections	49.972	44	1.136
	using technology as a tool for learning	43.832	44	.996
Total	critical thinking skills	483.312	49	
	collaboration skills	596.556	49	
	communication skills	571.280	49	
	creativity and innovation skills	561.720	49	
	self-direction skills	503.844	49	
	global connections	474.750	49	
	local connections	470.742	49	
	using technology as a tool for learning	597.662	49	

According to Table 4, neither the years of experience nor the educational qualification had any statistically significant effects on the means of the participant responses at the significance level (0.05). Regarding training on 21st century skills variable, only two skills showed differences: communication and collaboration, and these differences were in favor of teachers who had received the training.

The table shows that teachers' 21st century skills teaching practices were not affected by the difference in their experience and educational qualification.

Table 5. Means, Standard Deviations – According Years of Experience

Years of Experience		CRITICAL THINKING SKILLS	COLLABORATION SKILLS	COMMUNICATION SKILLS	CREATIVITY AND INNOVATION SKILLS	SELF-DIRECTION SKILLS	GLOBAL CONNECTIONS	LOCAL CONNECTIONS	USING TECHNOLOGY AS A TOOL FOR LEARNING
Less 5 year	Mean	3.15	3.35	3.31	3.18	3.12	3.12	3.09	3.35
	Std. Deviation	.798	.875	.870	1.231	1.263	1.125	1.133	1.126
10 –5	Mean	2.78	3.14	3.21	3.25	3.05	2.98	2.91	3.44
	Std. Deviation	1.064	1.042	.916	1.026	1.058	.931	.997	.993
More 10	Mean	3.07	3.52	3.36	3.25	2.92	2.83	2.83	3.31
	Std. Deviation	.890	.884	.859	.905	1.096	1.012	1.061	.897

Table 6. Means, Standard Deviations – According Educational Qualifica

Educational Qualification		CRITICAL THINKING SKILLS	COLLABORATION SKILLS	COMMUNICATION SKILLS	CREATIVITY AND INNOVATION SKILLS	SELF-DIRECTION SKILLS	GLOBAL CONNECTIONS	LOCAL CONNECTIONS	USING TECHNOLOGY AS A TOOL FOR LEARNING
Bachelor and less	Mean	3.06	3.39	3.36	3.21	3.02	3.04	3.02	3.37
	Std. Deviation	.989	.999	.885	1.085	1.151	1.117	1.133	1.031
Higher studies	Mean	2.83	3.29	3.11	3.32	2.97	2.62	2.58	3.32
	Std. Deviation	.592	.624	.787	.740	1.010	.308	.579	.754

Table 7. Means, Standard Deviations – According Training on 21st Century Skills

Training on 21st century skills		CRITICAL THINKING SKILLS	COLLABORATION SKILLS	COMMUNICATION SKILLS	CREATIVITY AND INNOVATION SKILLS	SELF-DIRECTION SKILLS	GLOBAL CONNECTIONS	LOCAL CONNECTIONS	USING TECHNOLOGY AS A TOOL FOR LEARNING
Yes	Mean	3.09	3.51	3.45	3.32	3.10	3.02	2.97	3.41
	Std. Deviation	.888	.838	.765	.970	1.104	1.021	1.065	.945
No	Mean	2.39	2.33	2.27	2.62	2.36	2.47	2.59	2.97
	Std. Deviation	.935	.913	.864	1.190	1.013	.806	.908	1.139

Discussion

The study aimed to investigate how EFL teachers perceive the integration of 21st-century skills in their classrooms. The findings suggested that EFL teachers have a moderate level of implementing these skills in their teaching and possess knowledge about them. Additionally, the study revealed that these skills were somewhat incorporated into teachers' teaching practices, possibly because they are aware of their roles and responsibilities in fostering their students' 21st-century skills. As McCommas (2014) rightly points out “the success of the “21st-Century Skills” movement depends on preparing teachers to effectively deliver both skills and content” (p.21). Additionally, a flexible set of 21st century skills-building functional language tasks and activities that are correlated to each unit in EFL textbooks are probably responsible for these results. This view is also supported by Amr (2020) who has found that The incorporation of these skills and competencies have been evident in designing teaching materials, like textbooks where learners are exposed to certain activities that activate these skills inductively and deductively. The results of this study are in line with those of Sulaiman &Ismail (2020) and Uka & Bedir (2023) findings. These studies illustrate that EFL teachers' 21st century skill level is at a moderate level. They also demonstrate that teachers are aware of these skills and their importance in English language learning and teaching. According to Menggo et al. (2020), English teachers should be encouraged to be able to integrate the intended 21st -century competency indicators into instructional materials that are preceded by a needs analysis stage. On the other hand, it is shown that 21st-century skills play a major role for EFL students in their EFL classes due to the universality of English language and due to the needs of the knowledge-based economy (Albahlal, 2019).

Additionally, the results showed that a high percentage of EFL teachers use technology in the classroom as a learning tool. This could be because technology has a positive effect on teaching and learning in the twenty-first century in general and language learning in particular. An additional possible explanation could be attributed to teachers' awareness of and utilization of online platforms, websites, applications, and the like, which can further enhance communication between teachers and learners. It is noticeable that technological devices have integrated heavily into EFL teacher' classes. It allows EFL teachers to prepare authentic materials for learners, use visual aids and plan interactive class activities to increase a better understanding of the material and engage more students. This is similar to the findings of study conducted by Bolat (2022), it demonstrated that the most used 21st century skill was using technology as a tool for learning. The current study result, however, differs from those of Amr (2019), which concluded that Information and Communication Technology (ICT) skills are the least integrated skills within the EFL textbook.

Based on the findings, there were no significant differences in the participants' responses based on their years of experience and educational qualifications. This suggests that teachers' 21st century skills teaching practices were not influenced by their level of experience or

educational background. One possible explanation for this finding is that all teachers follow the same EFL curriculum, which provides equal opportunities for all students and suggests the same teaching strategies and assessments for implementing 21st century skills in classrooms. This is supported by the results of studies by Otlu (2020) and Anderson (2020), which also found that teachers' years of experience and educational level did not significantly impact their use of 21st century skills.

In regards to the results concerning training on 21st-century skills, differences were found only in collaboration skills and communication skills. These differences were in favor of teachers who received training on 21st-century skills. These findings may be due to the lack of preparation or professional training among teachers on how to implement these skills in language teaching and learning. According to Alharbi (2022) teachers' high level of knowledge in some skills of 21st century, such as critical thinking, ICT literacy, etc, may also be a result of the continuous training courses offered by the Ministry of Education which provide teachers with various training opportunities concerning teaching 21st century skills in FL classrooms. Similarly, this finding matches with Paschal & Gougou (2022) and Aristiawan & Herman (2021) conclusions. It is evident that one of the most important factors in influencing educators' perspectives on teaching and practice is offering professional development in 21st century skills.

Conclusion

It is evident that 21st century skills and English language teaching are inseparable. The results demonstrated that EFL teachers had successfully incorporated 21st-century skills into their teaching practices. Additionally, it showed how important it is for teachers to be competent in order to successfully integrate 21st century skills practices into EFL classrooms.

Based on the research findings, it is essential for educational policy makers to prioritize the professional development of teachers and provide them with training opportunities focused on the teaching of 21st century skills. Therefore, it is imperative to train teachers in these skills if we want to see them integrated into the language classroom. Teacher preparation programs should address this issue at various levels, including standards, curriculum, instruction, and assessment. Additionally, when designing English Language Teaching (ELT) curricula, curriculum developers should take into account the findings of this study. It is necessary to conduct a content analysis of English textbooks and ensure that new editions incorporate 21st century skills for teachers. It is crucial for teachers to stay current in the rapidly evolving field of instruction.

Future research should focus on investigating EFL teachers' strategies in implementing the 21st century in language teaching and learning. Additional studies might focus more on obstacles that hinder integrating these skills in the language classroom. . Further work is required to examine the role of technology integration in developing 21st Century Skills.

References

Alamri, H. (2020). Teachers' 21st-Century Skills: How do Saudi EFL Students Evaluate their Use?. Saudi Journal of Humanities and Social Sciences, 5(2), 42-55.

Albahlal, F. (2019). The Integration of 21th Century Skills into English Language Learning. Journal of Applied Linguistics and Language Research, 6(3), 144- 154.

Alemi, M., & Daftarifard, P. (2010). Pedagogical Innovations in Language Teaching Methodologies. Journal of language teaching and research, 1(6), 765-770.

Alghamdi, A. (2022). Empowering EFL Students with 21st-Century Skills at a Saudi University: Challenges and Opportunities. International Journal of Education, Learning and Development, 10(3), 39-53.

Alharbi, B. (2022). Badr ALHARBI. Saudi teachers' knowledge of critical thinking skills and their attitudes towards improving Saudi students' critical thinking skills. PROBLEMS OF EDUCATION IN THE 21stCENTURY, 80 (3), 395-407.

Alowayyid, N. (2023). Research Article The Reality of Middle School (Intermediate) Female Students in Saudi Arabia and the Practice of 21st-Century Skills: Teachers' Perspective. Education Research International, https://doi.org/10.1155/2023/7869980

Amr, Sh. (2020). An Evaluation of Incorporating the 21st Century Skills in 12th Grade English for Palestine. Master thesis, Hebron University, Palestine.

Anderson, A. A. (2020). Teacher approaches to teaching in the 21st century a case from turkish teachers of english. (Master's thesis) Bahçeşehir University, İstanbul.

Aristiawan, D. & Herman (2021). Fl Teachers' Strategies In Implementing The 21st Century Skills Applied In 2013 Curriculum: A Case Study At Sman 1 Pringgarata, Lombok Tengah. Pioneer. 13 (2), 227 – 242.

Baysura, O.D., Altun, S. & Yucel-Toy, B. (2015). Perceptions of teacher candidates regarding project-based learning. *Eurasian Journal of Educational Research*, 62,15-36 http://dx.doi.org/10.14689/ejer.2016.62.3

Bolat, Y. (2022). THE USE OF 21ST CENTURY SKILLS BY SECONDARY SCHOOL ENGLISH LANGUAGE TEACHERS AND THE CHALLENGES THEY FACE. A master's thesis, TURKISH REPUBLIC, TRAKYA UNIVERSITY.

Creswell. J. (2018). Research design.5th edition, SAGE Publishing.

Dede, C. (2018). The 60 Year Curriculum: Developing New Educational Models to Serve the Agile Labor Market. Commentary. The EvoLLLution. Retrieved from: https://evolllution.com/revenue-streams/professional_development/the-60-year-curriculum-developing-new-educational-models-to-serve-the-agile-labor-market/

Eaton, SE. (2010). Global Trends in language learning in the twenty-first century. Calgary: Onate Press.

Eker Uka, E. & Bedir, H. (2023). Exploring EFL teachers' perceptions on 21st – century skills: A case study, e-Kafkas Journal of Educational Research, 10, 169-183, doi:10.30900/kafkasegt.1240904

Erdem, E. & Demirel, O. (2002). Constructivism in curriculum development. Dergisi Journal, 23, 81-87.

Fandino, Y. (2013). 21st Century Skills and the English Foreign Language Classroom: A Call for More Awareness in Colombia. Gist Education and Learning Research Journal, 7, 190-208.

Faulkner, J., & Latham, G. (2016). Adventurous Lives: Teacher Qualities for 21st Century Learning. Australian Journal of Teacher Education, 41(4). https://doi.org/10.14221/ajte.2016v41n4.9

Handayani, N. (2017). Becoming the effective English teachers in the 21st century: What should know and ehat should do? In 1st English Language and Literature International Conference (ELLiC), 6May, 2017 (pp. 156–164). University of Muhammadiyah Semarang.

Harshbarger, D. (2016). Learning in the 21st century: A study addressing educational trends and implications (Doctoral dissertation, University of Central Florida)

Hixson, N. K., Ravitz, J., & Whisman, A. (2012). Extended professional development in project-based learning: impacts on 21st century skills teaching and student achievement. Charleston, WV: West Virginia Department of Education, Division of Teaching and Learning, Office of Research. Retrieved from https://files.eric.ed.gov/fulltext/ED565466.pdf

Idrizi, E. (2022). The 21st Century Skills and Language Education. CONTEMPORARY ISSUES IN LANGUAGE TEACHING

Jamilah, S., Siti N. (2020). Teacher Competence and 21st Century Skills in Transformation Schools 2025 (TS25). Universal Journal of Educational Research, 8(8), 3536 - 3544. DOI: 10.13189/ujer.2020.080829.

Johnson. (2019). 21st century pedagogy framework. https://www.teachthought.com/the-future-of-learning/a-diagram-of-21st-century-pedagogy/

Klimas, A. & Baran-Lucar, M. (2020). Developing 21st Century Skills in a Foreign Language Classroom: EFL Student Teachers' Beliefs and Self-Awareness. Academic Journal of Modern Philology, 10, 23-38.

Ledward, B. C., & Hirata, D. (2011). An overview of 21st century skills. Summary of 21st century skills for students and teachers. Honolulu: Kamehameha Schools–Research & Evaluation.

Organization for Economic, Co-operation and Development. (2018). The future of education and skills: Education 2030. Retrieved from https://www.oecd.org/education/2030/E2030%20Position%20Paper%20(05.04.2018).pdf

Orr, D., Rimini, M., & Van-Damme, D. (2015). Open educational resources: A catalyst for innovation. Paris: Center for Educational Research and Innovation, OECD Publishing. https://doi.org/http://dx.doi.org/10.1787/978926424 7543-en

Otlu, Ş. (2020). Exploring language teachers' 21st century skills practices and perceptions. (Master's thesis). Çağ University Institute of Social Sciences, Mersin.

Pardede, P. (2012). Meeting the 21st century ELT challenges: Becoming a professional English teacher. Paper presented at the A paper presented at ELT Conference and JELTA Establishment held by the English Teaching Study program of Universitas Kristen Indonesia Jakarta.

The Partnership for 21st Century Skills (P21). (2019). Framrwork for 21st century learning definition. Retrieved from https://cutt.us/MBSck.

Paschal, M. & Gougou, S. (2022). Promoting 21st Century Skills in English Language Teaching: A Pedagogical Transformation in Ivory Coast. Global Journal of Educational Studies, 8(2), 50-74.

Saavedra, A. R., & Opfer, V. D. (2012). Learning 21st-century skills requires 21st-century teaching. The Phi Delta Kappan, 94(1), 8–13. Retrieved from http://www.jstor.org/stable/41763587

Sirin, A. (2008). The Theoretical Foundations of Constructionism. Marmara Journal, 17, 196-205.

Sun, J., & Wang, Y. (2014). Tool choice for e-learning: Task-technology fit through media synchronicity. Information Systems Education Journal, 12(4), 17.

Tican, C., & Deniz, S. (2018). Pre-service teachers' opinions about the use of 21st century learner and 21st century teacher skills. European Journal of Educational Research, 8(1), 181–197. https://doi.org/10.12973/eu-jer.8.1.181

Contact email: Kfg218@gmail.com

The Development of Higher Education in Egypt

M. A. Zaki Ewiss, Cairo University, Egypt
Seddik Afifi, Merit University, Egypt

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Higher education (HE) in Egypt faces problems regarding efficiency and efficacy. Although there is some progress, the system is not regenerating fast enough to prepare young people for a more vibrant future. This work aims to present a road map toward improving the HE system. In this study, A new model for developing higher education towards the global plan 2030-2063 is introduced. In this model, the operational research approach is implemented to determine the activities, including all educational processes, such as educational policies, management, curricula, and human resources. The process analysis of the policy strategy components depicted that the higher education system in Egypt faces a triple crisis: the scarcity of human capital, low quality, poor integration and inconsistency with the needs of the private sector. From the results, we conclude that developing HE require training for transformation to assist the country in adopting a comprehensive approach to its education system and obtaining better value for money from education expenditures to prepare skilled graduates for national development, introducing an "International Action Scheme" for mobility universities students; as well as enhancing Science, Technology and Innovation. To ensure that Egypt does not lag behind the "Fourth Industrial Revolution", we recommend the importance of developing priority through national entrepreneurship plans and incubators in academic sectors such as agrifood, marine science, energy, water treatment, ICT, infrastructure, medicines, nutrition, and green economies.

Keywords: Higher Education, Triple Helix, Operational Research, Edumod-Egypt Model, Educational Policy, Labor Skills, Innovations

iafor
The International Academic Forum
www.iafor.org

Introduction

The development of higher education in Egypt has a rich and complex history, closely linked to the cultural, political and social development of the country. From ancient times to the modern era, Egypt has been a beacon of learning and intellectual pursuits. Higher education in Egypt dates back to ancient times, with the founding of institutions such as the Temple of Ptah in Memphis and the Library of Alexandria. The latter, founded in the 3rd Century BC, became the largest and most important library in the ancient world, attracting scholars from across the Mediterranean and beyond. During the Islamic Golden Age, Cairo became a major centre of learning. Al-Azhar University, founded in 970 CE, is one of the oldest operating universities in the world. It was originally a mosque but was later converted into a comprehensive university focusing on Islamic law, theology and many other disciplines.

In the 19th Century, reform of higher education began under the reign of Muhammad Ali Pasha, who ruled Egypt in the early 19th Century and implemented a number of educational reforms. He sent students abroad to study in Europe and established schools and colleges in Egypt. His efforts laid the foundation for a more modern education system. In the early 20th Century, Cairo University was founded in 1908, marking a milestone in modern Egyptian higher education. It was Egypt's first secular university, offering a wide range of academic disciplines and serving as a model for other institutions in the region. In the mid-20th Century, after gaining independence from British rule in 1952, Egypt experienced rapid expansion of its higher education system. New universities were established, including Ain Shams University and Alexandria University. This period also saw an emphasis on free education and expanding educational opportunities for all. The Egyptian government enacted the Higher Education Law in 1972. This law aimed to regulate and modernize higher education in Egypt, addressing issues of governance, funding, and academic standards. Egypt has played a significant role in shaping the modern higher education landscape. Over the past decades, Egypt has focused on improving the quality of higher education, aligning it with international standards. Efforts have been made to improve research output, faculty qualifications, and infrastructure. The early 21st Century saw the establishment of private universities, such as the American University in Cairo (AUC), the German University in Cairo (GUC), and the Future University of Egypt (FUE). These institutions have introduced various models and curricula, contributing to the overall development of the sector. The advent of the digital age has brought significant changes to higher education in Egypt. Online learning platforms, online courses, and digital libraries have become an essential part of the educational landscape, especially during the COVID-19 pandemic. Recent government initiatives aim to modernize the higher education system further. Projects such as the Egyptian-Japanese University of Science and Technology (E-JUST) and the Knowledge City in the New Administrative Capital are examples of efforts to promote innovation and research.

Challenges and Future Prospects

In the last two decades, higher education in Egypt has faced numerous challenges affecting its efficiency, quality, and accessibility. These challenges are deeply rooted in the historical, socioeconomic, and political context (Afifi and Ewiss, 2023; Badran, 2018; Habchi, 2018; Mohamed et al., 2023). The main challenges are grouped in Table 1.

Challenges of Higher Education in Egypt	
- University motivation,	- Overpopulation
- Lack of educator capacity	- Educational Management
- Dilapidated infrastructure	- Disparities and Equity
- Teaching methodology	- Outdated curriculum
- Student enrolment	- Poor-calibre trainees
- Lack of recognition of certificates	- Limited Funds
- Supply and demand	- Brain Drain

Table 1: Challenges of Higher Education in Egypt

In the following, we present a comprehensive overview of the main challenges facing higher education in Egypt:

1. Quality Assurance and Accreditation
   - Varying standards: The quality of education differs greatly among various institutions. Public universities frequently fall behind private colleges in terms of facilities, faculty qualifications, and academic rigor.
   - Issues with accreditation: Making sure Egyptian universities comply with both national and international accreditation requirements is an ongoing challenge that impacts the worldwide recognition of degrees from the country.
2. Funding and Resources
   - Insufficient funding: Public universities face ongoing issues with a lack of funding, which hinders their capacity to enhance infrastructure, provide competitive pay, and support research and innovation.
   - Resource allocation is frequently inefficient, and the limited resources are not utilized effectively, resulting in disparities in the quality of education and facilities among institutions.
3. Faculty and Staff Development
   - Faculty qualifications: A large number of faculty members do not have higher education and experience with global educational standards and practices. It affects the standard of teaching and academic research.
   - Continuous professional development programs are necessary to ensure faculty remain current with the latest advancements in their fields.
4. Research and Innovation
   - Egyptian universities tend to have limited research output in comparison to global norms because of insufficient funding and a shortage of research infrastructure.
   - Innovation Ecosystem: The limited connection between universities and industry is hindering innovation and the implementation of research discoveries.
5. Access and Equity
   - Regional Disparities: The availability of quality higher education varies among different regions in Egypt. Educational facilities in urban areas are superior to those in rural areas.
   - Obstacles in Socioeconomic Status: Students coming from lower socioeconomic levels frequently encounter challenges in gaining access to higher education, such as financial constraints and insufficient preparatory education.
6. Curriculum and Pedagogy
   - Outdated curricula, found in numerous programs, do not match current industry needs or global educational trends.
   - Teaching Approaches: The use of traditional memorization techniques is still common, lacking focus on critical thinking, problem-solving, and practical abilities.

7. Employability and Labor Market Alignment
    - Skills Gap: Graduates lack the skills required by the labor market, creating a mismatch. This results in elevated levels of unemployment and underemployment among recent college grads.
    - University Career Services: Many universities do not have strong career services or partnerships with industries to assist students in moving from education to the workforce.
8. Governance and Autonomy
    - Strong government influence governs universities in the highly centralized higher education system. It restricts the independence and adaptability of institutions in making decisions.
    - Excessive bureaucracy within universities hinders effective management and creativity.
9. Technological Integration
    - The unequal distribution of digital technologies is present among institutions. While a few universities have adopted e-learning and digital resources, others are falling behind because they lack infrastructure and training.
    - Online learning during the COVID-19 crisis showcased the possibilities of online education while also revealing issues such as internet availability, digital skills, and the adequacy of institutions for providing high-quality online education.
10. Political and Social Stability
    - Political Unrest: Periodic political unrest has caused disruptions in the higher education system, impacting academic outcomes and the learning environment as a whole.
    - Broader social problems like poverty, gender inequality, and cultural norms also affect the availability and standard of higher education.

Implementation of the Triple Helix Model in Developing Higher Education

The Triple Helix model in higher education is a structure that helps us comprehend the relationships among universities, industry, and government. Henry Etzkowitz and Loet Leydesdorff (1998) developed this concept. They highlight the importance of the interconnected and constantly changing connections between these three foundations, essential for promoting innovation and economic growth. Here is a summary of the Triple Helix model, its parts, and its importance in higher education:

Components of the Triple Helix Model

1. Universities:
    - Responsibilities: Building knowledge, conducting research, and providing education.
    - Function: It is the role of universities to create fresh knowledge by conducting research and imparting it through education. Additionally, they are vital in cultivating talented individuals and promoting analytical thinking.
2. Industry:
    - Role: The economic production and marketing of knowledge.
    - Function: Utilizing research generated by universities, the field creates innovative products, services, and technologies. It provides financial support for research and provides useful knowledge and resources for academic endeavors.

3. Government:
    - Role: Governing, financing, and policymaking.
    - Function: The government influences the educational and economic environment through policy creation, funding research and development, and implementing regulations for university-industry relations.

Interactions and Dynamics

- University-Industry Collaboration: This includes joint ventures on research projects, technology transfer, internships, and the commercialization of scholarly findings between academic institutions and businesses. These kinds of partnerships can result in the creation of cutting-edge goods and services as well as give students real-world experience.
- University-Government Collaboration: Governments frequently use grants and scholarships to support university research. Additionally, they create frameworks for research funding and intellectual property laws, among other policies that promote innovation and higher education.
- Industry-Government Cooperation: Infrastructure development, tax breaks, and subsidies are some of the ways that governments assist businesses. They also establish rules that guarantee honest business practices and fair competition in the sector.

Significance of the Triple Helix Model in Higher Education

1. Innovation and Economic Growth:
    - By combining the assets and capabilities of academia, business, and government, the Triple Helix model fosters the co-creation of knowledge and innovation. Economic growth and major technological advancements can result from this cooperative approach.
2. Enhanced Research and Development:
    - The model strengthens university research capacities by promoting closer ties between academia and business. Universities offer funding and theoretical insights, while industry partnerships give access to real-world challenges and state-of-the-art research facilities.
3. Education and Workforce Development:
    - These three sectors work together to make sure that educational programs are in line with industry demands and that graduates have the necessary skills. By doing this, the skills gap is closed, and students are better prepared for the workforce.
4. Policy and Infrastructure Support:
    - The involvement of the government guarantees the establishment of infrastructure and policies that support industry-university collaboration. The sustainability of innovation ecosystems depends on this support.
5. Regional and National Competitiveness:
    - Countries and regions can become more globally competitive by putting the Triple Helix model into practice. Strong innovation ecosystems they build draw capital, skilled workers, and cutting-edge industries.

Challenges and Considerations

- Coordination and Communication: Clear coordination and communication between the three sectors are necessary for effective collaboration. Conflicting interests or misalignments can impede development.
- Intellectual Property and Data Sharing: When there are several parties involved, navigating agreements pertaining to intellectual property rights and data sharing can be difficult.
- Funding and Resource Allocation: It can be difficult to obtain sufficient funding and resources for cooperative projects, especially during uncertain economic times.
- Cultural Differences: Working together can be difficult because governments, businesses, and universities frequently have distinct cultures and ways of doing things.

The Triple Helix model's structure is shown in Figure 1. As can be seen from the previous, the Triple Helix model signifies a paradigm change in the way government, business, and higher education collaborate to promote innovation and economic growth. Together, these three industries can build a more vibrant and fruitful environment for the creation and application of knowledge, which will ultimately benefit society and the economy.

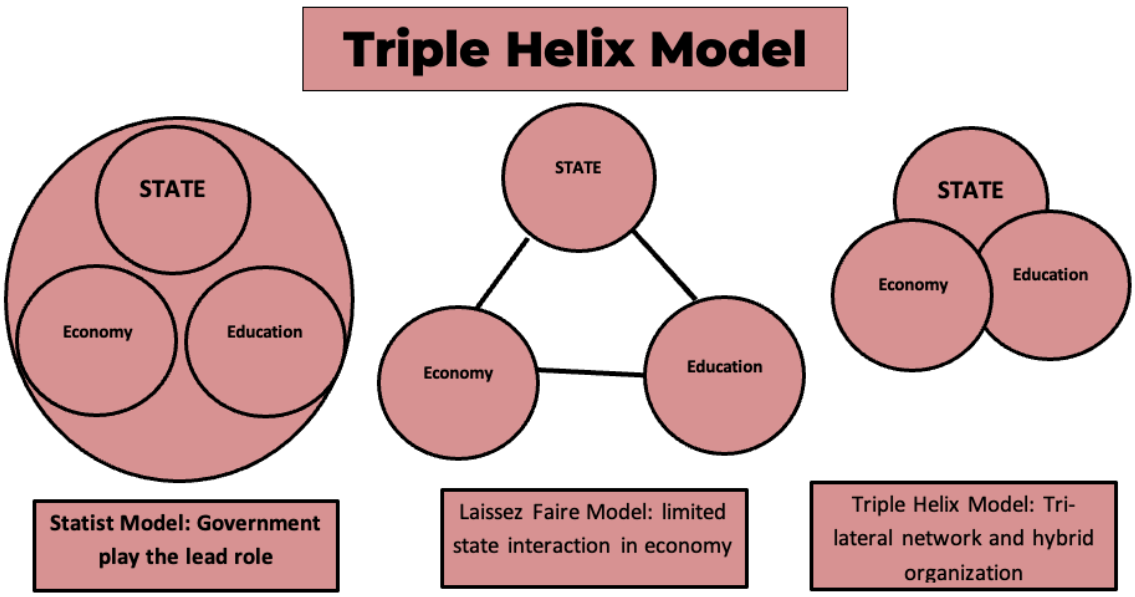


Figure 1: The Structure of the Triple Helix Model

Assessment, Planning, Doing, and Checking Cycle (APDC Cycle)

Assessment, planning, doing, and checking, or the APDC cycle, is a continuous improvement process that is especially important in higher education in order to guarantee efficacy and quality in both academic and administrative functions. The Deming Cycle, also known as PDCA (Plan-Do-Check-Act), is the source of this cycle, which has been modified to meet the unique requirements and environments of educational institutions. A thorough examination of each phase of the APDC cycle and its use in higher education is provided in Table 2.

Stage	Application
Assessment	**Objective**: To evaluate current processes, performance, and outcomes • **Academic Assessment**: This involves evaluating the effectiveness of curricula, teaching methods, and learning outcomes. Tools such as student surveys, course evaluations, and standardized tests are often used. • **Administrative Assessment**: This includes reviewing administrative processes and services such as admissions, financial aid, and student support services. Performance metrics and feedback from stakeholders (students, staff, faculty) are crucial. **Key Activities**: • Collecting data on various performance indicators. • Analyzing feedback from students, faculty, and other stakeholders. • Identifying strengths, weaknesses, opportunities, and threats (SWOT analysis
Planning	**Objective**: To develop strategies and plans based on the assessment findings. • **Academic Planning**: Based on assessment results, universities might redesign courses, update syllabi, introduce new programs, or implement new teaching methodologies. • **Administrative Planning**: This might involve restructuring departments, introducing new administrative processes, or enhancing student services. **Key Activities**: • Setting clear, measurable goals and objectives. • Designing action plans to address identified issues and improve outcomes. • Allocating resources and assigning responsibilities.
Doing	**Objective**: To implement the plans developed during the planning stage. • **Academic Implementation**: This includes rolling out new or revised curricula, adopting new teaching tools and technologies, and conducting professional development for faculty. • **Administrative Implementation**: This could involve launching new student services, implementing new administrative procedures, or upgrading infrastructure. **Key Activities**: • Executing the action plans. • Providing necessary training and resources to staff and faculty. Ensuring stakeholder engagement and participation.
Checking	**Objective**: To monitor and evaluate the implementation process and outcomes. • **Academic Checking**: This involves assessing the impact of the changes on student learning and academic performance. Tools such as formative assessments, summative assessments, and feedback mechanisms are used. • **Administrative Checking**: This includes evaluating the effectiveness of new processes and services, using performance metrics and feedback from stakeholders. **Key Activities**: • Collecting and analyzing data on the implementation outcomes. • Comparing actual performance against the set goals and objectives.

Table 2: The Stages of the APDC Cycle and Its Applications

Continuous Improvement

After the Checking phase, the cycle repeats, beginning again with Assessment. This continuous loop ensures that higher education institutions are constantly improving and adapting to new challenges and opportunities. The iterative nature of the APDC cycle fosters a culture of ongoing evaluation and enhancement. The benefits of the APDC cycle are summarized in Table 3.

Benefit	Function
1. **Enhanced Quality Assurance**:	o By regularly assessing and improving processes, institutions can ensure high standards in both academic and administrative functions.
2. **Increased Accountability**:	o The cycle promotes transparency and accountability as each phase requires documentation and evaluation.
3. **Stakeholder Engagement**:	o Continuous feedback from students, faculty, and other stakeholders is integral to the process, ensuring that their needs and expectations are met.
4. **Adaptability and Responsiveness**:	o The iterative nature of the cycle allows institutions to quickly adapt to changes in the educational landscape, including technological advancements and evolving student needs.
5. **Data-Driven Decision Making**:	o Decisions are based on empirical data and thorough analysis, leading to more effective and targeted interventions.

Table 3: Benefits of the APDC Cycle in Higher Education

Challenges and Considerations

- Resource Allocation: Effective implementation of the APDC cycle requires sufficient resources, including time, funding, and personnel.
- Stakeholder Buy-In: Achieving buy-in from all stakeholders, especially in large institutions, can be challenging but is crucial for successful implementation.
- Consistent Monitoring: Regular and consistent monitoring is necessary to ensure that the cycle is effective, which can be demanding in terms of effort and coordination.

Figure 2 shows a schematic of the framework of the APDC cycle.

In summary, the APDC cycle is a powerful framework for fostering continuous improvement in higher education. By systematically assessing, planning, doing, and checking, institutions can enhance their quality, effectiveness, and responsiveness, ultimately leading to better educational outcomes and overall institutional performance.

The Development of Higher Education Using Operational Research Methods

Applying an operational research (OR) approach to the development of higher education in Egypt can provide a structured and systematic method to optimize resources, improve decision-making, and enhance the overall quality and accessibility of education. Operational research employs analytical methods to aid in decision-making and can be instrumental in addressing complex challenges in higher education. Here is a detailed analysis of how OR can be applied to the development of higher education in Egypt:

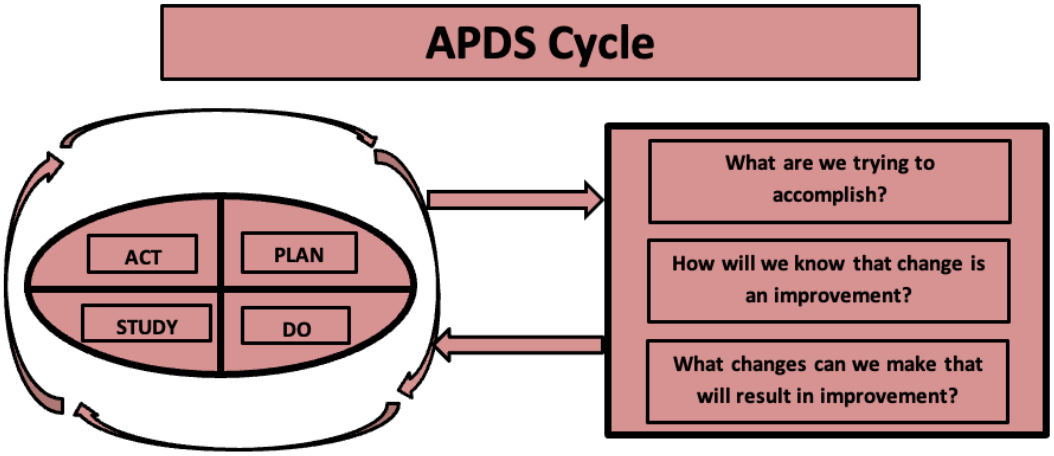


Figure 2: The Framework of the APDC Cycle.

Problem Definition

The first step in applying OR is to define the problems and objectives clearly. Key issues in the development of higher education in Egypt include 1) Insufficient funding and resource allocation, 2) Inequitable access to education, 3) Quality assurance and improvement., the mismatch between graduates' skills and market needs, and 4) Need for modernization and digital transformation.

Data Collection and Analysis

Accurate data is crucial for operational research. Data collection involves gathering information on the following: 1) student demographics, enrollment rates, and dropout rates; 2) financial data on funding sources, expenditures, and resource allocation; 3) Infrastructure status, including facilities, technology, and educational materials; 4) Faculty qualifications, training, and research output; and 5) Labor market trends and employer needs.

Model Formulation

Based on the data collected, various OR models can be formulated to address specific issues. These models are listed in Table 4.

Model	Description
1. Resource Allocation Models:	○ **Linear Programming (LP)**: LP can optimize the allocation of limited resources (e.g., budget, faculty, facilities) to maximize educational outcomes, such as graduation rates or research output. ○ **Multi-Criteria Decision Analysis (MCDA)**: This approach can balance multiple objectives, such as cost efficiency, quality improvement, and equity in resource distribution.
2. **Simulation Models**:	○ **Discrete Event Simulation (DES)**: DES can model the flow of students through the educational system, identifying bottlenecks and testing the impact of policy changes, such as increasing faculty numbers or expanding facilities. ○ **System Dynamics (SD)**: SD can capture the complex interactions between different components of the education system, such as funding, enrollment, and employment outcomes, to forecast long-term trends and outcomes.
3. **Queuing Theory**:	○ Queuing models can be used to analyze and optimize processes such as admissions, registration, and student services, reducing waiting times and improving service delivery.
4. **Forecasting Models**:	○ **Time Series Analysis**: This can project future trends in student enrollment, budget needs, and labor market demands, aiding in strategic planning and policy development.

Table 4: The Operational Research Models

Solution Implementation

Once the models are developed and validated, the next step is to implement the solutions:

- Policy Recommendations: Based on model outcomes, recommendations can be made for policy changes, such as increasing funding for specific programs, introducing new courses aligned with market needs, or implementing targeted financial aid for disadvantaged students.
- Resource Allocation: Optimal resource allocation plans can be developed and executed, ensuring that funds, faculty, and facilities are used efficiently to achieve educational goals.

Monitoring and Evaluation

Operational research is an iterative process. Continuous monitoring and evaluation are essential to ensure that implemented solutions are effective:

- Key Performance Indicators (KPIs): Establish KPIs to measure success, such as improved graduation rates, higher employment rates of graduates, and increased research output.
- Feedback Loops: Collect feedback from stakeholders, including students, faculty, and employers, to identify areas for further improvement.

Hypothetical Case Study to Develop Higher Education in Egypt Using Operational Research Approach

The Egyptian Structure of Higher Education

Currently, Egypt's higher education system is comprised of twenty-seven public universities, twenty-seven private universities, twenty semi-private universities, six foreign university branches, and four hundred higher institutes and academies. The public universities offer three hundred education programs at the undergraduate level and another three hundred programs at the postgraduate level, covering various scientific sectors such as medicine, engineering, basic sciences, and social and humanities. Conversely, private universities and other higher institutions and academies offer a more limited range of education programs (5-10 programs) to meet the students' demands. It is worth mentioning that 85% of 3.5 million Egyptian students are enrolled in public Universities, while only 15% of the students are enrolled in private universities and other higher institutions.

Let us consider a hypothetical case study where OR is applied to improve the allocation of government funding across public universities in Egypt:

1. Problem Definition: The objective is to distribute limited government funds to maximize student outcomes (graduation rates) while ensuring equity (supporting disadvantaged students).
2. Data Collection: Data is gathered on current funding levels, student demographics, performance metrics (graduation rates, dropout rates), and socioeconomic indicators.
3. Model Formulation: An LP model is developed to optimize fund allocation based on the objective function of maximizing weighted student outcomes, subject to constraints such as minimum funding levels for each university and equity considerations.
4. Solution Implementation: The optimal funding distribution is calculated and implemented. Universities receiving additional funds are required to report on their use and impact on student outcomes.
5. Monitoring and Evaluation: KPIs such as changes in graduation rates and improvements in disadvantaged students' performance are monitored. Regular feedback is collected to adjust the model and funding allocations as necessary.

Proposed Solution

EDUMOD – EGYPT Model

The Edumod-Egypt model is described in more detail elsewhere (Zaki Ewiss, 2018; Zaki Ewiss, 2023). In this framework, ten education pillars are identified. These pillars are identified as follows:

1) Educational Policy
2) Educational Management
3) Educational Economy (Budget)
4) School/University Construction and Equipment
5) Educational Programs Curricula
6) Educational Teaching Methods
7) Teacher responsibilities
8) Educational Human Resources
9) Evaluation
10) Media and Educational Development

Figure 3 shows the tree model for the analysis of each pillar and its domains, including educational activities and processes.

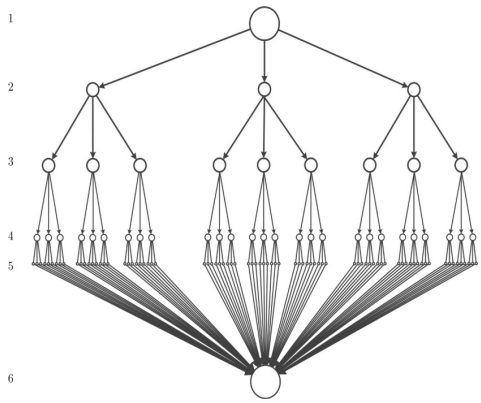


Figure 3: The Tree Model to Identify the Educational Domains, Activities, and Processes

Think about a scenario where OR is used to improve the distribution of government funds among public universities in Egypt:

1. Objective: The aim is to efficiently distribute scarce government funds to enhance educational results and ensure fairness.
2. Gather data on existing funding amounts, student characteristics, operational expenses, and performance measures.
3. Formulate a model to distribute funds through linear programming, taking into account goals like maximizing graduation rates and ensuring fair access. Budget constraints and minimum funding requirements for each institution will be considered.
4. Implement the optimal distribution of funds to universities and continuously monitor performance, making adjustments as necessary.
5. Evaluate the effectiveness of the funding strategy using key performance indicators such as changes in graduation rates and equity in access. Gather feedback to enhance the model and improve results.

In Figure 4-10, the main domains, including the educational activities and process of the educational pillars given above, are shown.

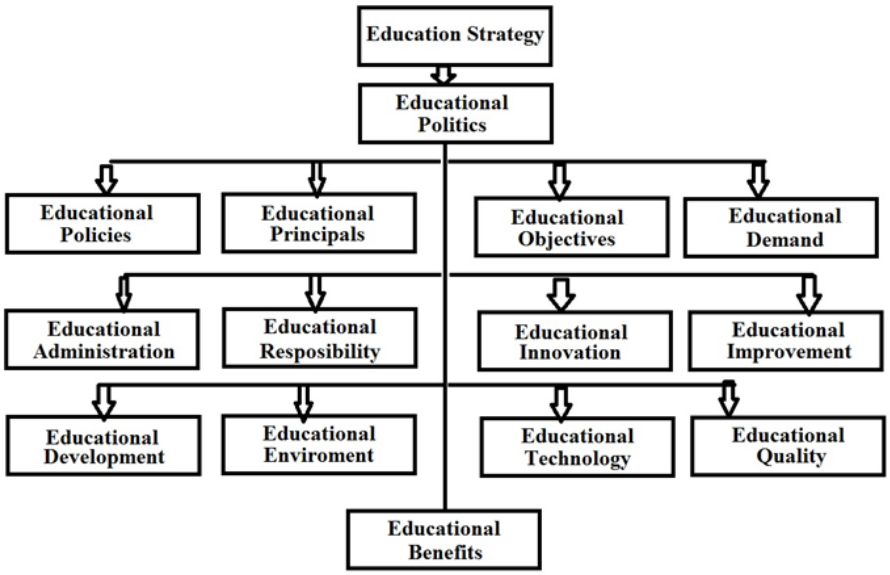


Figure 4: Suggested Tree Model for the Educational Strategy

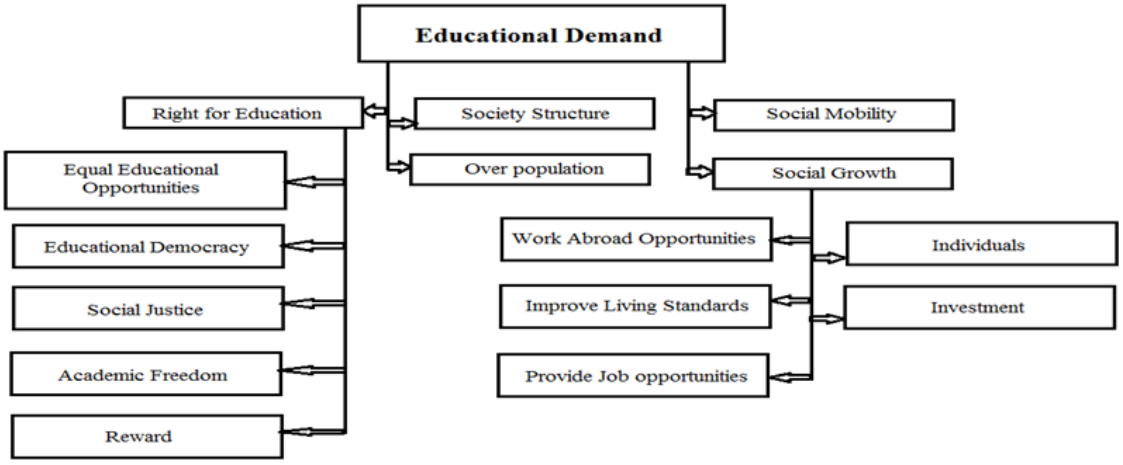


Figure 5: The Main Activities in the Domain of Educational Demand

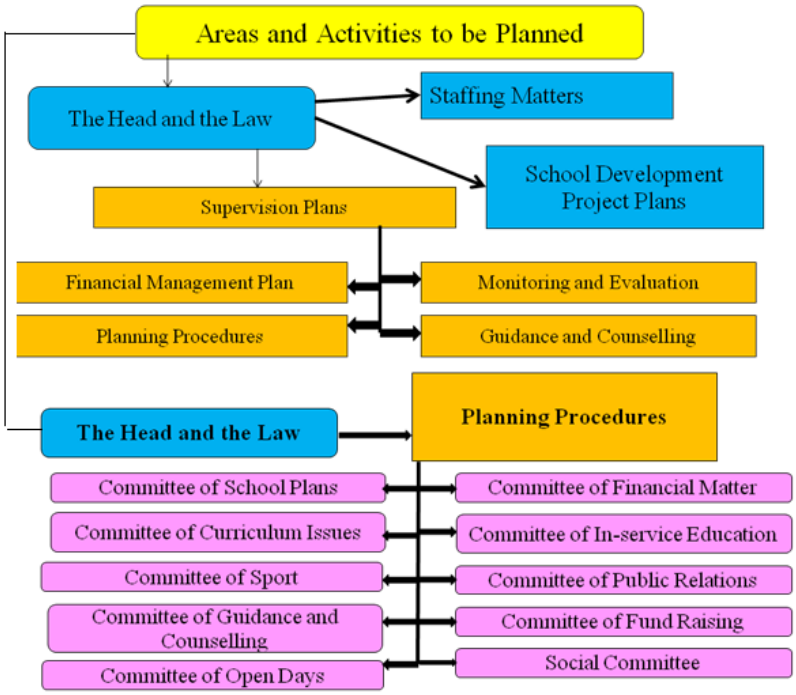


Figure 6: The Main Activities in the Domain of Educational Plans

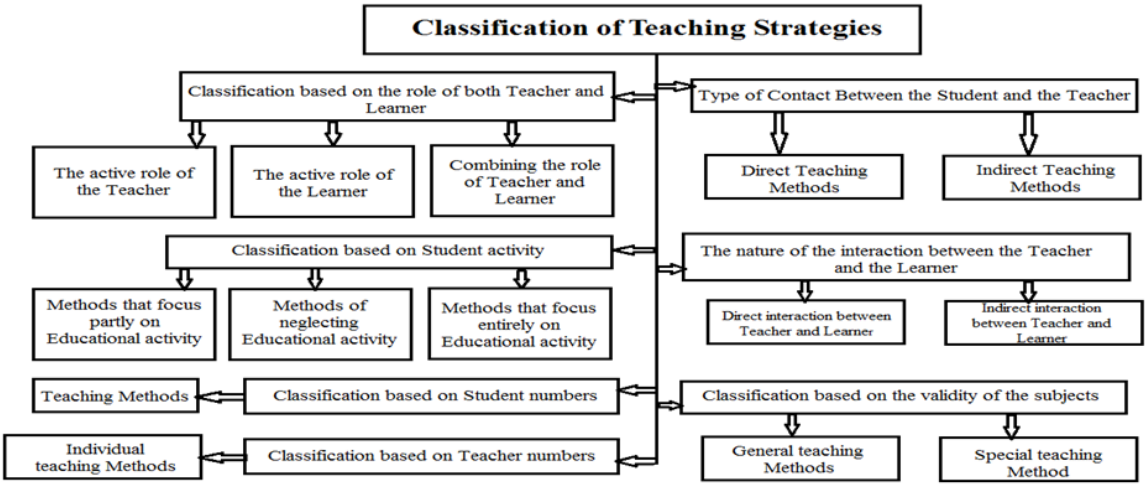


Figure 7: The Main Activities of the Teaching Strategies

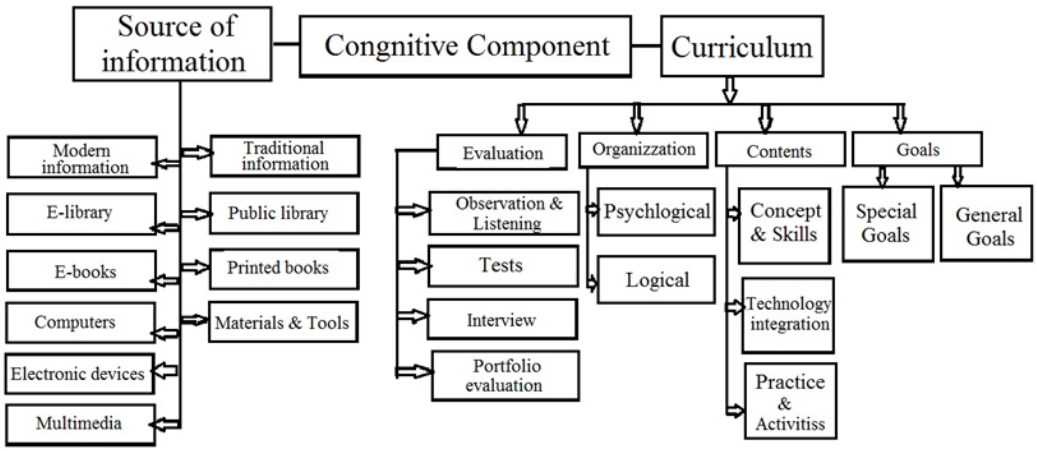


Figure 8: The Tree Model for the Cognitive Components

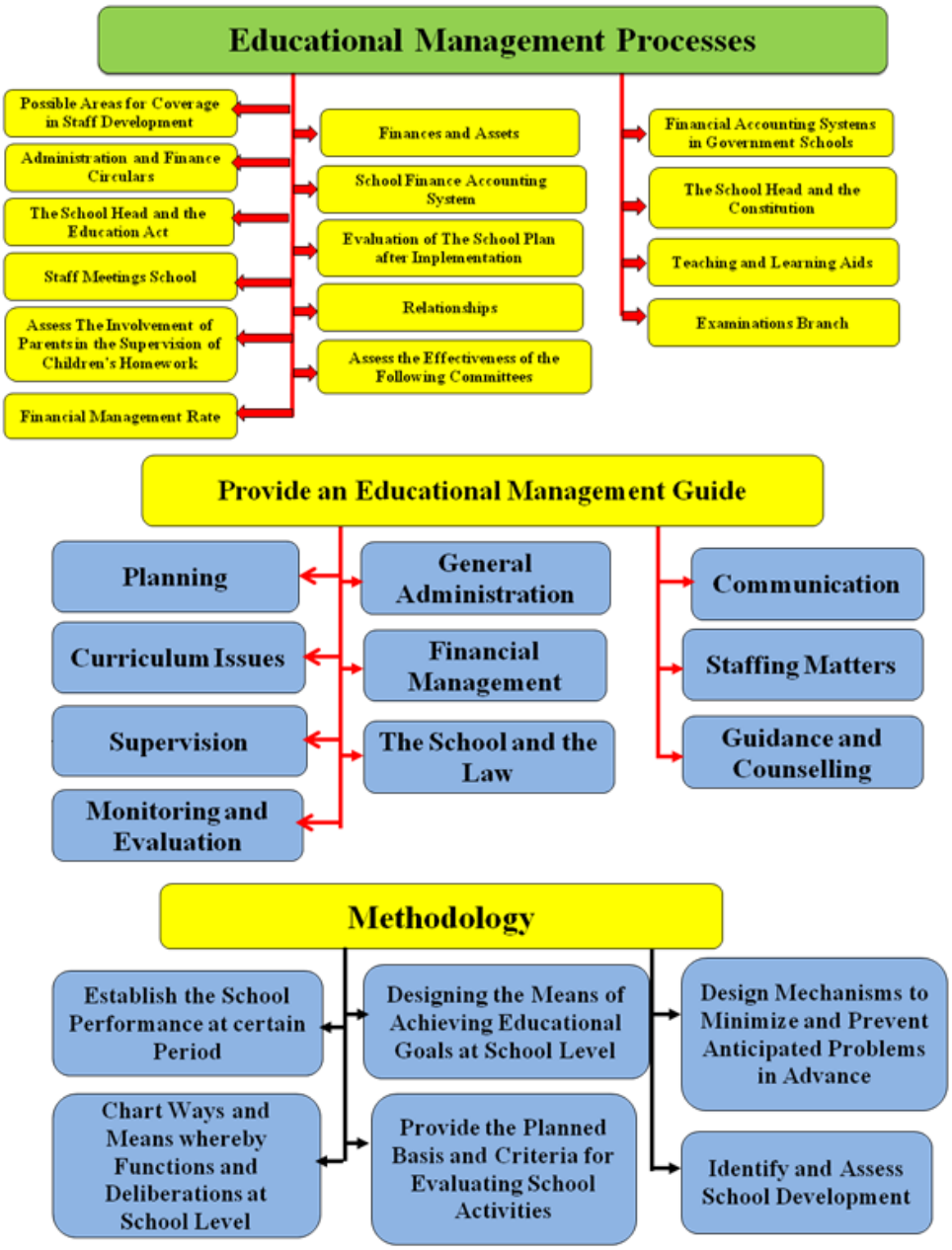


Figure 9: The Main Activities and Processes of the Educational Management

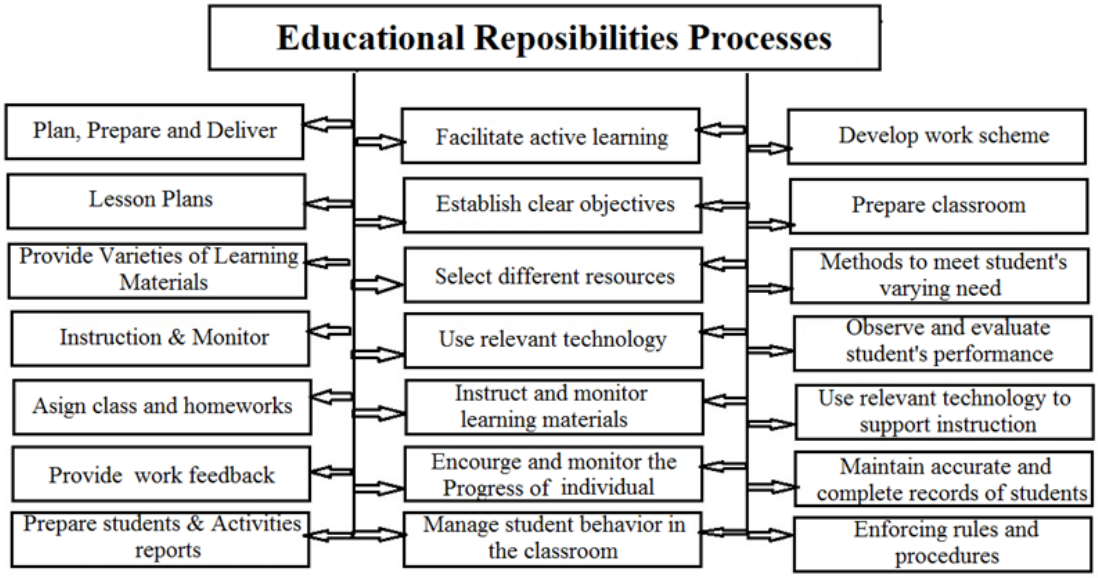


Figure 10: Scheme for the Educational Responsible Processes

Example: Proposal for Developing an Effective Model of Teaching in Higher Education

The aim is to develop an effective model for teaching in higher education, which involves integrating various pedagogical strategies, technological tools, and assessment methods to create a comprehensive and dynamic learning environment.

Table 5 describes our proposed model to enhance teaching in higher education, emphasizing student-centered learning, active engagement, and continuous improvement is presented.

Stage	Description
1. Curriculum Design and Planning	**Objective**: To develop a curriculum that is relevant, comprehensive, and aligned with learning outcomes. • **Outcome-Based Education (OBE)**: Design courses with clear, measurable learning outcomes that align with the skills and knowledge students need. • **Integrated Curriculum**: Ensure interdisciplinary integration where applicable, connecting concepts across different subjects to provide a holistic learning experience. • **Flexibility**: Incorporate elective courses and flexible learning paths to cater to diverse student interests and career goals.

2. Teaching Strategies	**Objective**: To implement diverse and effective teaching methods that cater to different learning styles.
	• **Active Learning**: Engage students through discussions, group work, problem-solving activities, and hands-on projects. Techniques include:
	  ○ **Flipped Classroom**: Students review content before class, and class time is dedicated to interactive activities and discussions.
	  ○ **Problem-Based Learning (PBL)**: Students learn through solving complex, real-world problems.
	  ○ **Case Studies**: Analyze real-life scenarios to apply theoretical concepts.

	• **Blended Learning**: Combine face-to-**face instruction with online learning to provide flexibility and enhance accessibility.** ○ **Synchronous Online Learning: Live virtual classes, webinars, and online discussions.** ○ **Asynchronous Online Learning: Pre-recorded lectures, discussion forums, and self-paced assignments.** • **Collaborative Learning: Foster teamwork and communication skills through group projects, peer reviews, and collaborative research**.
3. **Technological Integration**	**Objective: To leverage technology to enhance teaching and learning experiences.** • **Learning Management Systems (LMS): Platforms like Moodle, Canvas, or Blackboard for managing course content, assignments, and assessments.** • **Educational Technologies: Use tools like interactive whiteboards, simulations, and educational software to create engaging learning experiences.** • **Online Resources: Incorporate e-books, academic journals, videos, and other digital resources to supplement learning.**
4. Assessment and Feedback	**Objective: To employ diverse assessment methods to evaluate student learning and provide constructive feedback.** • **Formative Assessment: Continuous assessments like quizzes, in-class activities, and draft submissions to monitor progress and provide timely feedback.** • **Summative Assessment: Comprehensive evaluations like final exams, projects, and papers to assess overall learning at the end of a course.** • **Authentic Assessment: Real-world tasks such as internships, practicums, and portfolios to evaluate the practical application of knowledge**
5. **Student Support and Engagement**	**Objective: To create a supportive and engaging learning environment.** • **Academic Advising: Guide course selection, career planning, and academic challenges.** • **Mentorship Programs: Connect students with faculty or industry mentors for personal and professional development.** • **Student Services: Offer resources such as counseling, tutoring, writing centers, and disability services to support diverse student needs.** • **Extracurricular Activities: Encourage participation in clubs, organizations, and events to foster a sense of community and enhance soft skills.**
6. Professional Development for Faculty	**Objective: To ensure continuous improvement in teaching practices through professional development.** • **Training Programs: Regular workshops and seminars on teaching methodologies, technological tools, and curriculum development.** • **Peer Observations: Faculty observe each other's classes to share best practices and provide constructive feedback.** • **Research Opportunities: Encourage faculty to**

	engage in educational research to stay updated with the latest pedagogical advancements.
7. Evaluation and Continuous Improvement	**Objective**: To continuously assess and improve teaching practices and curriculum effectiveness. • **Course Evaluations**: Collect feedback from students on course content, teaching methods, and overall experience. • **Data Analysis**: Analyze performance data and feedback to identify areas for improvement. • **Review and Revise**: Regularly update curriculum, teaching strategies, and assessment methods based on evaluation results and emerging trends.

Table 5: *Proposal for an Effective Model of Teaching in Higher Education*

At this point, it is believed that implementing this comprehensive model for teaching in higher education can significantly enhance the quality of education provided. By focusing on student-centered learning, leveraging technology, employing diverse assessment methods, and continuously improving through feedback and professional development, higher education institutions can create dynamic and effective learning environments that prepare students for success in their academic and professional lives.

Conclusion

Egypt's longstanding dedication to education and intellectual advancement is reflected in the growth of its higher education system. Even though there has been much progress, ongoing work is still required to solve the problems at hand and guarantee that Egyptian higher education is kept competitive and relevant in the international arena. Government agencies, academic institutions, the commercial sector, and civil society must work together to implement comprehensive reforms and persistent efforts to address these issues. Reviving higher education in Egypt will require prioritizing funding, enhancing faculty development, updating curricula, strengthening ties between industry and education, and improving governance. By addressing these problems, Egypt can better prepare its graduates with the know-how and abilities required to support the socioeconomic development of the country and contend on the international stage. The evolution of higher education in Egypt can be approached using an operational research approach, which provides a strong framework for addressing difficult problems. An operational research approach can assist in maximizing resource use, enhancing educational quality, and guaranteeing equitable access through methodical data analysis, model development, and ongoing evaluation. It will ultimately result in a more efficient and long-lasting higher education system in Egypt.

References

Afifi S., Ewiss M. (2023). Improving Educational Management in Developing Countries Using an Operational Research Approach ISSN: 2188-1162 The European Conference on Education 2023: Official Conference Proceedings https://doi.org/10.22492/issn.2188-1162.2023.88

Almansour, S. (2016). The Crisis of Research and Global Recognition in Arab Universities, Near and Middle Eastern Journal of Research in Education, 2016(1), 1-13.

Badran, A. (2018). Landscape of Higher Education in the Arab World: Quality, Relevance, and Student M Afifi S., Ewiss M. (2023) obility, In Badran A., Baydoun E., Hillman J. (eds) Universities in Arab Countries: An Urgent Need for Change (pp. 71-84). Springer, Cham.

Etzkowitz, H., & Leydesdorff, L. (1998). A Triple Helix of University-Industry—Government Relations: Introduction. Industry and Higher Education, 12(4), 197-201. https://doi.org/10.1177/095042229801200402

Habchi, A. (2018). The Role of Governments in Shaping Governance of Higher Education Institutions in the Arab World, In Azzi G. (eds) Higher Education Governance in the Arab World (pp. 105-130), Palgrave Macmillan, Cham.

Mohamed M., Ghoneim Sywelem, Asmaa Mohamed Elsayed Makhlouf. (2023). Common Challenges of Strategic Planning for Higher Education in Egypt, American Journal of Educational Research, 2023, Vol. 11, No. 6, 430-439 Available online at http://pubs.sciepub.com/education/11/6/12 Published by Science and Education Publishing DOI:10.12691/education-11-6-12

Zaki Ewiss (2018). CAIRO UNIVERSITY PROPOSAL FOR EDUCATION REFORM IN DEVELOPING COUNTRIES USING MODELING TECHNIQUE (EDUMOD-EGYPT), ICERI2018 Proceedings, Pp. 9006-9014.doi: 10.21125/iceri.2018.0661

Zaki Ewiss, M. A. (2023). "Management of pre-university Egyptian education: politics, issues and trend", Journal of Humanities and Applied Social Sciences, Vol. 5 No. 1, pp. 35-58. https://doi.org/10.1108/JHASS-04-2021-0079/

Contact email: mzewiss@cu.edu.eg

The Financing of Higher Education in Egypt: Issues, Politics, and Trends

M. A. Zaki Ewiss, Cairo University, Egypt
Seddik Afifi, Merit University, Egypt

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The Strategic financing decisions of higher education have multifaceted effects on creating a knowledge economy and equitable access, quality, relevance, research and innovation in particular. This paper is based on the data sources and examines financing policies, programs, practices, trends and challenges. Low levels of funding, the inefficiency of the higher education system, inconsistent funding policies, programs and practices, weak financial management system, shadowed equity and access and the rising cost of higher education are traced. The general purpose of this work is to examine the existing funding system of higher education in Egypt and provide strategic funding modalities to achieve higher education goals of access, equity, relevance, quality research and innovation. More specifically, its aims are: a) to examine financing policies in higher education, b) To analyze the trends of public financing in higher education in terms of GDP, public budget and the education budget, c) To explore the status of per student allocation in public financing, d) To examine the diversification of source of higher education funding, and e) To identify major challenges associated with higher educational funding. We present suggested strategic funding measures using the operational research approach to achieve higher education goals of equity, access, relevance, quality, innovation and research.

Keywords: Higher Education, Financial Management, Operational Research

iafor
The International Academic Forum
www.iafor.org

Introduction

At the intersection of growth, jobs, and competitiveness lies the critical role of higher education, which has the potential to drive economic transformation. Higher education serves as the pinnacle of the education system, supporting lower levels of education, preparing professionals and skilled labor, and acting as a hub for research. As developing nations expand their basic education systems and transition into the knowledge economy, higher education will play a crucial role, as recognized in the Sustainable Development Goals. It will serve as a hub for the knowledge base and human capital needed to foster and maintain development across various sectors. Specifically, Sustainable Development Goal 4 is committed to "ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all" (UNGA 2015).

There is a consensus that education plays a crucial role in accelerating economic growth and ensuring an equal sharing of the benefits from this growth (Birdsall and London, 1997; Lant Pritchett, 1996). It is no surprise that the majority of developing nations, such as Egypt, have pledged to offer free education to all their citizens at every educational stage following their independence. The Egyptian government still upholds its commitment to be the primary supporter and financier of education, including higher education, as seen by its ongoing legacy.

Egypt currently faces two main challenges: (i) the returns on investment in education are believed to be low, and (ii) the growing need for higher education is straining the government budget. The benefits of investing in education for economic growth, income distribution, and poverty reduction are limited in Egypt and the MENA region overall. Simultaneously, the increase in the need for advanced education is being driven by shifts in population, advancements in technology, and a more competitive job market amidst limited financial resources (World Bank, 2017; World Bank, 2022). In the previous research conducted by (Afifi and Ewiss, 2023; Zaki Ewiss, 2023), we explored the various influences that impacted the educational systems, academic offerings, and organizational frameworks of Egyptian higher education uniquely. The restructuring of the public education system aimed to generate financial resources independently due to decreased government funding; this led to the formation of a new educational model distinct from traditional public universities, making it challenging to categorize its characteristics as either a state-affiliated system or one executing state human development policies.

Nevertheless, evaluating the current condition of the Egyptian education system requires considering the standards that regulate its educational approach in the context of the information age. There is a consensus that in the third millennium, the higher education system is marked by various standards and criteria for assessing its services to society. These standards include knowledge production, accessibility, fairness, coherence, sustainability, and credibility in the knowledge age of the third millennium. The following are some key previous criteria: 1) quality and standing out from competitors, 2) Despite increasing interest in the standard validated by the Egyptian Constitution, 3) Entry to advanced education and 4) fair chances to deliver its offerings. The fourth goal of the Sustainable Development Goals in its second goal emphasizes controversy and significance in the Egyptian case. Indeed, the necessity of education nowadays should be viewed from multiple perspectives. Expanding availability without excessive tuition fees can help achieve social justice in education and equal opportunities, while higher enrollment rates in higher education align with international standards, human rights, and education for all initiatives. Ultimately, improving rates of

access aligns with the necessity to develop acquired human capital for cognitive abilities and mental skills, which are essential in the knowledge era, the rise of advanced technology, and contemporary labor markets.

In order to address the future financial needs of higher education, Egypt must explore different funding options. Contributing to the discussion of how to ensure equitable access to quality education for those unable to afford it is crucial.

This study seeks to evaluate the adequacy, efficiency, and equity of public spending on higher education in Egypt. A new EDUMOD-Egypt model (Zaki Ewiss, 2018) ends by proposing different approaches to address the issue of funding higher education in Egypt, taking into account demographic shifts, the need for high-quality education, and the shift towards private education.

Funding higher education in Egypt requires a combination of government support, involvement from the private sector, assistance from international organizations, and financial contributions from students. This addresses the increasing need for advanced education in the country, driven by a youthful population and the requirement for a more proficient labor force. The points below highlight the main elements and difficulties in funding higher education in Egypt.

Government Funding

The Egyptian government's funding of higher education is essential for public universities and technical institutes. Public funds are necessary to fund operational costs, salaries, and infrastructure development. Nevertheless, due to the growing student population and lack of state funding, the government encounters difficulties in upholding education quality and increasing capacity.

Private Sector and International Contributions

1. Private Universities have been established due to the need for higher education and the constraints of public institutions. Many times, these schools have higher fees but provide updated amenities and programs that meet global criteria.
2. International assistance and partnerships: International institutions and overseas governments provide support through grants, scholarships, and cooperative initiatives. Collaborating with international universities also contributes to improving the standard of education and research in Egyptian institutions.

Student Contributions

Tuition fees provide the main financial support for universities and colleges. Public universities in Egypt generally have lower fees than private universities. Nonetheless, these expenses can still pose a challenge for numerous families, prompting the need for financial assistance programs.

Financial Aid and Scholarships

Different financial aid programs and scholarships are accessible to assist students from disadvantaged financial backgrounds. The government, private universities, and international

organizations provide these. In spite of these initiatives, numerous students continue to face challenges in paying for their higher education.

Challenges

1. Insufficient government funding often restricts the budget allocated for higher education, not meeting the sector's increasing needs. This results in classrooms being overcrowded, facilities being outdated, and resources for research and development being inadequate.
2. Equity and Access: Making sure everyone has fair access to higher education is still difficult. Students from rural and low-income backgrounds frequently encounter substantial obstacles when trying to access high-quality education.
3. Ensuring high levels of education in both public and private institutions is vital for Quality Assurance. Robust quality assurance mechanisms are necessary to guarantee that all institutions adhere to the necessary educational standards.
4. Economic limitations: The overall economic difficulties in Egypt, such as inflation and unemployment, also affect the capacity of families to pay for higher education and the government's ability to fund it.

Potential Solutions

1. Collaborations between public universities and the private sector, known as Public-Private Partnerships, can assist in resource mobilization, infrastructure development, and improving educational programs.
2. Exploring new ways to finance higher education, such as income-contingent loans, education bonds, and philanthropic donations, can bring in extra resources.
3. Increasing efficiency in public spending for higher education by minimizing waste and focusing on key areas can optimize the use of available funds.
4. Enhancing Financial Aid: Increasing scholarship options and creating inclusive financial aid packages can lessen the financial strain on students and their families.
5. International collaboration is an important tool for enhancing higher education in Egypt through funding, knowledge sharing, and research opportunities.

Paying for college in Egypt is a complicated matter influenced by a variety of political, economic, and social elements. In this article, we explore the primary concerns, governmental relationships, and developing patterns impacting the funding of post-secondary education in Egypt.

Issues in Financing Higher Education

1. **Insufficient Public Funding:**
   - Budget limitations: Despite the Egyptian government dedicating a considerable amount of its budget to education, the funding often does not meet the requirements to sustain and enhance higher education standards due to the large population and various competing needs.
   - Lack of adequate funding results in overcrowded classrooms, outdated facilities, and insufficient resources for research and development, causing a negative impact on the quality of education.

2. **Equity and Access:**
   - Socioeconomic Inequalities: Students belonging to low-income households and rural regions encounter major obstacles to obtaining higher education, worsening social disparities.
   - Tuition Costs: Even though public universities have cheaper fees compared to private universities, they can still be unaffordable for many families. Private colleges, which provide superior amenities and curricula, have significantly higher tuition costs, thereby restricting entry to students from affluent backgrounds.
3. **Private Sector Involvement:**
   - Market Dynamics: The emergence of private universities has brought market forces into higher education, frequently placing a higher emphasis on profit rather than educational excellence.
   - Regulation is a challenge in private institutions due to different standards and practices, making it hard to guarantee quality and fair access.
4. **Economic Pressures:**
   - Economic instability impacts families' capacity to afford education and the government's ability to boost funding due to inflation and unemployment.
   - Changes in foreign exchange rates affect the expenses of global collaborations, grants, and imported educational resources.

Political Dynamics

1. **Government Policies:**
   - Education Reform: Despite the focus on education reform by successive administrations, consistent policy implementation and long-term planning are frequently hindered by political instability.
   - National Strategies: Egypt's Vision 2030 highlights education as a crucial factor for economic growth, with a focus on enhancing both funding and quality.
2. **International Relations:**
   - Egypt receives assistance and collaborations from foreign countries and educational institutions to enhance domestic financial resources and enhance quality. Nevertheless, these connections are shaped by wider political and diplomatic factors.
   - Foreign universities are being encouraged to set up branches in Egypt, introducing new educational models and more funding while also sparking concerns about regulation and national priorities.
3. **Political Stability:**
   - Policy Continuity: Educational policies and funding can be disturbed by political instability. Consistent support and development of the higher education sector rely heavily on stable governance.
   - Public Opinion: Education is a topic that creates political sensitivity. Public dissatisfaction regarding the quality or accessibility of education has the potential to cause social unrest, which can, in turn, impact political priorities and decisions made by the government.

Emerging Trends

1. **Digital Transformation**:
   - The COVID-19 pandemic sped up the implementation of e-learning and online education platforms. Prioritizing digital infrastructure and training is increasingly important to improve accessibility and flexibility.

- Blended Learning, which involves blending online and in-person classroom learning, is becoming increasingly popular, necessitating investments in technology and innovative teaching approaches.

2. **Public-Private Partnerships (PPPs)**:
   - Collaborations between public universities and private enterprises can be enhanced to fill funding gaps, enhance infrastructure, and match curricula with market demands.
   - Exploring fresh methods of funding, like income-based loans and education bonds, can offer sustainable financial solutions.
3. **Focus on Research and Innovation:**
   - Increasing spending on research and development is crucial for promoting innovation and driving economic growth. Collaborating with businesses and foreign organizations can improve research capacities.
   - Establishing centers of excellence in key fields can draw in funding and talent, leading to progress in crucial areas.
   - Globalization.
   - Internationalization: Egyptian universities are now more focused on obtaining international accreditation and forming partnerships in order to enhance quality and gain global recognition.
   - Encouraging student and faculty exchanges with international institutions boosts educational quality and promotes cross-cultural understanding.

Improving the Financing of Higher Education in Egypt Using an Operational Research Approach

Enhancing the funding of higher education in Egypt through an operational research (OR) method requires using quantitative methods for examining, improving, and executing successful financial plans. This organized approach can improve the sustainability and efficiency of higher education financing by dealing with funding distribution, resource usage, and policy execution complexities. Here is an in-depth overview of how Operations Research can be used to enhance the funding of higher education in Egypt:

Problem Definition

In order to make use of OR effectively, it is crucial to clearly identify the main topics concerning funding for higher education:

1. Poor and ineffective distribution of public funds.
2. Restricted entry to tertiary education for students coming from economically low-income families.
3. In addition to this, we must consider the impact that the new policy will have on our employees. Unequal allocation of resources in public and private institutions.
4. More funding is required for research and infrastructure.
5. Guaranteeing that educational outcomes match the demands of the labor market.

Data Collection and Analysis

Gathering precise and extensive data is the basis of the OR approach. Important information consists of:

- Data on financial support from the government, private investments, and international aid;
- Statistics on enrollment, fees for tuition, and characteristics of students;

- Costs related to running higher education institutions;
- Information on graduation rates, employment results, and faculty credentials.

Information on economic indicators and the requirements of the labor market:

- Economic information regarding government funding, private investments, and international aid;
- Statistics on enrollment, tuition costs, and the composition of students;
- The expenses related to running higher education institutions;
- Information regarding the rates of completing a program, job placements after graduation, and the qualifications of the teaching staff;
- Details on economic indicators and the labor market are needed.

Model Formulation

Different mathematical models can be used to tackle certain funding obstacles:

Resource Allocation Models:

- Linear Programming (LP) involves optimizing the distribution of scarce financial resources to achieve certain goals, like improving graduation rates, increasing research output, or ensuring equal access. Limitations may consist of minimum funding stipulations and budget constraints.
- Multi-Criteria Decision Analysis (MCDA): MCDA is useful for weighing various goals like enhancing quality, boosting accessibility, and maximizing cost-effectiveness.

1. **Simulation Models**:
   - System Dynamics (SD): SD models can replicate the connections among various parts of the higher education system, including funding, enrollment, and results. This contributes to comprehending the enduring effects of financial decisions and policies.
   - Monte Carlo Simulation evaluates how uncertainty and variability in financial projections impact risk assessment and planning.
2. **Forecasting Models**:
   - Time Series Analysis: Predicting future trends in enrollment, funding needs, and economic conditions through time series models aids in strategic planning and budgeting.
3. **Cost-Benefit Analysis (CBA)**:
   - CBA is able to assess the economic effectiveness of various funding approaches by comparing the expenses of education investments with the anticipated advantages in terms of enhanced results and economic expansion.

Solution Implementation

Once the models have been created and verified, the next stage involves putting the solutions into action.

1. **Optimized Funding Allocation:**
   - Utilize linear programming models to allocate government and private funding more efficiently, guaranteeing that institutions obtain sufficient resources to accomplish educational goals effectively.

- Provide extra funding to institutions and programs that show strong effectiveness and efficiency.

2. **Targeted Financial Aid Programs**:
   - Create financial assistance programs based on data that focus on students from less privileged backgrounds, utilizing models to enhance the allocation of scholarships and grants.
   - Introduce income-dependent loan programs to increase accessibility and sustainability of higher education.
3. **Public-Private Partnerships (PPPs)**:
   - Promote public-private partnerships to utilize private-sector funding for improvements in higher education facilities and research.
   - Utilize MCDA to determine and rank zones with the highest potential for private investment impact.
4. **Investment in Digital Transformation**:
   - Allocate money for digital infrastructure and e-learning platforms in order to improve both the accessibility and quality of education.
   - Utilize simulation models for strategizing and executing digital projects, guaranteeing they are both scalable and efficient.

Monitoring and Evaluation

Ongoing monitoring and evaluation are essential to guarantee the effectiveness of solutions that have been put into place.

1. **Key Performance Indicators (KPIs)**:
   - Set up Key Performance Indicators to assess the success of funding plans, such as enhancements in graduation rates, research productivity, and equality in opportunity.
   - Frequently assess and modify funding distributions according to performance data and input from stakeholders.
2. **Feedback Mechanisms:**
   - Establish systems for receiving feedback from students, faculty, and employers in order to maintain the relevance and effectiveness of financial strategies.
   - Utilize OR models to constantly improve and enhance funding strategies using up-to-date data and evolving circumstances.

The strategy is visually schematically represented in Figure 1.

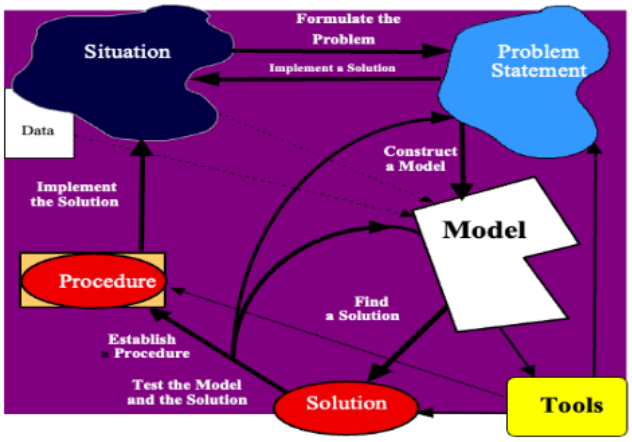


Figure 1: The Operational Research OR Model

Case Study

Egypt's higher education system is comprised of twenty-seven public universities, twenty-seven private universities, twenty semi-private universities, six foreign university branches, and four hundred higher institutes and academies. The public universities offer three hundred education programs at the undergraduate level and another three hundred programs at the postgraduate level, covering various scientific sectors such as medicine, engineering, basic sciences, and social and humanities. Conversely, private universities and other higher institutions and academies offer a more limited range of education programs (5-10 programs) to meet the students' demands. It is worth mentioning that 85% of 3.5 million Egyptian students are enrolled in public Universities, while only 15% of the students are enrolled in private universities and other higher institutions.

In Table 1, the trends in revenues and expenditures for public and private higher education are given.

Table 1: The Trends in Revenues and Expenditures for Public and Private Higher Education Are Given.

The primary source of revenue for public universities	The primary sources of institutional expenditure
1. Tuition fees, 2. Application from a government source 3. Grants and contracts from government source 4. Private gifts, grants, and contracts, 5. Endowment income, 6. Sales and services of educational activities, 7. Auxiliary enterprises, 8. Hospitals	1. Instruction 2. Research 3. Public services 4. Academic support 5. Student services, 6. Institutional support 7. Operation and maintenance, 8. Scholarships and fellowships, 9. Mandatory and non-mandatory transfers, 10. Auxiliary enterprises, 11. Hospitals, 12. Independent operations

Regrettably, the only revenue available stems from restricted sales and a few educational services and activities. This situation leads to deficiencies in crucial expenditures, particularly in providing academic support for students, which encompasses laboratory resources and infrastructure development. Conversely, funding for research initiatives and the organization of conferences and workshops remains constrained.

In this context, Egyptian public universities face significant challenges due to a budget deficit, which adversely affects the efficiency and quality of the continuation of the educational process. This is due to the recognition of education as a costly social service in the National Policy on Education in Egypt, the current underfunding of university education, the impact of poverty and population density, and the need to attract funding, enhance research capacity and output, and address discrepancies between education outputs and career opportunities, as well as issues related to quality and access. Moreover, the budget of the public university is centralized. University presidents make central decisions regarding spending terms without being held accountable or assuming the highest level of

responsibility. Accordingly, the higher education system is bureaucratic, lacks transparency, and has limited access to information.

Figure 2 shows the administration structure of the public university.

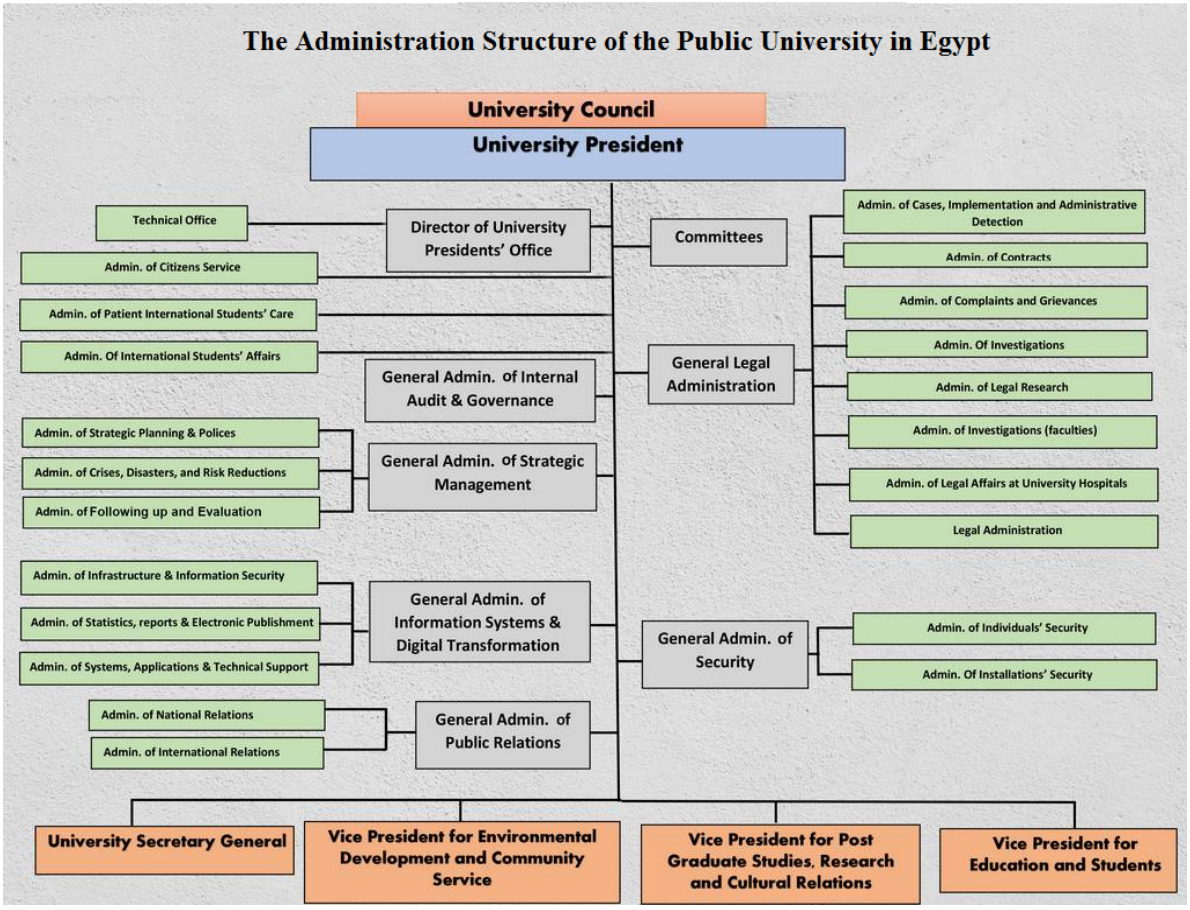


Figure 2: The Administration Structure of the Public University.

Proposed Solution

Operations Research in Higher Educational Budget

EDUMOD – EGYPT Model

The Edumod-Egypt model is described in more detail elsewhere (Zaki Ewiss, 2018). In this framework, ten education pillars are identified. These pillars are identified as follows:

1) Educational Policy
2) Educational Management
3) Educational Economy (Budget)
4) School/University Construction and Equipment
5) Educational Programs Curricula
6) Educational Teaching Methods
7) Teacher responsibilities
8) Educational Human Resources
9) Evaluation
10) Media and Educational Development

Figure 3 shows the tree model for the analysis of each pillar and its domains, including educational activities and processes.

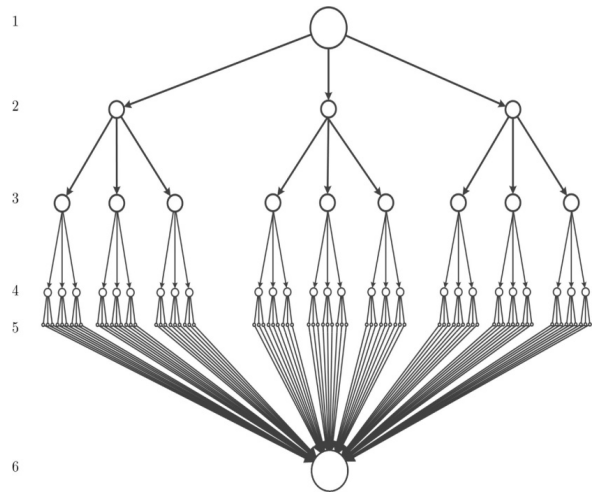


Figure 3: The Tree Model to Identify the Educational Domains, Activities, and Processes

Think about a scenario where OR is used to improve the distribution of government funds among public universities in Egypt:

1. Objective: The aim is to efficiently distribute scarce government funds to enhance educational results and ensure fairness.
2. Gather data on existing funding amounts, student characteristics, operational expenses, and performance measures.
3. Formulate a model to distribute funds through linear programming, taking into account goals like maximizing graduation rates and ensuring fair access. Budget constraints and minimum funding requirements for each institution will be considered.
4. Implement the optimal distribution of funds to universities and continuously monitor performance, making adjustments as necessary.
5. Evaluate the effectiveness of the funding strategy using key performance indicators such as changes in graduation rates and equity in access. Gather feedback to enhance the model and improve results.

In Figure 4 (a-c), the main activities of the higher education budget system are shown.

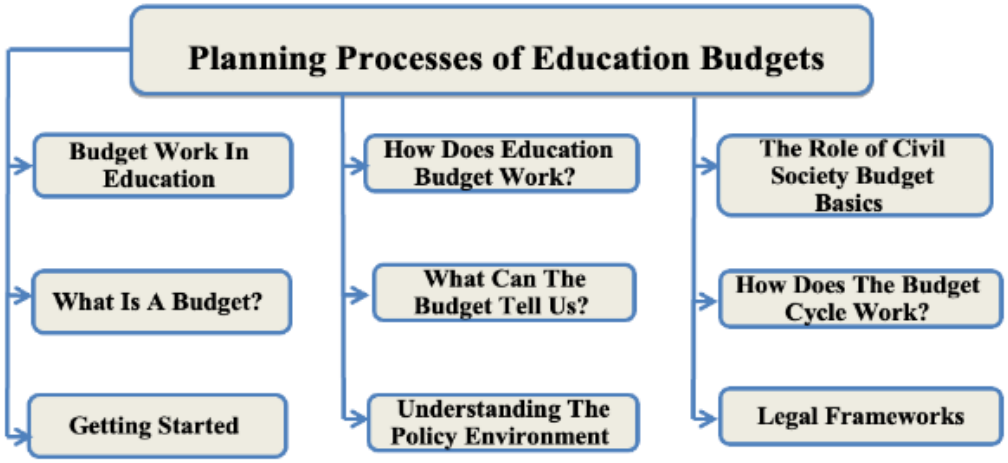


Figure 4a: The Activities of the Planning Processes of the Education Budget

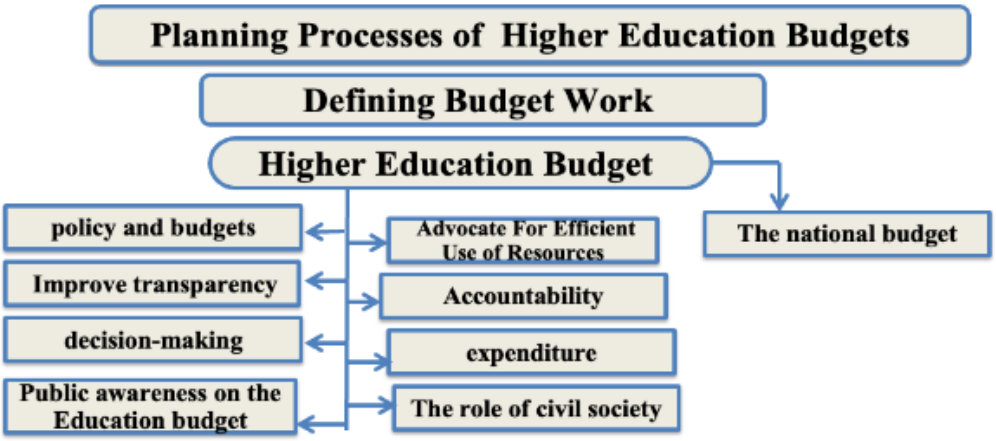


Figure 4b: The Defining Work of the Planning Processes of the Education Budget

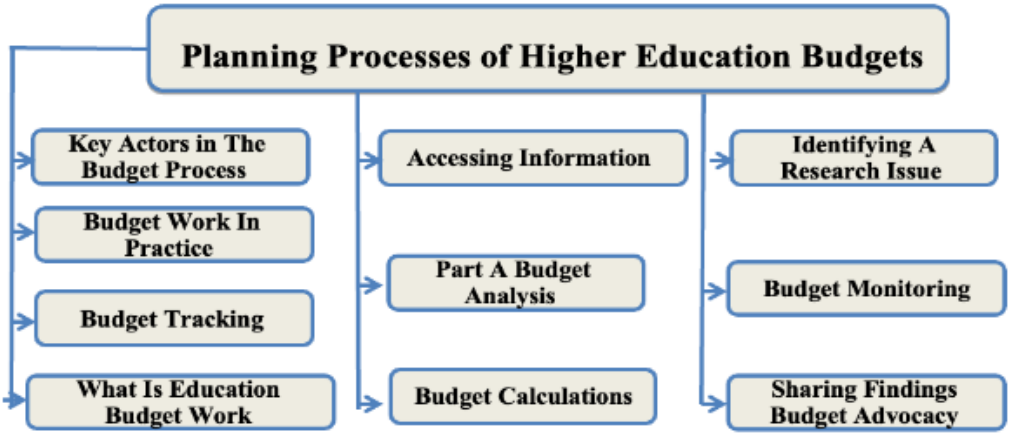


Figure 4c: The Key Actors of the Planning Processes of the Education Budget

Figure 5 shows the budget cycle of the higher education system:

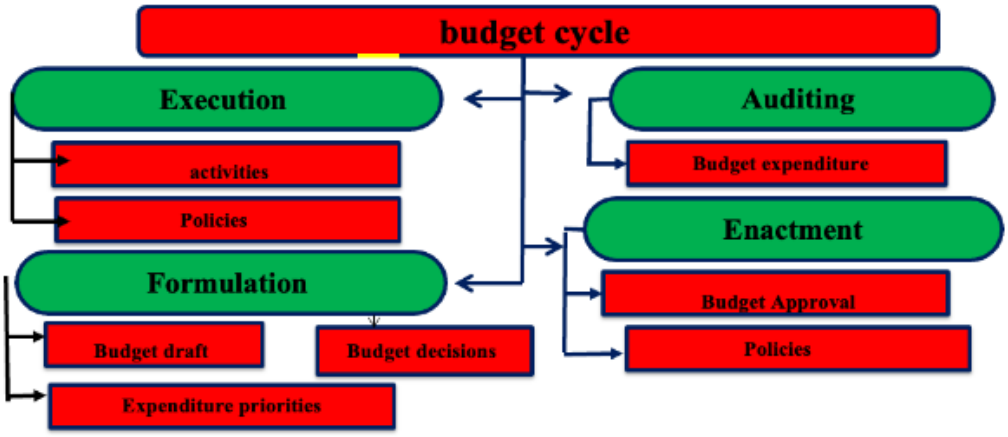


Figure 5: The Budget Cycle of the Higher Education System

From those mentioned above, the operational research approach provides a robust structure for enhancing the funding of higher education in Egypt. Through the use of data, analytical models, and systematic assessment, OR has the potential to improve resource distribution,

promote fairness and excellence, and establish viable financial plans. This method not only tackles present obstacles but also lays the groundwork for sustained growth and achievement in the higher education field.

Conclusion

In conclusion, funding higher education in Egypt presents a complex challenge that necessitates a well-rounded strategy involving strong government backing, engaged private sector participation, global collaboration, and efficient student financial assistance initiatives. It will be essential to tackle the obstacles and put into practice creative ideas in order to ensure the sustainable growth of higher education in Egypt. Dealing with the problems of inadequate funding, inequality, and economic challenges while maneuvering through the political environment is crucial for the long-term growth of the industry. By adopting new developments like digital transformation, public-private partnerships, and internationalization, Egypt can enhance its higher education system to be strong and of high quality.

References

Afifi S., & Ewiss M. (2023). Improving Educational Management in Developing Countries Using an Operational Research Approach ISSN: 2188-1162 The European Conference on Education 2023: Official Conference Proceedings https://doi.org/10.22492/issn.2188-1162.2023.88

Birdsall, Nancy & Londono, Juan Luis (1997). "Asset Inequality Matters: An Assessment of the World Bank's Approach to Poverty Reduction," American Economic Review, American Economic Association, vol. 87(2), pages 32-37, May.

Lant Pritchett (1996). Forget Convergence: Divergence Past, Present, And Future. https://www.imf.org/external/pubs/ft/fandd/1996/06/pdf/pritchet.pdf/

UNGA 2015. Opening of the 70th Session of the UN General Assemblyhttp://www.un.org/en/media/accreditation/UNGA70.shtml

World Bank (2017). Annual Report. https://thedocs.worldbank.org/en/doc/908481507403754670-0330212017/original/AnnualReport2017WBG.pdf

World Bank (2022). Annual Report: Helping Countries Adapt to a Changing World https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099030009272214630/bosib0db37c9aa05a0961a08a83a0ea76ea/

Zaki Ewiss (2018). Cairo University Proposal for Education Reform in Developing Countries Using Modeling Technique (Edumod-Egypt), ICERI2018 Proceedings, pp. 9006-9014.doi: 10.21125/iceri.2018.0661

Zaki Ewiss, M. A. (2023). "Management of pre-university Egyptian education: politics, issues and trend", *Journal of Humanities and Applied Social Sciences*, Vol. 5 No. 1, pp. 35-58. https://doi.org/10.1108/JHASS-04-2021-0079/

Contact email: mzewiss@cu.edu.eg

The Relationship Between the Online Learning Difficulties and Self-Efficacy Among Middle-Aged and Older Adults in Taiwan During the COVID-19 Pandemic

Jing-Yi Lu, Asia University, Taiwan

The European Conference on Education 2024
Official Conference Proceedings

Abstract
During the pandemic, all educational institutions, including senior education centers, closed. To support the physical and mental health of the elderly, Taiwan's Ministry of Education Taiwan urged active aging centers to develop online courses. This study explored the difficulties and self-efficacy of middle-aged and older adults transitioning to online learning during the Covid-19 pandemic. Drawing on data from 271 participants engaged in online learning at active aging centers in Taiwan, the analysis employed t-tests, one-way ANOVA, and Pearson correlation to examine how personal background variables relate to participants' online learning difficulties and self-efficacy. Findings revealed that participants experienced moderate difficulties in online learning, particularly regarding course design and teacher interaction. However, their self-efficacy was above average, and they recognized the value of online learning. Prior to the pandemic, participants had experience with online learning or related features, and their daily internet habits influenced their difficulties and self-efficacy. Additionally, participants from different residential areas, educational levels, or perceived health conditions experienced significant differences in online learning difficulties. Moreover, the number of online courses attended during the pandemic affected participants' self-efficacy. Finally, higher difficulties in online learning were associated with lower self-efficacy. These findings offer insights for researchers, older adult education practitioners, and online learning program designers seeking to understand online learning for middle-aged and older adults.

Keywords: Learning Difficulties, Older Adult Education, Online Learning, Self-Efficacy

iafor
The International Academic Forum
www.iafor.org

Introduction

The COVID-19 pandemic in 2020 posed considerable difficulties to conventional classroom education worldwide. To ensure the health and learning rights of students, governments encouraged higher educational institutions and older adult education units to offer online learning courses. Consequently, learning methods shifted from in-person classroom learning to online classes (Barlow, Adekola, & Siddiqui, 2021; Doetinchem & Livingston, 2021). In line with Taiwan's epidemic prevention policies, older adult education services and education units, such as active aging learning centers and community colleges, suspended in-person classes and activities during the Level 3 alert in May 2021. This interruption in learning for older adults reduced their physical activity, interpersonal interaction, and social participation and negatively affected their physical and mental health (I, 2020; Ministry of Education Taiwan, 2021).

To encourage older adults to continue learning and maintain their physical and mental health during the pandemic, Taiwan's Ministry of Education introduced a policy that aimed to suspend classes without suspending learning. This policy encouraged all 373 active aging learning centers across the country to offer a series of online courses for older adults to learn at home during the pandemic, and they covered subjects such as music, exercise, photography, and digital technology, enabling older adults to participate in online learning from home (Ministry of Education Taiwan, 2021). However, older adults are accustomed to classroom instruction. According to a 2019 report by Taiwan's National Development Council, internet usage and the rate of learning new skills online greatly declined among individuals aged >50 years; specifically, approximately 56.5% of those aged 65 years and above did not use the internet, and the participation rate in online courses for those aged >60 years was <10%. Additionally, older adults often lack technological skills and trust in the internet, which can make online learning challenging and anxiety-inducing, and they typically need assistance from others to complete learning tasks (Age UK, 2021; Li et al., 2021). Therefore, older adults have experienced difficulties transitioning from in-person to online courses during the pandemic. Given this situation, the present study investigated the difficulties and self-efficacy of older adults transitioning to online learning during the pandemic. On the basis of the research findings, we provide recommendations that can be applied by older adult education units and educators for developing online learning courses.

Literature Review

As an impact of the COVID-19 pandemic, older adults experienced a shift in their learning methods, facing numerous difficulties and challenges in using technology and participating in online learning. One obstacle was the physical and psychological barriers due to aging, such as declining vision, hearing, reaction time, and memory, as well as a lack of concentration. Small web fonts and complex interfaces made typing and reading difficult, leading to the fear of participating in online learning (Chiu & Liu, 2017; Yazdani-Darki et al., 2020; Wilson et al., 2021). Additionally, the lack of computer knowledge and skills, coupled with low self-efficacy, contributed to difficulties in internet usage, causing some older adults to abandon learning altogether (Bakaev et al., 2008; Czaja et al., 2006; Gitlow, 2014). Furthermore, limited interaction with instructors due to the course design, issues associated with program contents, and lack of support from educational institutions hindered older adults' participation in online learning (Kara et al., 2019).

Related studies have highlighted the importance of self-efficacy in the life development and learning of adults and older individuals. Self-efficacy refers to one's belief in their ability to exert control over their functioning and achieve desired outcomes. It helps individuals acquire new skills and experiences and take risks, thereby continually striving for success (Bandura, 1977; Bandura & Cervone, 1986; Chowdhury, 2020). On the basis of their beliefs, individuals regulate their efforts and persistence to achieve their goals (Cervone, Artistico, & Berry, 2006; Wang & Shan, 2018). High self-efficacy increases one's willingness to pursue complex tasks, overcome difficulties, and persist until the goals are attained (Bandura & Locke, 2003; Gatti, Brivio, & Galimberti, 2017). However, scant research has explored the factors influencing older adults' online learning and their self-efficacy and motivation for continuous learning (Chu & Chu, 2010; Lin et al., 2013). Understanding the specific difficulties older adults face in online learning can reduce barriers and enhance their self-confidence and motivation for ongoing learning.

Methodology

Study Design

This study employed a quantitative survey to understand the effect of the difficulties faced by older adults when participating in online learning courses on their self-efficacy. The research scale was developed by referencing relevant domestic and international studies and conducting interviews with individuals who participated in online learning during the COVID-19 pandemic. Key elements from these interviews were extracted to create the Older Adults' Online Learning Difficulties and Self-Efficacy Scale. The scale was then reviewed and validated by three experts in gerontology, and it was revised accordingly. The scale consists of three parts. The first part covers demographic variables, including gender, age, education level, perceived health status, experience with online learning, frequency of internet use, experience in operating tablets or smartphones, and types of online learning courses the older adults' participated in. The second part addresses online learning difficulties, consisting of physical and psychological barriers, issues with the learning environment and teacher interaction, and problems with the course materials and design. The online learning difficulties scale in this study employed a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with a total of 17 items. Higher scores indicated greater difficulties experienced by older adults in participating in online learning. The Cronbach's α of this section was determined to be 0.938. The third part assesses self-efficacy, encompassing the value of online learning, performance in online learning skills, and self-regulation and motivation. The Cronbach's α of this section was determined to be 0.953.

Participants and Procedure

This study targeted individuals aged 55 years and above from the 373 active aging learning centers announced by Taiwan's Ministry of Education (2021) on the Senior Learning Website. During the COVID-19 pandemic, these centers allowed middle-aged and older volunteers aged 45 years and above to participate in online courses. Therefore, this study included middle-aged and older adults aged 45 years and above. Purposive sampling was conducted, with a focus on active aging learning centers that offered online courses during the COVID-19 pandemic. The directors or coordinators of these centers assisted the researchers of the present study in identifying middle-aged and older adults who participated in online learning during the pandemic and were willing to complete the questionnaire. A

total of 271 participants from active aging learning centers in the northern, central, south-central, and southern regions of Taiwan were included in this study.

Data Analysis

Descriptive statistical analysis, independent sample t-tests, and one-way analysis of variance were performed to examine the effect of different demographic variables on online learning difficulties and self-efficacy among older adults. Additionally, Pearson correlation analysis was conducted to assess the relationship between online learning difficulties and self-efficacy.

Results

1. Analysis of Participants' Personal Background Information

This study included 271 valid samples. Regarding gender, women (79%) outnumbered men (21%). The 60–64 years age group was the largest (24.4%), followed by the 70–74 years (24.0%) and 65–69 years age groups (20.0%). Geographically, the majority of participants were from active aging learning centers located in the central region (36.9%), followed by those from the south-central region (25.1%) and the northern region (22.1%). Regarding the years of learning, the most common duration was 4–6 years (29.5%), followed by 1–3 year(s) (22.9%) and 7–9 years (18.1%). Participants' education level was primarily university (29.9%), followed by senior or vocational high school (24.7%) and technical school (21.4%). Regarding perceived health status, most participants considered themselves to be healthy (48%) or average (37.3%). Before the COVID-19 pandemic, nearly 63% of participants had experience with online learning, and 67.9% had learned to use online course applications. Additionally, 94% of participants habitually used the internet; most of the participants used the internet almost daily (72%), followed by those using the internet two to three times a week (11.8%). During the pandemic, most participants attended one online course (36.2%), followed by those attending two courses (28.8%). The most popular course types were digital technology (smartphone use, photography, and media literacy) (36.2%), followed by one-time lectures (e.g., medicine and health-related) (20.3%) and exercise and stress relief (e.g., yoga, aerobics, and aromatherapy) (17.8%) (see Table 1).

Variable	N=271							
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Gender	Male				Female			
	57(21)				214(79)			
Age	45–49 years	50–54 years	55–59 years	60–64 years	65–69 years	70–74 years	75–79 years	80 years and above
	4 (1.5)	7 (2.6)	35 (12.9)	55 (20.3)	66 (24.4)	65 (24.0)	31 (11.4)	8 (3.0)
Location of Active Aging Learning Center	Northern region		Central region		South-central region		Southern region	
	60(22.1)		100(36.9)		68(25.1)		43(15.9)	
Years of Learning	1–3 year(s)	4–6 years	7–9 years		10–12 years	13 years and above	Not specified	
	62(22.9)	80(29.5)	49(18.1)		35(12.9)	42(15.5)	3(1.1)	

Education Level	Junior high school or below	Senior or vocational high school	Technical school	University	Graduate school or above	Not specified
	32(3.5)	67(24.7)	58(21.4)	81(29.9)	31(11.4)	2(0.7)
Perceived Health Status	Unhealthy	Average	Healthy	Very healthy	Not specified	
	6(2.4)	101(37.3)	130(48)	30(11.1)	4(1.5)	
Experience with Online Learning before COVID-19	No	Yes	Not specified			
	98(36.2)	170(62.7)	3(1.1)			
Experience in using Online Learning Applications Before COVID-19	No	Yes	Not specified			
	82(30.3)	184(67.9)	5(1.8)			
Regular Internet Usage	No	Yes	Not specified			
	14(5.2)	255(94.1)	2(0.7)			
Frequency of Internet Use	No	Once a week	Two to three times a week	Four to five times a week	Almost daily	Not specified
	7(2.6)	11(4.1)	32(11.8)	23(8.5)	195(72.0)	3(1.1)
Number of Online Courses Taken During the COVID-19 Pandemic	1	2	3	4 or more	Not specified	
	98(36.2)	78(28.8)	49(18.1)	44(16.2)	2(0.7)	
Types of Online Courses Participated In	One-time lectures (e.g., medicine and health-related)	Exercise and stress relief (e.g., yoga, aerobics, aromatherapy)	Arts and music (e.g., painting, calligraphy, singing)	Life safety (e.g., medication, transportation, food, fraud prevention)	Digital technology (e.g., smartphone use, photography, media literacy)	Language (e.g., English, Japanese)
	121(20.3)	106(17.8)	85(14.2)	79(13.2)	128(21.4)	66(11.1)

Table 1. Participants' Personal Background Information

2. Older Adults' Online Learning Difficulties and Self-Efficacy

For older adults, participating in online courses presented a moderate level of difficulty, with an average score of 3.02. These difficulties included small text in the course materials, which made it hard to read; distractions or external interruptions during online courses; a lack of

prior instruction from teachers or assistance from helpers regarding system operation, which led to learning difficulties; and limited interaction time with teachers and classmates.

Overall, older adults exhibited a higher level of self-efficacy in online learning, with an average score of 3.86. This finding indicates their confidence and adaptability in the online learning environment. Their self-efficacy in online learning encompassed the perceived value of online learning, performance in online learning skills, self-regulation, and motivation. This includes aspects such as interest in courses, recognizing the value and benefits, evaluating personal performance, and a willingness to continue participating in online learning, among others (see Table 2).

Scale	N	Mean	Standard Deviation
Online Learning Difficulties	271	3.02	.66639
Self-Efficacy	271	3.86	.56489

Table 2. Older Adults' Online Learning Difficulties and Self-Efficacy

3. Differences in Online Learning Difficulties and Self-Efficacy Based on Demographic Variables

3.1 Differences in Online Learning Difficulties Based on Demographic Variables

As presented in Table 3, no significant differences were observed in online learning difficulties in terms of gender, years of learning, experience with online learning before COVID-19, or number of online courses taken during the COVID-19 pandemic. However, significant differences were found in terms of age, location of the active aging learning center, education level, perceived health status, experience in using online learning applications before COVID-19, regular internet usage, frequency of internet use, and number of online courses taken during the COVID-19 pandemic.

Furthermore, Scheffe's post hoc test revealed no differences in online learning difficulties in terms of age and the number of online courses taken during the COVID-19 pandemic. However, the location of the active aging learning center significantly affected the difficulties faced by older adults. Participants from active aging learning centers in the southern region reported higher online learning difficulties than those from centers in the northern and central regions. Regarding the education level, older adults with an education level of junior high school or below experienced more online learning difficulties than those with higher education levels, including senior or vocational high school, technical school, university, and graduate school or above. Regarding perceived health status, participants with unhealthy and average health statuses reported higher online learning difficulties than those with a very healthy status. Thus, older adults who perceived themselves as very healthy encountered fewer online learning difficulties. Furthermore, those without experience in using online learning applications before COVID-19 reported higher difficulties than those with such experience. Participants who did not regularly use the internet experienced more online learning difficulties than those who did. Among regular internet users, those who used the internet two to three times a week reported higher online learning difficulties than those who used the internet almost daily.

Demographic variable	Online learning difficulties Significance	Post hoc test (Mean)
Gender	.565	
Age	.026*	
Location of Active Aging Learning Center	.001**	Southern region (3.35) > Northern region (2.84) and Central region (2.97)
Years of Learning	.501	
Education Level	.000***	Junior high school or below (3.51)> Senior or vocational high school (3.09), Technical school (3.06), University (2.83), Graduate school or above (2.71)
Perceived Health Status	.001**	Unhealthy (3.48) and Average (3.14) > Very healthy (2.63)
Experience with Online Learning before COVID-19	.090	
Experience in using Online Learning Applications before COVID-19	.009*	No (3.18)>Yes (2.95)
Regular Internet Usage	.003*	No (3.53)>Yes (2.99)
Frequency of Internet Use	.000***	Two to three times a week (3.36) > Almost daily (2.91)
Number of Online Number of Courses Taken During the COVID-19 Pandemic	.044*	

*p<.05; **p<.01; ***p<.001

Table 3. Differences Online Learning Difficulties Based on Demographic Variables

3.2 Differences in Self-Efficacy Based on Demographic Variables

As displayed in Table 4, no significant differences were observed in self-efficacy for participating in online learning among older adults in terms of gender, location of the active aging learning center, years of learning, education level, or perceived health status. However, significant differences were found in self-efficacy in terms of age, experience with online learning before COVID-19, experience in using online learning applications before COVID-19, regular internet usage, frequency of internet use, and number of online courses taken during the COVID-19 pandemic.

Furthermore, Scheffe's post hoc test revealed no significant differences in self-efficacy for online learning in terms of age and frequency of internet use. However, experience with online learning before COVID-19 significantly affected self-efficacy. Participants with experience in online learning had higher self-efficacy than those without such experience. Additionally, individuals with experience in using online learning applications before COVID-19 had higher self-efficacy than those who without such experience. Regular internet users had higher self-efficacy than those who did not regularly use the internet. This result indicated that participation in online learning courses, experience in using online learning

applications, or regular internet usage were correlated with higher self-efficacy in online learning. Moreover, during the COVID-19 pandemic, older adults who took three or more online courses had higher self-efficacy than those who only took one online course.

Demographic variable	Self-efficacy Significance	Post hoc test (Mean)
Gender	.405	
Age	.006*	
Location of Active Aging Learning Center	.211	
Years of Learning	.315	
Education Level	.327	
Perceived Health Status	.263	
Experience with Online Learning before COVID-19	.031*	Yes (3.93) > No (3.75)
Experience in using Online Learning Applications before COVID-19	.000***	Yes (3.96) > No (3.65)
Regular Internet Usage	.005*	Yes (3.88) > No (3.45)
Frequency of Internet Use	.008*	
Number of Online Number of Courses Taken During the COVID-19 Pandemic	.000***	3 (4.04) and 4 or more (4.07) > 1 (3.73)

*p<.05; **p<.01; ***p<.001

Table 4. Differences in Self-Efficacy Based on Demographic Variables

4. Correlation Between Older Adults' Online Learning Difficulties and Self-Efficacy

Table 5 presents a significant negative correlation between the difficulties faced by older adults in online learning (i.e., physical and psychological barriers, issues with the learning environment and teacher interaction, and problems with the course materials and design) and their self-efficacy. This observation implies that the higher the score for online learning difficulties, the lower the score for self-efficacy for online learning.

	Level of Self-Efficacy
	Correlation Coefficient
Physical and psychological barriers	-.546**
Issues with the learning environment and teacher interaction	-.458**
Problems with the course materials and design	-.416**
Overall online learning difficulties	-.537**

*p<.05; **p<.01

Table 5. Correlation Analysis Between Various Online Learning Difficulties and Self-Efficacy

Conclusions

This study investigated the relationship between the difficulties faced by older adults in online learning and their self-efficacy. The conclusions are as follows: 1. Older adults experienced moderate difficulties in participating in online learning, with the primary difficulties being problems with the course materials and design as well as issues with the learning environment and teacher interaction. 2. Older adults who had prior experience with online learning courses or the related applications before COVID-19 and those with regular internet usage encountered fewer online learning difficulties and had higher self-efficacy. 3. For older adults, their online learning difficulties varied depending on the region, education level, and perceived health status. Older adults from active aging learning centers located in the southern region, with education levels at or below junior high school, and who had perceived poor or average health status had greater online learning difficulties. 4. The number of online courses taken during the COVID-19 pandemic affected older adults' self-efficacy for online learning. Those who participated in three or more online courses exhibited favorable self-efficacy. 5. A negative correlation was discovered between online learning difficulties and self-efficacy among older adults. Higher scores for online learning difficulties correspond to lower self-efficacy scores. Finally, this study recommends that active aging learning centers and education units should teach older adults how to use online learning features and applications in advance. Furthermore, older adults' physical and psychological conditions should be considered to reduce the barriers to online learning and to increase their self-efficacy and confidence.

References

Age UK (2021). *Digital inclusion and older people – how have things changed in a Covid-19 world?*. Retrieved from https://reurl.cc/ve3jlL

Bandura, A., & Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. *Cognitive Therapy and Research, 1*, 287-308.

Bandura, A., & Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes, 38*, 92-113.

Bandura, A., & Locke, E. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, *88*, 87-99.

Barlow, A., Adekola, J., & Siddiqui, N. (2021). Current and Future Online and Blended Learning Provisions. *Journal of Perspectives in Applied Academic Practice*, *9*(2), 39-53.

Cervone, D. Artistico, D., & Berry, J. (2006). Self-Efficacy and Adult Development. *In Handbook of Adult Development and Learning*, edited by Carol Hren. Hoare, 169-95. Oxford: Oxford University Press.

Chiu, C. J., & Liu, C. W. (2017). Understanding Older Adult's Technology Adoption and Withdrawal for Elderly Care and Education: Mixed Method Analysis from National Survey. *Journal of Medical Internet Research*, *19*(11), e374, 1-11.

Chowdhury, M. (2020). 4 ways to improve and increase self-efficacy. Retrieved from https://positivepsychology.com/3-ways-build-self-efficacy/

Chu, R. J., & Chu, A. Z. (2010). Multi-level analysis of peer support, Internet self-efficacy and e-learning outcomes – The contextual effects of collectivism and group potency. *Computers & Education*, *55*, 145-154.

Czaja, S. J., Charness, N., Fisk, A. D., Hertzog, C., Nair, S. N., Rogers, W. A., & Sharit, J. (2006). Factors predicting the use of technology: Findings from the center for research and education on aging and technology enhancement (create). *Psychology and Aging, 21*(2), 333–352. https://doi.org/10.1037/0882-7974.21.2.333

Doetinchem, S., & Livingston, L. (2021). *Lifelong Learning in the Age of COVID-19*. Retrieved from https://generations.asaging.org/lifelong-learning-age-covid-19

Gatti, F. M., Brivio, E., & Galimberti, C. (2017). "The future is ours too": A training process to enable the learning perception and increase self-efficacy in the use of tablets in the elderly. *Educational Gerontology*, *43*(4), 209-224.

Gitlow, L. (2014). Technology use by older adults and barriers to using technology. *Physical & Occupational Therapy in Geriatrics*, *32*(3), 271-280. doi: 10.3109/02703181.2014.946640

I, J. C. (2021). The epidemic has pushed the use of technology and the Internet to become more widespread, but it is the beginning of a nightmare for the elderly. Retrieved from https://www.thenewslens.com/article/143678

Kara, M., Erdogdu, F., Kokoc, M., & Cagiltay, K. (2019). Challenges Faced by Adult Learners in Online Distance Education: A Literature Review. *Open Praxis*, *11*(1), 5-22.

Li, W., Ornstein, K. A., Li, Y., & Liu, B. (2021). Barriers to learning a new technology to go online among older adults during the COVID-19 pandemic. *Journal of the American Geriatrics Society*, *69*, 3051-3057.

Lin, Y. C., Liang, J. C., Yang, C. J., & Tsai, C. C. (2013). Exploring middle-aged and older adults' sources of Internet self-efficacy: A case study. *Computers in Human Behavior*, *29*, 2733-2743.

Ministry of Education Taiwan. (2021). *Learnig together during COVID-19--Active aging learning turnaround grandparents digital ramming*. Retrieved from https://www.edu.tw/News_Content.aspx?n=9E7AC85F1954DDA8&s=D9FD422793157F21

Wang, C. H., & Shan, S. (2018). The Effects of Self-Efficacy on Learners' Perceptions of Cognitive Presence in Online Collaborative Learning Activities. *International Journal of Social Sciences, 3*(3), 1144-1172.

Wilson, G., Gates, J. R., Vijaykumar, S., & Morgan, D. (2021). Understanding older adults' use of social technology and the factors influencing use. *Ageing & Society*, 1–24. doi:10.1017/S0144686X21000490

Yazdani-Darki, M., Rahemi, Z., Adib-Hajbaghery, M., Izadi-Avanji, F. S. (2020). Older adults' barriers to use technology in daily life: A qualitative study. *Nursing and Midwifery Studies*, *9*, 229-236.

From Text to Context: Analyzing Idiomatic Expressions in Psychological Thrillers Through Corpus-Based Study Among Law Students in Uzbekistan Higher Education

Sojida Samandarova, Uzbekistan State World Languages University, Uzbekistan

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Teaching English for Specific Purposes is a less explored branch in Uzbekistan and it has been a crucial part of discussion. Considering the process of student-centered learning with flipped classroom using corpus tools, focusing on cognition of idiomatic units in modern literature can be the most perspective part of the involvement. ESP teachers in Uzbekistan are aiming to design the syllabus in terms of meeting students' needs for their future professions. As researchers have already indicated, the most frequent type of psychological units' transformations in the corpus can assist the author's intention to specify the utterance, to revive the meaning of the phraseological unit intensifying its expressiveness (Bekhta et al., 2022). C.P.Amador-Moreno (2022) argues that using corpus linguistics techniques can be beneficial in illustrating value of literary (re)productions. M.N.L.Azmi's research (2015) stresses the elements of concepts of "meaning" and "truth" in literary works and Lazar (2009) proves that literature can be used as a tool for discussion, controversy, and critical thinking in ESP setting. Concerning these issues, we designed over four-week home reading classes on "The Silence of the Lambs" by Thomas Harris in three gradual steps: 1) collecting idioms; 2) analyzing the frequency list of idioms in COCA; 3) exploring Uzbek literary translations of idioms using parallel corpora (www.uzbekcorpus.uz). The results showed that the experiment can help law students to learn the most frequently used idiomatic units in modern English. The presenters will discuss the challenges they faced and the productivity of classes by focusing on idiomatic units in psychological thriller fiction.

Keywords: Psychological Thriller, Idiomatic Expression, Parallel Corpora, Home Reading, Flipped Classroom

iafor
The International Academic Forum
www.iafor.org

Introduction

The field of English for Specific Purposes (ESP) in the Republic of Uzbekistan, particularly within higher education, has been evolving to meet the diverse needs of students pursuing various professional disciplines. Among these spheres, law students require not only a robust understanding of legal English but also an awareness of idiomatic expressions that permeate legal texts, courtroom discourse, and professional communication. Idiomatic expressions, which are phrases whose meanings are not immediately apparent from the individual words, pose unique challenges to non-native speakers. Understanding and appropriately using idioms are crucial for law students as these expressions often carry significant connotations, cultural references, and nuanced meanings that are essential in legal contexts.

In Uzbekistan, where English is taught as a foreign language, law students often struggle with idiomatic expressions due to limited exposure and practice in their academic curriculum. Moreover, psychological thrillers, a genre rich in idiomatic language and complex narratives, offer an intriguing medium for exploring these linguistic features. Psychological thrillers often delve into the human psyche, using language to create tension, suspense, and depth. These elements make the genre an excellent resource for teaching and learning idioms, especially within the context of legal education where precise and nuanced language use is paramount.

The primary purpose of this study is to investigate the effectiveness of using psychological thrillers as a tool for teaching idiomatic expressions to law students in Uzbekistan's higher education system. By employing a corpus-based approach, this research aims to:

1. Analyze the frequency and usage of idiomatic expressions in selected psychological thrillers.
2. Assess how these idioms are understood and applied by law students in their academic and professional language use.
3. Explore the implications of integrating corpus linguistics tools in ESP teaching to enhance.
4. students' comprehension and usage of idiomatic language.

This study also seeks to bridge the gap between theoretical knowledge and practical application by contextualizing idiomatic expressions within legal and psychological narratives. The insights gained from this research will contribute to the development of more effective ESP curricula and teaching strategies that align with the specific needs of law students in Uzbekistan. Ultimately, this study aims to enhance students' linguistic competence, enabling them to navigate the complexities of legal English with greater confidence and precision.

Methodology

The research was carried out at Tashkent State Law University in Tashkent, Uzbekistan, focusing on law students who were enrolled in an ESP course. The course integrated psychological thrillers into the curriculum to facilitate the learning of idiomatic expressions. The study followed a mixed-methods approach, combining quantitative and qualitative data collection and analysis. The study involved 50 law students, with an equal representation of male and female participants. These students were in their second year of study and had an intermediate level of English proficiency, according to the Common European Framework of Reference for Languages (CEFR). We selected "The Silence of the Lambs" by Thomas Harris

as the primary text for analysis due to its wide usage of idiomatic expressions and psychological depth. The text was chosen because it aligns with the interests and future professional needs of law students. The identified idioms were translated into Uzbek using the parallel corpora available at www.uzbekcorpus.uz. This step was crucial for understanding how idiomatic expressions are rendered in the students' native language and how they might influence comprehension.

The students participated in four-week home reading classes structured into three steps:

Step 1: Collection of idiomatic expressions from the text.
Step 2: Analysis of the frequency list of idioms in COCA.
Step 3: Exploration of Uzbek translations of the idioms using parallel corpora.

Home-reading classes in English for Specific Purposes (ESP) contexts, particularly among law students, offer a unique and effective approach to language learning. By engaging with legal literature and related texts, students are not only able to enhance their language proficiency but also deepen their understanding of legal concepts and terminology. The incorporation of home-reading assignments allows students to explore complex legal narratives at their own pace, fostering critical thinking and analytical skills essential for their future careers. This method also encourages independent learning and the ability to apply language skills in real-world contexts, making it an invaluable component of ESP instruction.

Furthermore, home-reading classes facilitate the development of specialized vocabulary and contextual understanding that is crucial for law students. By interacting with authentic legal texts, students are exposed to the nuances of legal language and the specific jargon used in various legal documents. This exposure is critical in helping students to not only grasp the meaning of legal terms but also to understand their application in different legal scenarios. The structured analysis of these texts in a classroom setting, coupled with guided discussions and tasks, enables students to articulate their understanding more effectively, thereby improving both their written and spoken English skills. The integration of home-reading into ESP curricula aligns with contemporary pedagogical approaches that emphasize the importance of content-based instruction in developing language proficiency for specific professional fields.

Assessment

To evaluate the effectiveness of the instructional sessions, we administered pre- and posttests. The tests measured the students' ability to recognize, interpret, and use idiomatic expressions in context. Additionally, qualitative data was collected through focus group discussions to gain insights into the students' experiences and challenges.

Results

The results from the study were encouraging and indicated a significant improvement in the students' understanding and use of idiomatic expressions.

1. Pre-Test Results:

- Only 30% of students could correctly identify and interpret idiomatic expressions before the instructional sessions.
- A majority of students (70%) found idioms challenging, often misinterpreting their meanings or failing to recognize them altogether.

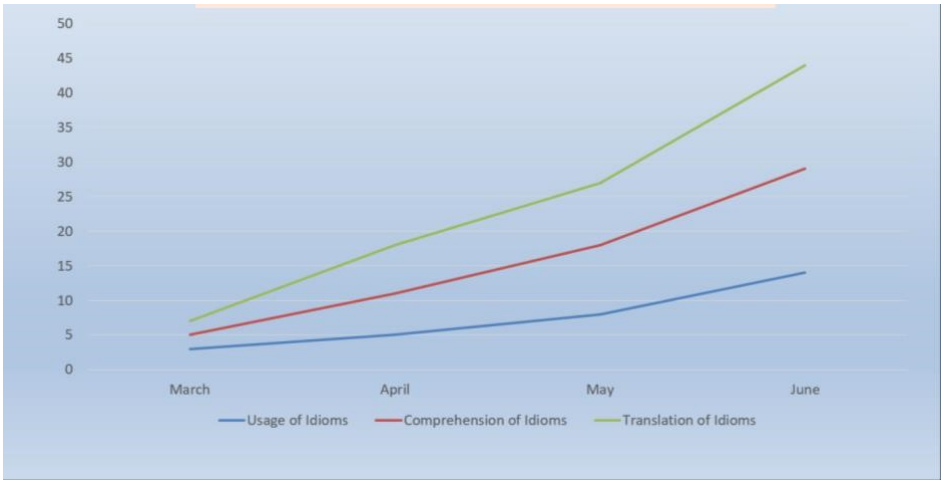
2. Post-Test Results:

- After the instructional sessions, 75% of students were able to correctly identify and interpret idiomatic expressions, showing a 45% improvement.
- The students also demonstrated a 40% increase in the correct usage of idioms in their writing and speaking tasks.

3. Qualitative Feedback:

- Students reported that the use of psychological thrillers made the learning process more engaging and relevant to their field of study.
- The integration of COCA and parallel corpora helped bridge the gap between English idioms and their Uzbek equivalents, enhancing comprehension.

The following bar graph illustrates the pre- and post-test results, showing the percentage of students who correctly identified and interpreted idiomatic expressions.



Graph 1: Improvement in Students' Comprehension of Idiomatic Expressions

Discussion

The findings of this study highlight the effectiveness of using psychological thrillers as a medium for teaching idiomatic expressions in an ESP context. The significant improvement in students' comprehension and usage of idioms underscores the importance of contextualized learning in ESP courses. Our research aligns with Bekhta et al.'s (2022) assertion that the transformation of psychological units in literary works can enhance the expressiveness and specificity of language learning. Similarly, C.P. Amador-Moreno (2022) emphasizes the value of corpus linguistics techniques in illustrating the literary (re)productions, which is evident in our successful use of COCA for analyzing idioms. The study also resonates with M.N.L. Azmi's (2015) focus on the concepts of "meaning" and "truth" in literary works, demonstrating how idioms can convey deeper meanings in legal contexts. Lastly, Lazar (2009) and Bennett et al. (2020) advocate for the integration of literature into ESP, arguing that it fosters critical thinking and discussion—outcomes that were clearly observed among our students.

Conclusion

The study confirms that incorporating psychological thrillers into ESP instruction is an effective strategy for enhancing law students' understanding and use of idiomatic

expressions. The corpus-based approach, combined with contextualized learning, provides a robust framework for addressing the linguistic needs of law students in Uzbekistan. Future research could explore the long-term impact of this approach and its applicability to other genres and professional contexts. By integrating literary works like psychological thrillers into ESP courses, educators can create more engaging and meaningful learning experiences that equip students with the linguistic tools they need for their future careers. The findings of this study shed light on the profound impact that psychological thrillers can have on the cognitive and analytical capabilities of law students. By delving into complex characters and intricate plots, students are exposed to scenarios that enhance their critical thinking and empathy—skills that are indispensable in legal practice. This research not only reinforces the importance of integrating literature into legal education but also highlights the unique role that psychological thrillers can play in developing a deeper understanding of human psychology and behavior, which is crucial in interpreting the law.

Moreover, these results suggest practical applications for educational settings. Incorporating psychological thrillers into the curriculum could serve as a valuable tool for fostering analytical skills, encouraging students to approach legal cases with a more nuanced perspective. This interdisciplinary approach bridges the gap between legal studies and literature, offering students a well-rounded education that prepares them for the complexities of legal practice. This study aligns with existing literature, such as Bennett et al. (2020) and Lazar (2009), which advocate for the use of literary works in specialized education to cultivate critical thinking and discussion. However, our research offers new insights by specifically focusing on law students and the genre of psychological thrillers, thereby contributing a fresh perspective to the ongoing discourse on the role of literature in education. Looking forward, future research could explore the effects of different literary genres on various aspects of legal education, or extend the study to include students from different academic backgrounds. Such studies would further enrich our understanding of the intersection between literature and professional education.

In conclusion, this research underscores the potential of psychological thrillers not only as a tool for entertainment but also as a means of enhancing educational outcomes in law. By fostering critical thinking and empathy, these narratives can play a pivotal role in shaping the legal professionals of tomorrow, making a compelling case for their inclusion in academic curricula.

References

Amador-Moreno, C.P. (2022). Using corpus linguistics to explore literary speech representation: non-standard language in fiction. The Routledge Handbook of Corpus Linguistics. pp. 517-531.

Azmi, M.N. (2015). East meets west: The reader response theory in thriller fictions. ProcediaSocial and Behavioral Sciences 174, pp. 58-63.

Bekhta, I., N. N. Bondarchuk, O. Hrytsiv, O. Levchenko, O. Matviienkiv and O. Melnychuk, "Computational Actualization of Idioms: Authorial Corpus-based Idiomaticity of Contemporary British Fiction," *2022 IEEE 17th International Conference on Computer Sciences and Information Technologies (CSIT)*, Lviv, Ukraine, 2022, pp. 103-106, doi:10.1109/CSIT56902.2022.10000798

Bennett, G.R., Borasheva, A., & Ruzmatova, D.R. (2020). Implementing Flipped Classrooms in Uzbek and Karakalpak EFL Teacher Education.

Lazar, G. (2009). Literature and Language Teaching. A guide for teachers and trainers. Cambridge Teacher Training and Development. Cambridge University Press.

Samandarova, S.F. (2024). Psychological Thriller Genre and Its Major Characteristics. International journal of progressive sciences and technologies. pp. 244-248. https://ijpsat.org/index.php/ijpsat/article/view/6107

A Comparative Study of Persian Synthesized Intonation Based on Autosegmental-Metrical and PENTA Models

Fatemeh Lotfi, Imam Khomeini International University, Iran
Vahid Sadeghi, Imam Khomeini International University, Iran

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This paper presents a comparison study concerning the level of naturalness of the manipulated Persian intonation based on AM and PENTA models of speech prosody. In this piece of study, the implementation rules in accordance with the aimed approaches are based on the pitch contours analyses. Intonation is used in all languages and it is linguistically structured and pragmatically meaningful. PENTA model is based on communicative and functional view of speech. AM model reflects the connection between two subsystems of phonology and views tone on separate tiers. A corpus containing 15 sentences was created with different types of focus on the content words. In production level, 12 male and female native speakers of Persian participants were assigned to produce and record the sentences. The data were analyzed and resynthesized via PRAAT software manually. Finally, 10 Persian native speakers were selected to judge the naturalness of the manipulated sounds of both AM and PENTA Models. After accomplishing the perception level, based on the quantitative results obtained from a chi-squared test (xi2) analyses, we argue that firstly, there is a significant difference between the natural speech intonation produced by the control group and the sampling groups. Although, the other test was conducted on two sampling groups comparing AM and PENTA models. The obtained results of its xi2 test indicated no significant difference between the Persian manipulated speech intonation based on Autosegmental-metrical approach parameters and PENTA.

Keywords: AM, PENTA, Intonation, Prosody, Speech Manipulation, Speech Synthesis

iafor
The International Academic Forum
www.iafor.org

Introduction

This paper is an attempt to discover the naturalness of the Persian synthesized speech intonation. It determines the manipulated prosody of speech intonation based on the two outstanding and state-of-art approaches Autosegmental-Metrical (AM) and Parallel Encoding and Target Approximation (PENTA), respectively. It scrutinizes the difference between the manipulation of the intonation with the help of data gathered and judged by native speakers. This piece of study would assist the better and conscious decision making in NLP and machine learning fields of study of Persian. This study will enhance our understanding of Persian speech intonation synthesis by aligning with international approaches in prosody. For this purpose, the components of the two approaches will be studied and evaluated on data and later the more efficient one on Persian will be determined. On the other hand, Persian language has not been under broader research. There is a substantial body of literature and numerous areas of ongoing research in this field. This study is significant as it validates the approach by demonstrating its effectiveness in an additional language, thereby enhancing its credibility.

In order to synthesize Persian intonation, systematic intonational units should be implemented based on the credited approaches, AM and PENTA, respectively. The primary concern that arises in this context is determining which of these options would yield more natural and higher quality intonation in Persian and Which analytical components in the two approaches take precedence over the other in the context of the Persian language.

Prior to commencing the research, based on previous studies, we hypothesize that intonation manipulated using the AM approach will exhibit superior quality compared to that produced by the PENTA approach.

In the present study, we have elected to implement a two-level investigation. The initial phase will focus on production and synthesis, wherein the intonational phrases of Persian will be analyzed in accordance with the components of both the Autosegmental-Metrical (AM) and PENTA (Parallel Encoding and Target Approximation) frameworks. A corpus of 15 sentences has been constructed. Each sentence incorporates both subjective and objective focus. The words have been carefully selected to include two or three syllables and voiced consonants, ensuring a smooth pitch contour without disruptions. The acoustic analyses of the utterances are conducted using PRAAT (Boersma, 2022). Using this software, we explore and manipulate the pitch changers of Persian intonation utterances by examining pitch tracks on the aimed focus. A pitch track demonstrates the fluctuations in the form of a curve over a span of time.

Intonation involves the systematic and contextually significant variation of fundamental frequency (F0) in speech. Intonation is used in all languages and is specified in phrasal level. The occurrence of pitch movement is based on a number of determining factors such as syntax, pragmatics, prosodic phrases. In linguistics, intonation is utilized to convey meanings and verbal information, while non-verbal features such as age and mood are not taken into account. There are said to be two main patterns for intonation: Rising and Falling patterns. The carry different contextual meanings in various utterances. Informative sentences follow the falling pattern. While in question, surprise, hesitation or emphasis we have the rising pattern. Consider Figure 1 as example from Persian, and observe the pitch contour as extracted using PRAAT. the question is:

A. /Qejmæt in tʃænd æst/? “How much do they cost?”
B. /Pændʒah hezar Tomæn/. “50 bucks”

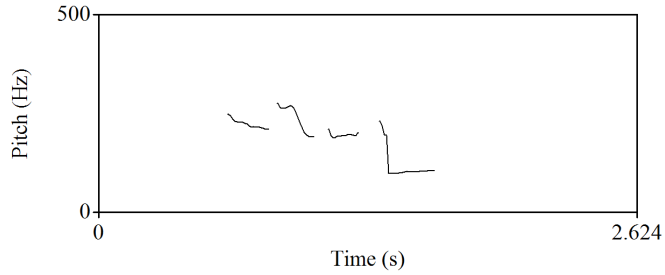


Figure 1: Pitch pattern for the Persian sentence: /Pændʒah hezar Tomæn/

Consider Figure 2 as example from Persian, and observe the pitch contour as extracted using PRAAT. the question is:

A. /Qejmæt in tʃænd æst/? “How much do they cost?”
B. /Pændʒah hezar Tomæn/? “50 bucks?”-we are shocked by the price or ask for emphasis.

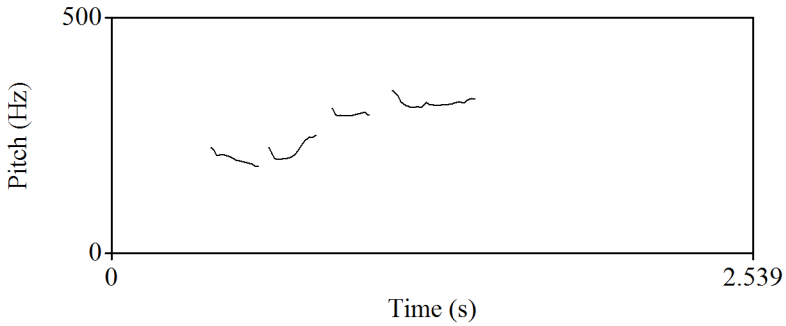


Figure 2: Pitch pattern for the Persian sentence: /Pændʒah hezar Tomæn/

Another feature that causes the pitch curve to alter its shape is prominence. The alteration in pitch accent results in the alteration of the contextual meaning. Consequently, it may contrast with other meanings of the sentence arguments. This point is also significant and merits attention.

There are two main approaches in regard to intonation, level and configurational analysis of speech intonation. The following paragraphs will be assertive of the named Analytic approaches.

AM Theory

The partisans of level-analysis of English intonation strongly believe that the pitch levels are relative (Boliger, 1951). As G.L.Trager and Henry Lee Smith, JR state this point explicitly: “It is relative pitch, not absolute, that is being discussed”. However, it has not been enlightened how relative these relative pitches are thought to be (Boliger, 1951). The American structuralists believe that the intonation of a language should be defined using the four tonal levels: very high, high, mid, low (Pike, 1945). One of the scholars who criticized this perspective was Dwight L. Bolinger. He assumes that if pitch pattern had four different tonal realization, the entire pattern may be transferred to the higher or lower frequencies

without interfering inner relation of the four tones (Boliger, 1951). As a result, the pitch range would smoothly expand or compress. However, each tone is to have its specific pitch range. Leben pointed out that the tonal units have different tones from the segmental structure of a speech (Leben, 1976). Then, Goldsmith showed that each tone in phonological tier is independent from the segmental tier and is known as the auto-segmental tier (Goldsmith, 1976). Along with these studies, Liberman also approved his intonational studies and analyses on the auto-segmental tier (Liberman, 1975). These were the prelude for the birth of the Auto-segmental Metrical theory.

The most significant reason for the appearance of Autosegmental-Metrical theory was to define and explain the continuous pitch changes in speech base on the three PhD dissertations Liberman, Bruce (Bruce, 1977) and Pierhummbert (Pierrehumbert, 1980). The initial framework in AM theory started with works such as Liberman (Liberman, 1975)**,** Bruce (Bruce, 1977)**,** and Pierrehumbert (Pierrehumbert, 1980). They were all about speech intonation synthesis. They played a crucial role in the rise of the AM approach, specifically Bruce`s dissertation on Swedish. There were points stated in his work that is worth mentioning. First, the H and L targets of the F0 curve is in pitch contour level. Second, he proved that the whole curve of an utterance consists of two different tones with difference structures, the first group is the pitch accent that occurs on the word and then the boundary tone that happens with the end of the intonational phrase. The third point in his work is that tonal units in words and phrases are all put together to build up the whole contour. Pierhummbert, whose dissertation was based on the initial AM theory of Bruce, provided a comprehensive analysis of the English intonation. The findings of her dissertation were then developed by Beckman- Pierhummbert (Beckman & Pierrehumbert, 1986) and Pierhummbert-Beckman (Pierrehumbert, 1988). In such framework the tonal structure is composed of significant tonal events which are considered to be H (high) and L (low) pitch targets as well as their combination and they are considered way more important that the transition between the target points. This means the whole shape of the curve may not serve an importance throughout the analysis. Tones on the pitch track is phonetically aligned depending on different factors such as a focused element in an utterance. The smallest unit of Persian prosody is the accentual phrase (AP) with the phonological representation of L+H* related to the stressed syllable (Sadat-Tehrani, 2007). Intonational features are focus, tone, phrasing and pitch range. All the mentioned features correlate and the correlation is determined by two factors: prominence and pitch contour. Prominence comes in two terms: weak and strong. Pitch contour comes with two main definitions rising and falling pattern.

L and H tones are the abstract symbolic (i.e. phonological) primitives of intonation. Their identity as Hs and Ls is largely determined by phonetic observation and defined in relative terms: H is used to represent tones deemed to be high in a melody with respect to the speaker’s range and other tones in the same contour; L is used to represent tones deemed to be low by the same criteria (Pierrehumbert, 1980). Tones are morphemes with pragmatic meaning; all tones in a melody contribute compositionally to the pragmatic interpretation of an utterance (Pierrehumbert, 1990).

Tones are *autosegments* that is they exist independently of the segmental string. They are phonologically associated to structural positions in the metrical representation of an utterance. It is this connection that has given rise to the term autosegmental-metrical. Phonetically, tones are said to be realized as *tonal targets* that is as specific points in the contour, while the rest of an F0 curve is derived by *interpolation* between these targets. tones associate either with phrasal boundaries or constituent heads. The last and most important of

pitch accents in a phrase is referred to as the *nuclear* accent. Tones that associate with boundaries are collectively known as *edge tone* (Arvaniti, 2022). The primary function of edge tones is to mark the boundaries of phrases. Phonetically, tones are said to be realized as *tonal targets* that is as specific points in the contour, while the rest of an F0 curve is derived by *interpolation* between these targets. Tonal targets are typically, turning points in the contour, such as peaks. It is very essential to understand the intonational structure for modelling.

Focus serves two meanings in linguistics. First, prosodically speaking, it refers to the most prominent element comparing to the others. Second, it refers to a part of the sentence in which an element has a new information and it is emphatic (Ishihara, 2001), (Vallduví, 1990), (Jackendoff, 1972). Focus carries pragmatic and contextual significance, and various languages employ different syntactic, prosodic, or semantic methods to express it and also some other may have all of these methods (Vallduví & Engdahl, 1996). *Focus* is categorized into three types: broad focus, contrastive focus, and narrow focus.

PENTA Theory

Configuration approach has been the center of attention, since it is fully based on the speaker`s intuition. The relation between the form and meaning is simple and natural. In this approach, meaning and communicational functions are depended on pitch curve and directly affects the changes in the pitch track. Accordingly, the whole shape of the curve changes in the pitch accent. Unlike AM, here the target tones and points are not playing the role. Prosodic parameters such as F0, duration, intensity defines the pitch changes. Ladd (Ladd, 2008) names this as parametric approach. As it is believed, in this type of analysis, the entire shape and form of the pitch curve is considered not just the target points in a specific time. In accordance to the configuration approach, there are three computational models of speech intonation synthesis: INTSINT[1] (Hirst et al., 2000), OXIGEN[2] (Grabe et al., 2004) and PENTA[3] (Xu & Xu, 2005). The Parallel Encoding and Target Approximation (PENTA) model of speech prosody was proposed as an attempt to improve the understanding of prosody by putting emphasis on two aspects of speech prosody communicative functions and articulatory mechanisms (Xu & Xu, 2005). The development of PENTA followed a different approach comparing to AM. It focused mostly on the meaning and communicative functions, importantly, it determines how prosody encodes the meaning in a way that one can decode it. Figure 3 is a diagram of PENTA in general. Not only does this schematic diagram show the prosody, but it also represents other aspects of speech.

[1] International Transcription System for Intonation
[2] Oxford Intonation Generator
[3] Parallel Encoding and Target Approximation

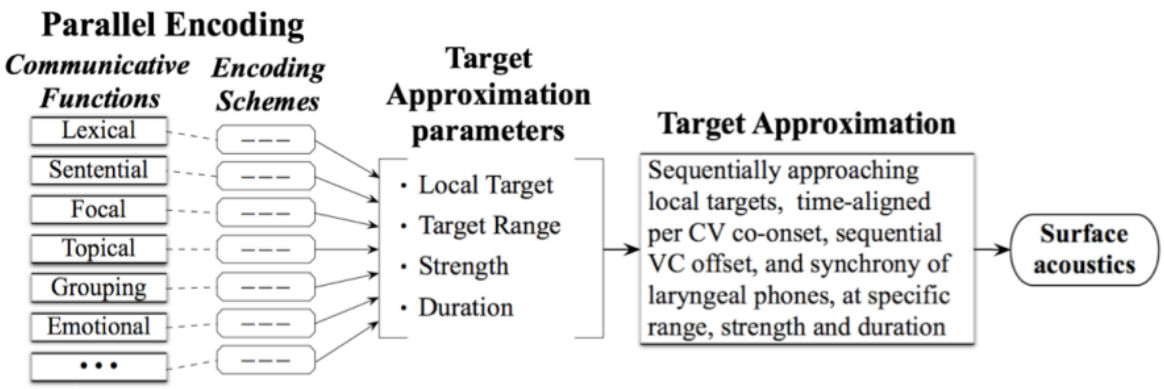


Figure 3: A schematic Sketch of PENTA model

In this model of intonation, the only obligatory melodic primitives are the syllable-sized pitch targets and this resembles the tone in AM theory (Xu et al., 2015). The phonetic characteristics of these targets include height, slope and rate of approximation.

In the subsequent sections, I will examine the existing Persian background studies and conduct a literature review.

This comparative study is the first research on Persian language. In the current work, I have conducted a comparison study on the naturalness of the speech intonation synthesis based on the two main intonational models AM and PENTA. Many Iranian scholars have studied Persian intonation using the AM framework.

Towhidi (Towhidi, 1974) did study on Persian intonation based on English school of thought. He applied the pragmatic meanings for determining the intonation pattern. He divided the speech into smaller tonal units that the smallest is a work and the biggest is a sentence. Each unit has a pitch accent and the boundary tone is defined by the change in tone. Mahootian (Mahootian & Gebhardt, 1997) conducted a study which examines the syntactic view point of the Persian intonation. Hayati (Hayati, 1998) conducted a comparative study on Persian and English intonation to gain a comprehensive understanding of the challenges Persian speakers face in producing English intonation patterns. Eslami (Eslami, 2000) performed an introductory study on Persian intonation based on Autosegmental-Metrical (AM) theory in his PhD dissertation. He has comprehensively defined Persian intonation. Within this study, he introduced *the head avoidance principle*. This principle provides insights into the syntactic and derivational characteristics of an accent within a phrase or utterance. Vahidiyan (Vahidian-Kamyar, 2001) has studied on semantic units of Persian intonation. He does not consider the syntactic features throughout his studies. He categorizes speech intonation into semantic groups as words, phrases, small sentences and utterances. This categorization was applied utilizing English school. Mahjani (Mahjani, 2003) studied Persian intonation based on AM theory in his MA thesis. in his studies, he grouped Persian intonation into three: intonational phrase, accentual phrase and intermediate phrase. Sadat Tehrani (Sadat-Tehrani, 2009) has a more comprehensive PhD study on Persian intonation based on Autosegmental-Metrical theory. In his research, he recorded data of 2100 utterances produced by Persian speakers and analyzed it using AM framework of intonation. In his thesis, it was proposed that the smallest unit of Persian prosody is the Accentual Phrase (AP), with the pitch accent L+H* associating with the stressed syllable. Sadeghi (Sadeghi, 2018) has done valuable research on Prosodic features of Persian. In his book- The prosodic structure of the Persian

language- he has delved into the intonational approaches and frameworks and has analyzed different methods.

In summary, there are two main analytical approaches for intonation of a language that was discussed earlier. Each served as a foundation for the major intonational models, Autosegmental-Metrical (AM) and Parallel Encoding and Target Approximation (PENTA).

Methods

This study is a primary and experimental quantitative work. The subjects were wisely chosen and they were all monolingual native speakers of Persian. They all reside in Tehran.

The first step was to customize a corpus for the study. I designed 15 sentences all including 3 simple arguments, subject, verb and object. All the accented syllables were voiced so as not to have a teared pitch signal. In order to gather the data, questions were designed according to the intended answers that were expected to be produced by the subjects. 15 utterances were articulated in 5 forms of focus: broad focus, subjective contrastive focus, objective contrastive focus, subjective narrow focus and objective narrow focus. All the produced data was uploaded in PRAAT for the manipulation process. There were 7 men and 11 women. I excluded 6 speakers due to the bad quality and noises that was recorded unintentionally. 12 recorded voices were selected. Recording phase was conducted by Boya microphone to denoise the environment. Data preparation, trimming and annotation has been done using PRAAT afterwards. Annotations were according to the framework of the two separate models of intonation AM and PENTA. The files were saved instinctively by special codes in naming so would be used in trainer software of both theories. After creating data text grids for the AM trainer and PENTA trainer, we had to import them into the trainers and start synthesizing.

It was required to create two tiers for annotating the data according to AM model. In the first tier, I marked the syllable boundaries and named them with lower case letters by order. The second tier was created to be a tier for marking the pitch accents on the accented syllable. Figure 4 demonstrates annotated tiers for the Persian sentence: “Mary watered the plants.”

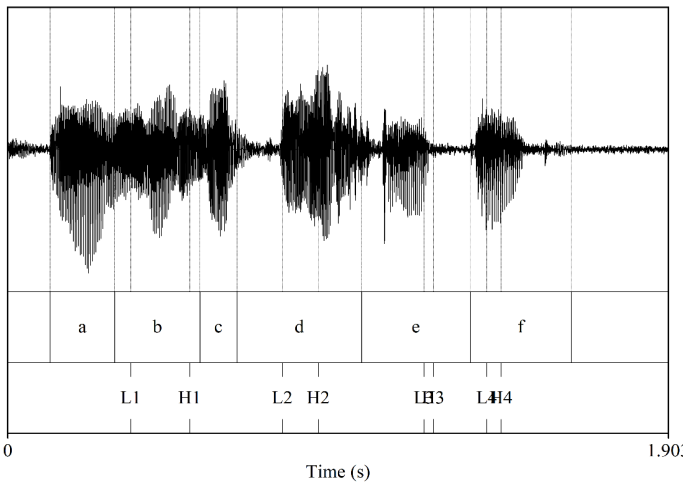


Figure 4: Annotating syllabic and tonal tiers in Persian sentence /mærjæm be gɔl ab dad/

The files were saved as Wav.

For annotating the data according to PENTA framework, just one syllabic tier is marked. As xu believes in this approach the whole form of the pitch curve serves importance throughout the syllable, it is not just a tonal target in temporal alignment. Figure 5 illustrates the annotated tiers for the Persian sentence: “Ayda is a proficient speaker of German.”

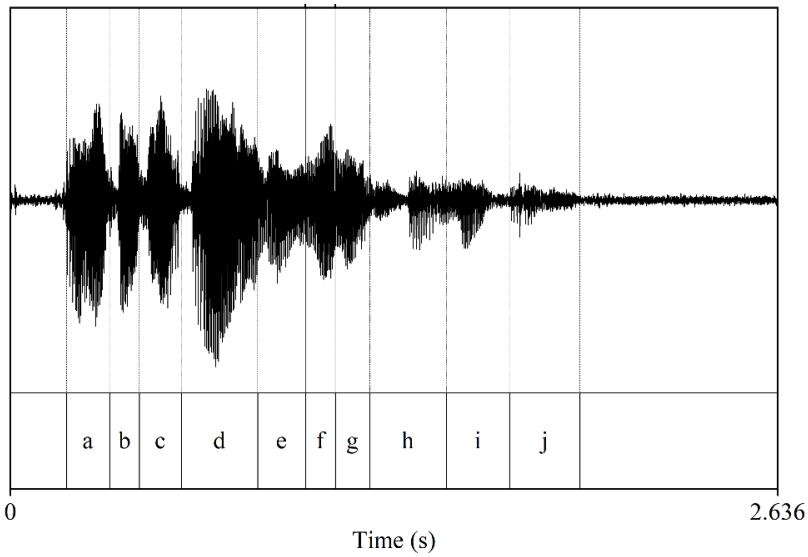


Figure 5: Annotating syllabic and tonal tiers in Persian sentence
/ajda be almani mɔsælæt æst/

The same process was conducted for the second set of data.

Input data was ready to be loaded in trainer programs. On the process some problems came up and avoided the machine syntheses. We changed the plan for manipulation process and synthesized manually in PRAAT. So, we can retreat to the problem and find a solution for the drawbacks.

Having the AM framework in mind, I followed the order below to first stylize the speech signal.

Manipulate sound → View and edit → Pitch → Stylize pitch

The resolution was set as 2 semitones. Following the structure above will help better and smoother transition of the target points on a pitch track (Boersma, 2022). The manipulation is done on the broad focus and the focus is being created artificially by displacing the target tones. All the accents on the other arguments were deaccented where needed. The increase in target point was about 30 Hz on each aimed tone. After each manipulation, I followed the structure below:

Pitch Tab → Resynthesize → Interpolate quadrable

PRAAT is using a linear interpolation between the two starting and final points in all tiers as: Pitch Tier, Intensity Tier, Duration Tier, Amplitude Tier, Formant Grid. The last version of the data was stored as published resyntheses sounds. Figures 6 and 7 show the synthesized signals for the sentence: “Ayda didn’t respond the teacher.” in two forms of subjective manipulation and objective manipulation.

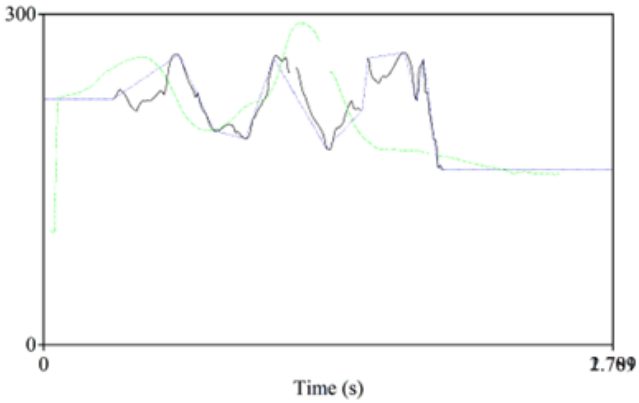


Figure 6: resynthesized informative focus on object in Persian sentence /Ajda be mɔælem jævab nædad/

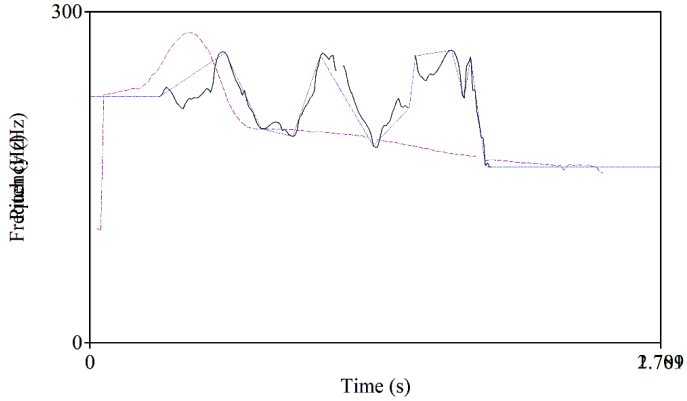


Figure 7: resynthesized informative focus on subject in Persian sentence /Ajda be mɔælem jævab nædad/

The green dotted line in Figure 6 is the synthesized intonation pitch contour. The purple dotted line in Figure 7 is the synthesized intonation pitch contour.

All the above-mentioned process is done for PENTA model manipulation. There is just one step that is not appropriate and is ignored is to stylize. As PENTA framework is considered, no target points and tones are aimed here but the entire signal in the syllable is of the value.

Figures 8 and 9 are the synthesized sentences according to the PENTA intonation model frameworks.

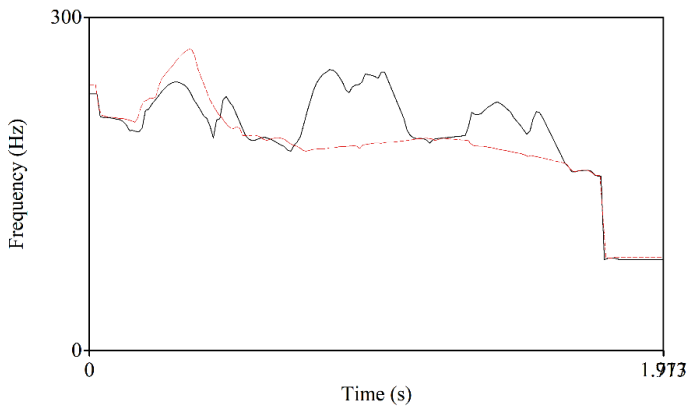


Figure 8: resynthesized contrastive focus on subject in Persian sentence /baba æz bazi esteqbal kærd /

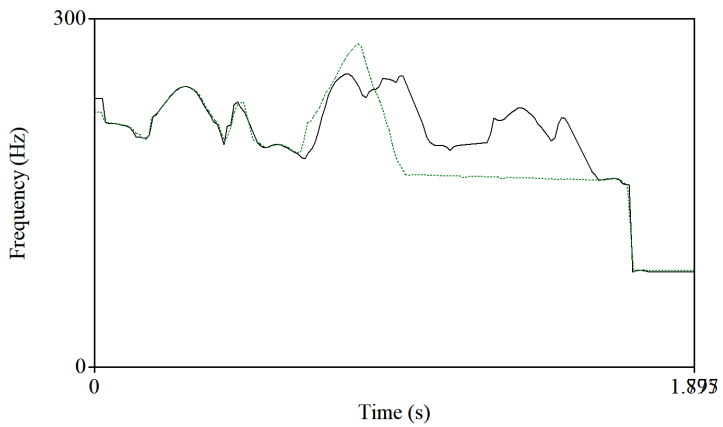


Figure 9: resynthesized contrastive focus on object in Persian sentence /baba æz bazi esteqbal kærd /

In these figures, we only have one colorful dotted line due to the ignorance of the stylizing level according to PENTA framework.

The next level after finishing the manipulation process is to combine the questions that were actually asked in the interview with the resynthesized sounds. Followed:

Select both Sound files in object list using ctrl→ Combine → Concatenate

Perception phase was conducted by *Questionnaire design*. I designed a five scaling LIKERT questionnaire in which the listeners would judge the level of naturalness of the sounds they heard. The evaluated five scales were:

very natural- almost natural- natural- almost unnatural- very unnatural

Ten Persian native speakers were selected as the judgers for the perception phase. Files were played and questionnaire was distributed to be marked.

Results

We compared the results of the different data gathered from both group of questionnaires- AM and PENTA- and graded them using excel. We used the Chi-square statistical test (X^2) for the final analyses of the data. There are three groups to be studied in this paper: the control group is the natural interview that was conducted at the very first step, second group is the synthesized data based on AM and the third group is the synthesized data based on PENTA.

In the first place, I compared each synthesized group with the natural production group. The gained results are as below:

The p level in X^2 test for the speech intonation synthesized according to AM.

$X2= 183.74, p < 0.001$

The p level in X^2 test for the speech intonation synthesized according to PENTA.

$X2= 218.28, p < 0.001$

According to the obtained results, there is a significant difference between the natural intonation of speeches and the synthesized ones.

$Sig= 0.001< 0.05$

Comparing the two synthesized sentences based on AM and PENTA.

$X2= 2.713, p = 0.52$ ($Sig= 0.52> 0.05$)

As observing the significant level number of the test, we conclude that there is no considerable difference between the perceived frequency of the data based on AM or PENTA. Generally speaking, the average naturalness of the synthesized intonation in each focused utterance is as below:

- The average of naturalness in the naturally produced utterances: 98.67%
- The average of naturalness based on AM synthesized output: 81.17%
- The average of naturalness based on PENTA synthesized output: 84.85%

Conclusion

This research aimed to determine whether there is a significant difference between Persian synthesized speech intonation manipulated using Autosegmental-metrical approach parameters and PENTA. Additionally, the study sought to assess the naturalness of the manipulated intonation. The findings of this study are intended to encourage further research in Persian language studies within the rapidly advancing field of Natural Language Processing (NLP). Intonation refers to a combination of acoustic parameters including duration, intensity and pitch to distinguish lexical items. The most important parameter, pitch, is determined by the fundamental frequency, or F0, of speech, and is measured in hertz (Hz) or semitones. Intonation here is considered a component of a language's prosody, which is an overarching term that includes interacting elements such as rhythmic structure, prominence, and prosodic phrasing. In order to have a synthesized intonation of a language

we need to follow authentic frameworks. There are models of speech intonation syntheses. In this study, we applied AM and PENTA models of intonation.

So, to run the project, we implemented rules based on pitch contour analyses using specialized software. Initially, a corpus of 15 sentences was created, each with different focuses on content words. The sentences were carefully selected, ensuring that the content words were voiced consonants to maintain the integrity of the pitch contour. This approach aimed to produce precise and fruitful results. Subsequently, 12 native Persian speakers (both male and female) were tasked with producing and recording the sentences. The recorded data were then manually analyzed and resynthesized using PRAAT software. Finally, 10 native Persian speakers evaluated the naturalness of the manipulated sounds for both the AM and PENTA models under identical conditions. The selected subjects were tasked with evaluating whether the responses matched the questions meaningfully and naturally. Following the perception phase, quantitative results from a chi-squared (χ^2) test indicated a significant difference between the natural speech intonation produced by the control group and the sampling groups. However, when comparing the two sampling groups (AM and PENTA), the χ^2 test results revealed no significant difference between the Persian manipulated speech intonation based on Autosegmental-metrical approach parameters and PENTA.

Acknowledgements

I would like to express my sincere gratitude to all those who have supported and contributed to this research.

I am also thankful to my family for their unwavering support and understanding during the course of this research. Their patience and encouragement have been a constant source of motivation.

Thank you all for your contributions and support.

References

Arvaniti, A. (2022). The Autosegmental-Metrical model of intonational phonology.

Beckman, M. E., & Pierrehumbert, J. B. (1986). Intonational structure in Japanese and English. Phonology Yearbook, 3, 255–309. *Bolinger, Dwight (1986) Intonation and its parts, Edward Arnold*.

Boersma, P. W., David. (2022). Praat: doing phonetics by computer [Computer program]. Version 6.2.14. http://www.praat.org/

Boliger, D. (1951). Intonation – levels vs. configurations. 7:199-200.

Bruce, G. (1977). Swedish Word Accents in Sentence Perspective. *Travaux de l'Institute de Linguistique de Lund/CWK Gleerup*.

Eslami, M. (2000). "Šenaxt-e nævay-e goftar-e zæban-e farsi væ karbord-e an dar bazsazi væ bazšenas-yerayan'i-ye goftar." The prosody of the Persian language and its application in computeraided speech recognition] [PhD dissertation].

Goldsmith, J. A. (1976). *Autosegmental phonology* Massachusetts Institute of Technology].

Grabe, E., Kochanski, G., & Coleman, J. (2004). Quantitative modelling of intonational variation.

Hayati, A. M. (1998). A contrastive analysis of English and Persian intonation. *Papers and studies in contrastive linguistics*, *34*, 53-72.

Hirst, D., Di Cristo, A., & Espesser, R. (2000). Levels of representation and levels of analysis for the description of intonation systems. Prosody: Theory and experiment: Studies presented to Gösta Bruce.

Ishihara, S. (2001). Stress, focus, and scrambling in Japanese. *MIT working papers in linguistics*, *39*, 142-175.

Jackendoff, R. S. (1972). Semantic interpretation in generative grammar.

Ladd, D. R. (2008). *Intonational phonology*. Cambridge University Press.

Leben, W. R. (1976). The tones in English intonation. *Linguistic analysis*, *2*(1), 69-107.

Liberman, M. Y. (1975). *The intonational system of English* Massachusetts Institute of Technology].

Mahjani, B. (2003). An Instrumental Study of Prosodic Features and Intonation in Modern Farsi (Persian).

Mahootian, S., & Gebhardt, L. (1997). Persian (descriptive grammars). *London: Routledge. doi*, *10*, 9780203192887

Pierrehumbert, J. (1990). Phonological and phonetic representation. *Journal of phonetics*, *18*(3), 375-394.

Pierrehumbert, J., and Mary Beckman. (1988). "Japanese tone structure." Linguistic inquiry monographs 15. 1-282.

Pierrehumbert, J. B. (1980). *The phonology and phonetics of English intonation* Massachusetts Institute of Technology].

Pike, K. L. (1945). The intonation of American english.

Sadat-Tehrani, N. (2007). The intonational grammar of Persian.

Sadat-Tehrani, N. (2009). The alignment of L+ H* pitch accents in Persian intonation. *Journal of the International Phonetic Association*, *39*(2), 205-230.

Sadeghi, V. (2018). The prosodic structure of Persian intonation.

Towhidi, J. (1974). Studies in the phonetics and phonology of modern Persian: intonation and related features. *(No Title)*.

Vahidian-Kamyar, T. (2001). Næva-ye goftar dær farsi [Melody of speech in Persian]. In: Mashhad: Ferdowsi University Press.

Vallduví, E. (1990). The informational component.(Doctoral dissertation). In: University of Pennsylvania New York.

Vallduví, E., & Engdahl, E. (1996). The linguistic realization of information packaging.

Xu, Y., Lee, A., Prom-On, S., & Liu, F. (2015). Explaining the PENTA model: a reply to Arvaniti and Ladd. *Phonology*, *32*(3), 505-535.

Xu, Y., & Xu, C. X. (2005). Phonetic realization of focus in English declarative intonation. *Journal of phonetics*, *33*(2), 159-197.

Contact email: Fatemehlotfi1992@gmail.com

A Comparative Evaluation of MOOCs and Classroom Learning in Engineering and Science in India: A MOOC Policy Assessment

Anurag Mehra, Indian Institute of Technology Bombay, India
Pramath Kant, Indian Institute of Technology Bombay, India

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In 2016, the Indian government introduced the SWAYAM regulation, allowing Indian MOOCs to be an alternative to regular classroom learning in higher education. The policy was designed to facilitate broader access to high-quality learning content and provisioning for credit transfer. However, after the introduction of the regulation, studies have yet to be conducted on the impact of MOOC policy in higher education. This study employs a policy evaluation framework to ascertain the effects of the SWAYAM MOOC policy on its key stakeholders, students, and faculty in higher education based on the data gathered from our survey. Drawing from more than five hundred survey data collected from multiple engineering and science colleges across India, we investigated the experiences of both faculty and students using quantitative and qualitative statistics. The analysis compared stakeholders' perspectives on MOOCs with traditional classroom learning. Our study revealed that the current version of MOOCs under the SWAYAM policy fails to provide avenues for face-to-face discussion, hands-on skill development or real-life learning experiences, which are crucial in engineering and science education. However, students and faculty agreed that MOOCs provide learning flexibility and enrich knowledge beyond the classroom curriculum. The faculty members also believe that MOOCs negatively impact the professional development of the students. We also found that students reaffirmed the importance of classroom learning and are convinced that MOOCs should not substitute classroom courses. The paper concludes by discussing the implications of the findings and highlighting feedback for policy stakeholders.

Keywords: Massive Open Online Content (MOOCs), Classroom Learning, India, NPTEL, SWAYAM, Policy Evaluation

iafor
The International Academic Forum
www.iafor.org

Introduction

Massive Open Online Content (MOOC) has been envisioned to provide access to quality education and help reduce the cost of higher education. Supporters of MOOCs often highlight their benefits in terms of convenience, deep knowledge, qualified instructors and professional development. (Belanger & Thornton, 2013; Jacobs, 2013; Watted & Barak, 2018). Through these undercurrents of advantages, various governments have considered formalising MOOCs in higher education (White, 2014).

In India, MOOCs are influenced not only by individual motivations but also by government policies. The introduction of the AICTE Regulation Act 2016 was a policy intervention that allowed engineering and science colleges/institutes to run 20% of their courses using MOOCs (NPTEL) courses (AICTE (Credit Framework for Online Learning Course through SWAYAM) Regulations 2016, 2016). Although NPTEL/SWAYAM MOOCs primarily consist of recorded lectures, the faculty members and teaching assistants help the students clear their doubts in discussion forums. The students must complete weekly assignments and appear for in-person proctored end-semester examinations to receive a course completion certificate (Mehra & Kant, 1970; NPTEL, 2022). However, we need to assess the efficacy of this learning policy proposed as an alternative to classroom learning.

When policymakers address technology intervention in education, they must incorporate the views of primary stakeholders. Since faculty members and students are primary and internal stakeholders in higher education (Savga et al., 2018), their observations and experiences with teaching and learning are invaluable for policy assessment (Birkland, 2006). Our study attempts to understand the 'real' classroom and MOOC-based learning and elucidate the contrasts perceived by faculty members and students.

Literature Review

Arguments About MOOC-Based Learning

MOOCs have garnered both support and criticism over time. Supporters cite advantages like free accessibility, quality content from leading instructors, flexibility, and scalability, believing it will revolutionise higher education (Onah et al., 2014; Sharrock, 2015; Yuan & Powell, 2013). However, faculty opinions are mixed. Jaschik and Lederman, in their study, found differing views about online learning, with technology administrators being more optimistic about online course quality than college faculty. They also found bias among faculty towards online courses which they had taught online (Jaschik & Lederman, 2014).

Despite their advantages, some studies criticise MOOCs for lacking face-to-face and peer interactions (Evans & Myrick, 2015; Jacobs, 2013; Jaschik & Lederman, 2014). While MOOC platforms offer discussion forums, only some students utilise them; Breslow et al. found that only 3% of students are engaged in online forums (Breslow et al., 2013). The educators have emphasised the importance of student-to-student and student-instructor interactions for knowledge sharing and fostering critical discussions for effective learning (Dillenbourg, 1999; Kolowich, 2010).

The lack of interaction also affects student engagement, often examined through attrition rates (Onah et al., 2014). MOOCs face high attrition rates, with drop-off from online courses highlighted as a significant disadvantage.(Haber, 2013; Jordan, 2015; Koller et al., 2013).

Further, critics have raised concerns about students' evaluation in MOOC-based learning: plagiarism and the authenticity of learning (Hew & Cheung, 2014).

Most studies on MOOCs have focused on students' consumption patterns, motivations, and usage factors (Koller et al., 2013; Littlejohn et al., 2016; Watted & Barak, 2018). Studies have also dwelled on critical reasons for pursuing MOOCs which include acquiring new skills (Wang & Baker, 2015), enhancing employability (Dillahunt et al., 2016) and obtaining certificates (Shapiro et al., 2017). However, these studies fail to address student and faculty perspectives on MOOCs and their effectiveness in engineering and science disciplines. This study aims to bridge this gap.

NPTEL and SWAYAM Regulation

MOOCs in India have their roots in the National Program on Technology Enhanced Learning (NPTEL). The NPTEL programme ensued from a collaborated effort of the Indian Institute of Technology (IITs), Indian Institute of Management (IIMs) and Carnegie Mellon University (CMU) during the years 1999-2003 (Department of Secondary and Higher Education, 2007).

The 'broader' objective of the NPTEL project was to enhance the *'competitiveness of Indian industries* worldwide through high-quality engineering education. Thus, the key 'operational' objective was to increase access to high-quality educational content and material for engineering. The project identified students and faculty members as its essential target group (Department of Secondary and Higher Education, 2007).

The NPTEL has evolved in phases (Kant & Mehra, 1970). During NPTEL's Phase 2 review, the Project Implementation Committee (PIC) noted increasing enrollment and felt NPTEL could become a viable alternative to the 'in-class chalk and talk method ' (NPTEL PIC, 2014). The committee also felt that MOOC-based learning could solve the faculty shortage crisis (Sreevatsan & Venugopal, 2016). The proposal led to the creation of the NPTEL Online Certification (NOC) program in Phase 3, laying the groundwork for the SWAYAM program. The SWAYAM program's main objectives are:

- Develop the SWAYAM MOOC platform for hosting and running thousands of courses simultaneously.
- To conduct examinations and award certificates to learners after successfully passing the SWAYAM course.
- To provide guidelines and recommendations to Institutions on implementing Choice Based Credit System (CBCS) for SWAYAM MOOCs through the AICTE SWAYAM Regulation Act 2016. and UGC SWAYAM Regulation Act 2016 (Department of Higher Education, 2015).

The regulation allows engineering and science universities to use SWAYAM/NPTEL MOOCs for credit transfer in India. However, it limits SWAYAM credit transfer to 20% of total semester courses. Determining the weightage of credit transfer lies with the universities and colleges. It can use SWAYAM MOOCs when teachers of a subject are not available in their institute or for elective subjects (AICTE (Credit Framework for Online Learning Course through SWAYAM) Regulations 2016, 2016).

Government-funded MOOC platforms like NPTEL and SWAYAM lack significant policy scrutiny or feedback studies. There is no data on input or feedback from faculty, institutes, or

students who are primary stakeholders of the policy. This study aims to assess the SWAYAM policy in engineering and science education and address the issue of stakeholders' feedback.

Policy Evaluation and Research Questions

There are different definitions of public policy. Guy Peters describes it as a "*set of activities that governments engage"* to change social and economic conditions (Peters, 2015). Thomas Dye views it as what the government "chooses to do or not do" (Dye, 2013), while James Anderson emphasises practical actions taken to address specific issues (Anderson, 2003).

The policymaking process involves six steps: identifying the problem, agenda setting, policy formulation with stakeholders, legitimisation through laws, implementation by state actors, and policy evaluation (Dye, 2013). Policy evaluation measures effectiveness against goals. It is an objective and evidence-based examination to assess the merit and value of government interventions (Nachmias, 1979; Vedung, 2013). Evaluation serves two primary purposes: learning and accountability (HM Treasury, 2020). It helps identify risks and challenges to ensure government actions maximise taxpayer benefits and improve governance.

In this study, we utilised the policy evaluation framework outlined in the Magenta Book from the United Kingdom. This framework encompasses three types of evaluation: process evaluation, impact evaluation, and value-for-money evaluation (cost-benefit analysis), explained below (HM Treasury, 2020):

Process evaluation primarily focuses on assessing the implementation of the policy interventions and delivery of the policy. It covers both subjective perceptions and objective issues of policy delivery based on operational data.

Impact evaluation assesses the impact of the policy interventions by scrutinising intended and unintended consequences and determining the extent of change due to policy interventions.

Value-for-money evaluation determines if the benefits of policy implementation outweigh its cost and whether policy intervention is using resources effectively.

This study aims to answer the following through the impact evaluation of SWAYAM policy using this framework:

1. What is the faculty's perception of MOOC-based learning compared to classroom learning?
    a. What is their belief in the SWAYAM policy implemented in Indian colleges and universities?
    b. What are the consequences of using MOOCs as the only source of learning?
2. What is the perception of students about MOOC-based learning as compared to classroom learning?

Methodology

We conducted surveys in-person and online across several colleges. It employed a Multi-Stage Systematic Random Sampling method to determine the number of colleges and institutes needed across various Indian states. This method identifies and selects clusters of the target population from the state, city, and, finally, neighbourhood (Bhandari, 2021; Penn

State Eberly College of Science, 2023). This approach allowed us to cover multiple states and representative engineering and science institutes and colleges (CSDS, 2019; Garg, 2019). The state and the cities for the survey were selected using the probability proportional to the sample size (PPS), a ratio of selected samples to the total population (CSDS, 2019; Penn State Eberly College of Science, 2023). After identifying the city, convenience sampling (Sedgwick, 2013) was used to select colleges, faculty members, and students. This method was necessary due to logistics and limited consent from institutions, instructors, and students. We conducted surveys only with those who agreed to participate.

Demography and Background of Faculty and Students

A total of 404 faculty members from private and public institutes/colleges participated in this survey. Approximately 57% were male, while the remaining 43% were female. The academic qualifications of faculty members are Ph.D. (42%) and Post-graduates (58%), which aligns with the minimum requirement to teach in engineering and science colleges in India.

Table 1 shows the demographic details of 515 students who participated in our survey. The Goodness of Fit test is significant for all demographic factors. We include the student's caste to address the representation of their social category. However, disclosing such personal details was purely discretionary and only valid responses to questions were considered for analysis.

Demographics of Students	Sub-division	Distribution (%)	χ^2	df	p
Type of Institute/College (N=515)	Public	40.20%	19.8	1	<.001
	Private	59.80%			
Gender (N =509)	Male	69.90%	84.2	1	<.001
	Female	30.10%			
Caste (N=505)	General	73.27%	382	2	<.001
	OBC	21.39%			
	SC/ST	5.35%			

Table 1: Demographic Data of the Students Participating in the Survey (N=515)

Methods for Analysis and Validation

Descriptive statistics: Responses to the questionnaire were measured on a 5-point Likert scale and analysed using descriptive statistics and non-parametric tests. Likert scale responses, treated as ordinal variables, were tested against independent nominal variables using Mann-Whitney tests (Laerd Statistics, 2018), and SPSS software was utilised for non-parametric testing. The statistical analysis used the Mann-Whitney test for two groups, while the Kruskal-Wallis test for three or more groups for nominal variables.

Thematic analysis has emerged as a critical tool for analysing qualitative data (Braun & Clarke, 2006; Walsh et al., 2019). It requires analysing and identifying the themes reflected in the open-ended question and categorising them (Braun & Clarke, 2006). We followed Braun and Clarke's recommendation to code and identify the major themes alongside close-ended questions to interpret data and reason their response.

Validation: To ensure credibility, we validated the survey using triangulation (Turner & Turner, 2017). The literature on triangulation describes several methods to triangulate the

analysis (Guion, 2002). We have used data and methodological triangulation. Data triangulation involved two target populations – faculty members and students - to validate perceptions about MOOC versus classroom learning. Methodological triangulation used open-ended follow-up questions to Likert-scale questions to understand and validate the reasoning behind responses.

Findings and Analysis

This section assesses the data and expounds on faculty and students' perspectives of MOOCs and their comparison with classroom learning and its impact on faculty members and students. As a note, the MOOCs examined in the survey are primarily NPTEL/SWAYAM MOOCs of India.

Analysis of the Faculty Survey

Perception of MOOCs vs Classroom Learning: We asked the faculty members to express their opinion about Classroom and MOOCs-based learning on nine variables measured on a 5-point Likert scale (1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree), and approximately four hundred of them responding. Tables 2 and 3 show the descriptive statistics of their responses for the two learning modes. The descriptive statistical analysis indicates four key attributes highlighting the difference between classroom learning and MOOCs: *Facilitates useful real-life interactions, Allows productive student engagement, Promotes peer-to-peer discussions and Easy to invigilate / proctor examinations.*

The attribute '*Facilitates useful real-life interactions'* has a high mean score and skewness in classroom learning compared to MOOC learning (from Tables 2 and 3). Approximately 93% believe that classroom learning facilitates better real-life interactions or experiments than MOOC-based learning (45%), including experiments, simulations, experience working in the laboratory, etc.

Attributes	**Mean**	**Median**	**Standardised mean score**	**Std. dev**	**Skewness**
Facilitates Useful Real-life Interactions	4.5	5.0	1.8	0.7	-2.12
Promotes Intense Peer to Peer Discussions	4.5	5.0	1.3	0.8	-1.50
Opportunity for Fair Objective Assessments	4.3	4.0	0.1	0.8	-1.22
Easy to Invigilate Proctor Examinations	4.2	4.0	-0.6	1.0	-1.15
Fosters Creative Teaching Lecturing	4.2	4.0	-0.4	0.8	-1.13
Allows Productive Student Engagement	4.3	4.0	0.1	0.9	-1.31
Easy to Conduct Planned Course in Time	4.0	4.0	-1.6	0.9	-1.15
Facilitates Knowledge Creation	4.2	4.0	-0.2	0.8	-0.88
Timely Feedback Given to Students	4.2	4.0	-0.3	0.8	-0.99

Table 2: Descriptive Statistics of Faculty Data on Classroom Learning

The faculty members also believe that the classroom learning environment facilitates *Better student engagement* and provides a more conducive milieu for *peer-to-peer interaction* than MOOC-based learning (from Tables 2 and 3). The data underscores the importance of interaction and student engagement in higher education, which the current MOOCs lack.

The data also highlights a substantial mean difference in the '*Easy to invigilate / proctor examinations*' attribute favouring classroom learning. The faculty members believe conducting and invigilating examinations in the classroom is better than MOOCs and more authentic. The analysis of the remaining five variables indicates that faculty believe that MOOC-based learning is on par with classroom learning.

We tested attribute responses to statistical tests for two independent variables: Gender and Type of College. The association test on classroom data indicated no significant difference in *Gender* or *Type of College* for all nine variables. However, the Mann-Whitney test on MOOC-based learning showed a statistically significant difference for two attributes: *gender* and *type of college*. The test showed that female faculty members agreed more about MOOCs facilitating real-life interactions than male faculty members ($U = 3915$, $p = 0.047$, $r = -0.141$).

Attributes	**Mean**	**Median**	**Standardised mean score**	**Std. dev.**	**Skewness**
Facilitates Useful Real-life Interactions	3.3	3	-0.4	1.1	-0.78
Promotes Intense Peer-to-Peer Discussions	3.0	3	-1.5	1.0	-0.12
Opportunity for Fair Objective Assessments	3.4	3	-0.2	1.1	-0.31
Easy to Invigilate Proctor Examinations	3.2	3	-0.7	1.2	-0.12
Fosters Creative Teaching Lecturing	3.6	4	0.4	0.9	-0.78
Allows Productive Student Engagement	3.2	3	-0.8	1.0	-0.23
Easy to Conduct Planned Course in Time	3.9	4	1.5	0.9	-0.79
Facilitates Knowledge Creation	3.8	4	1.1	0.8	-0.78
Timely Feedback Given to Students	3.7	4	0.7	1.0	-0.64

Table 3: Descriptive Statistics of Faculty Data on MOOC-Based Learning

The analysis between the two types of colleges showed that private institutes/college faculty members are more likely to believe that MOOCs will facilitate real-life user interaction and allow productive student engagement than public institute faculty. This perceptual difference is statistically significant [*Facilitate real-life interactions* ($U = 4968$, $p = 0.014$, $r = 0.174$) and *Allow productive student engagement* ($U = 4688$, $p = 0.048$, $r = 0.142$)]. It shows that public institute faculty have more confidence in classroom learning and are less inclined to use technology for teaching and learning.

Effects and Consequences of Teaching Exclusively Through MOOCs

We asked the faculty members to elucidate the consequences of using only MOOCs for teaching and learning in higher education (i.e., no classroom learning for the courses). Around 160 faculty responded to the question. The thematic analysis highlighted four salient themes: *Issues associated with teaching and learning*, *Impact on students' development*, *Impact on the faculty* and *Advantages of MOOCs*. Table 4 shows the themes and the codes to identify the themes from faculty responses.

Themes	**Sub-themes**
Issues Associated with Teaching and Learning	Lack of offline discussion with teacher / Lack of peer-to-peer discussion
	No or lack of doubt clearing
	Lack of conceptual understanding
	Lack of problem-solving
	Lack of real-world applications
Impact on Students' Development	Lack of personality development
	Lack of ability to work in a group
	Decrease in critical thinking.
	Decrease communication skill
	Decrease social engagement
Impact on Faculty	Unemployment of Teachers
	Student assessment is difficult
	Creativity decreases
	Teaching pedagogy Change
	Lack of knowledge creation
Advantages of MOOCs	Increases knowledge
	Accessibility of quality lectures/material
	Flexibility of self-learning at any time
	Better concept/ understanding
	Flexibility to select any course

Table 4: Thematic Analysis of the Faculty members' view on the Consequences of using MOOCs

Issues associated with teaching and learning: We coded the responses to open-ended questions during the thematic analysis and identified five critical sub-themes under this theme, as shown in Table 4. The faculty members have raised concerns regarding the lack of peer-to-peer or offline discussions. They also added that the lack of discussions would also impact the clearing of doubts among students. One of the faculty gave the following reasoning:

> *"Since there will be no one-on-one interaction, students might not be able to get their doubts cleared."*

The faculty members also highlighted the lack of real-world applications or hands-on experience necessary in science and engineering, highlighting the critical drawback of MOOC-based learning. Following are a few statements that faculty have highlighted:

"With just online mode, practical skills cannot be validated".

Impact on students' development: The faculty has asserted that exclusive MOOC-based learning will affect the students' development (refer to Table 4). They believe excessive usage of MOOCs will result in a lack of personality development, decreased communication skills and reduced critical thinking. Table 5 (number of samples around 200) shows that most faculty believe that using MOOCs will foster critical thinking (as evidenced by high negative skewness) among students and positively impact the student's personality development. However, it will decrease the social engagement of students and is likely to affect communication skills.

Student development attributes	**Decrease/ Negative**	**No effect**	**Positive /Increase**	**Mean**	**Standardised mean score**	**Skewness**
Critical thinking	14%	21%	66%	2.52	0.6	-1.16
Personality development	17%	42%	41%	2.25	-0.2	-0.413
Engagement in social life	35%	39%	26%	1.91	-1.2	0.166
Ability to interact and communicate professionally	26%	32%	42%	2.17	-0.5	-0.312
Knowledge creation	2%	16%	82%	2.79	1.4	-2.16

Table 5: Descriptive Statistics of the Faculty Data on the Impact of MOOCs on Students' Development

A few faculty also noted the absence of collaboration or teamwork in MOOCs, which is usually encouraged in project or laboratory experiments. One such faculty stated the following answer:

"Students might not learn the ability to work in the group and solve the problem."

Impact on faculty: Some faculty members believe that MOOC-based teaching will negatively impact faculty. They believe that only using MOOCs for learning will result in job loss. The following quote from a faculty member vividly reflects this sentiment:

"Excessive use of the online courses make teacher feel unsafe thinking these courses will replace classroom teaching."

The second concern relates to student assessment. The faculty will face challenges evaluating the students' learning if the courses are solely run on MOOCs. They underline the need for authentic learning and not plagiarised learning. Third, the faculty members feel that online learning does not provide the opportunity to adapt teaching methods based on students' understanding levels. Following is a quote expressing the concern:

"A teacher who teaches physically in front of students can change their way of delivering according to students' requirements, which is not possible in online courses."

Advantages of MOOCs: While many faculty members have stated the negative impact of MOOCs, some have also advocated its benefits (refer to Table 4). The first advantage identified is the increase in knowledge, with many faculty members believing that MOOCs enhance students' understanding of subjects. The second advantage is the accessibility of quality materials and lectures, as MOOCs from premier Indian institutes (NPTEL/SWAYAM) provide resources that would otherwise be unavailable to most students. Faculty also noted that MOOCs offer flexibility, allowing students to learn at their convenience, irrespective of time and place.

Analysis of the Student Survey

Student's Perception of MOOC-Based Learning vs. Classroom Learning: This section explores the students' beliefs about MOOC courses and how they differ from the classroom courses they pursue in their respective institutes/colleges. We measured the data on a 5-point Likert scale (1= Strongly Disagree, 2= Disagree, 3=Neutral, 4= Agree, 5= Strongly Agree) for both learning modes. Four hundred ninety students responded to the questions, but were filtered based on valid responses.

Attributes	**Mean**	**Median**	**Mode**	**Standardised mean score**	**Skewness**
Allows sufficient live demonstrations, simulations and examples	3.7	4	4	0.8	-0.4
Assignments cover almost all the topics in the course	3.6	4	4	0.5	-0.4
Ease of availability of course resources	3.5	4	4	0.4	-0.5
Feedback on the assignments/homework is given frequently	3.5	4	4	0.4	-0.4
Find it hard to apply concepts to real-life problems	3.2	3	3	-0.4	0.0
Flexibility of learning (anytime and anywhere)	2.8	3	2	-1.4	0.2
Flexibility to choose the instructor of liking	2.9	3	2	-1.2	0.1
I am easily distracted	3.0	3	3	-0.9	0.0
I can fit learning into my life more easily	3.4	3	3	0.0	-0.2
Learning is self-paced	3.1	3	3	-0.6	-0.1
Learning is stressful	3.1	3	3	-0.7	-0.1
Opportunity for face-to-face discussion with teacher	4.2	4	5	2.2	-1.3
Promotes healthy peer discussions/ reviews	3.8	4	4	1.2	-0.6
Use of various multimedia tools enhances learning experience	3.3	3	4	-0.2	-0.3

Table 6: Descriptive Statistics of Students' Data on Classroom Learning

Tables 6 and 7 show the descriptive statistics of the responses for Classrooms and MOOCs, respectively. The students firmly believe that MOOCs are convenient for learning. The convenience parameters *such as flexibility to learn, selecting instructors,* and *self-paced learning* have a high agreement among students. Various MOOC platforms provide many learning resources that students can choose depending on their needs and help build skills they can apply in real life and make learning less stressful.

Apart from benefits, students have also acknowledged concerns about MOOCs. Similar to faculty sentiment, students feel MOOCs do not provide interaction with faculty or review with peers as classroom learning. They also accept that MOOCs are a greater source of distraction than classrooms. However, there is no significant difference between MOOCs and Classroom for '*live demonstrations', 'assignments, or feedback on the assignment' attributes.*

Attributes	**Mean**	**Median**	**Mode**	**Standardised mean score**	**Skewness**
Allows sufficient live demonstrations, simulations and examples	3.7	4	4	0.6	-0.5
Assignments cover almost all the topics in the course	3.8	4	4	0.6	-0.5
Ease of availability of course resources	4.1	4	4	0.4	-0.7
Feedback on the assignments/homework is given frequently	3.5	4	4	-0.5	-0.3
Find it hard to apply concepts to real-life problems	3.0	3	3	0.4	0.0
Flexibility of learning (anytime and anywhere)	4.5	5	5	1.3	-1.3
Flexibility to choose the instructor of liking	3.9	4	4	0.0	-0.8
I am easily distracted	3.3	3	4	0.6	-0.2
I can fit learning into my life more easily	4.0	4	4	-0.1	-0.8
Learning is self-paced	4.3	4	4	1.3	-0.8
Learning is stressful	2.7	3	2	-2.6	0.4
Opportunity for face-to-face discussion with teacher	2.7	3	2	-0.7	0.3
Promotes healthy peer discussions/ reviews	3.5	4	4	-0.7	-0.4
Use of various multimedia tools enhances learning experience	4.1	4	4	-0.5	-0.9

Table 7: Descriptive Statistics of Students' Data on MOOC-based learning

Attending a Classroom Course for the Same Course Pursued via MOOC

The survey asked students about their attitudes towards attending classroom courses for a course they had taken or completed through a MOOC, using a Likert scale: '*If I am enrolled in an online course, I am less likely to attend the same course in the classroom?'*. There is no clear statistically significant difference between the percentages of students who would attend a classroom course they took online and those who would not (Figure 1).

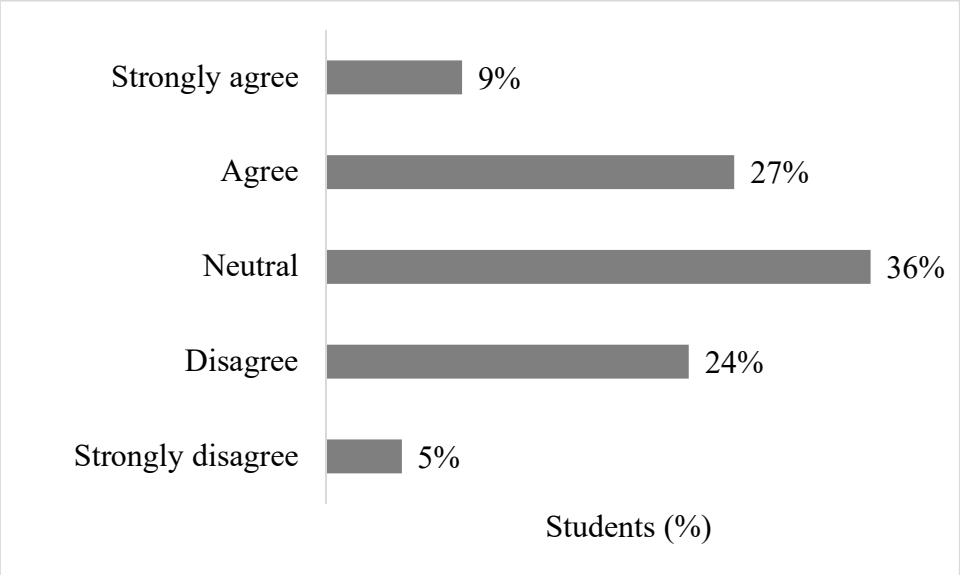


Figure 1: Students' Opinions on Attending Classroom for the Course Pursued on MOOCs

However, the Mann-Whitney U test showed a statistically significant effect on the responses based on the student's college type, i.e., public/private (U=26302, p=.011, Z=-2.59, r= -.115). We can infer that private college students are more likely not to attend classroom courses if they have pursued the same course in MOOCs. The thematic analysis of the reasons revealed two distinct opinions: those who disagreed and those who agreed.

Thematic analysis (Strongly disagree / Disagree): The two themes were identified among the students who disagreed with the lower likelihood of attending classes: learning benefits and classroom benefits (refer to Table 8). As identified in the analysis, the learning benefits bolster the argument of learning inadequacies of MOOC-based learning. The students who are likely to attend the classroom reiterate the importance of the brick-and-mortar environment that the classroom provides. Following is a quote from a student:

> *"The material taught in such courses is usually focused on a practical point of view, whereas the classroom is mostly theory-oriented, discussing the logic and reasoning behind it. Thus, both are required for the best possible outcome."*

The revision of learning is an essential ritual for the students, and a combination of MOOC and classroom learning provides the best learning method. To quote a student:

> *"Different teachers have different styles of teaching. It provides a revision."*

The second theme highlights classroom benefits like diverse learning perspectives, face-to-face interaction, and an engaging learning environment (Table 8). Students believe that classroom learning fosters interaction among peers and faculty, enhancing their understanding of diverse perspectives and providing practical learning experiences. The following quote from a student illustrates this:

> *"Classrooms have the benefit of understanding something from classmates' doubt and perspective of someone else. Also, it is interactive in real-time, which has a different effect than MOOCs."*

Students' Perception	**Themes**	**Sub-themes**
Strongly Disagree or Disagree.	Learning Benefits	Better understanding/knowledge
		Discussion of doubts in class
		Revision
		Practical learning
	Classroom Benefits	Different perspective
		Face-to-face interaction
		Learning is efficient
		Better environment for learning
		Interactive classroom
Strongly Agree or Agree.	Convenient and Efficient	Ease of access
		Less wastage of time
		Flexibility to learn
		Comfortable learning
		Revisit online content
	Online Learning Benefits	Better content and source of learning
		Resolve doubts
		More knowledge
	Concerns	Issues of classroom
		Unwanted repetitive learning

Table 8: Thematic Analysis of the Reasons

Thematic analysis (Strongly agree / Agree): Most students (more than one-third) also answered that they would not attend the classroom if they had learned the same course on MOOCs/Online. We identified three central themes from open-ended responses: convenience and efficiency, benefits and concerns (refer to Table 8).

Students appreciate MOOCs' ease of access, time efficiency, flexibility, and comfort in revisiting online content. Many students consider attending the same course in a classroom a waste of time, as MOOCs offer the flexibility and comfort that traditional classrooms lack.

Second, students identified that the benefits of online learning outweigh those of classroom learning, citing better content, resources, and opportunities for resolving doubts. Third, they expressed concerns about offline learning, including unnecessary repetition and classroom issues. Many students felt that learning the same material twice was redundant, and negative

classroom learning experiences influenced their preference for MOOCs over traditional classes. Below is a quote expressing the sentiment:

> *"I agree because if I get sufficient knowledge on a particular topic, then there is no need to go through the classroom for the same courses."*

Can MOOCs Replace Classroom Learning?

We also asked students if they believe MOOCs can replace classroom learning. There is no statistical difference between the responses. One-third think MOOCs can serve as substitutes, while two-thirds either disagree or lack any opinion. A chi-square test showed a significant association between responses and college type ($\chi^2 = 6.27$, df = 2, p = .044; Cramér's V = .11), indicating private college students are likely to believe that MOOCs will replace classroom learning more than public college students (from Table 9).

Type of Institution/College		**No**	**Yes**	**Can't Say**	**Total**
Public	Observed (Expected)_	81 (68.3)	57 (65.9)	69 (72.8)	207
	% within row	39.10%	27.5 %	33.3 %	100.0 %
Private	Observed (Expected)	89 (101.7)	107 (98.1)	112 (108.2)	308
	% within row	28.9 %	34.7 %	36.4 %	100.0 %
Total	Observed	170	164	181	515

Table 9: Goodness of Association between Institute Type and the Response to MOOCs as a Substitute for Classrooms

Discussion

This study's motivation was to compare classroom and MOOC-based learning as perceived by faculty and engineering and science students as part of the SWAYAM policy evaluation. The analysis focused on ascertaining and quantifying the perceived beliefs for better understanding and decision-making of the policy stakeholders. This section discusses the findings and answers the research questions of this study.

Faculty Insights: Assessing the Benefits and Limitations of MOOCs vs. Classroom

From the analysis, the faculty experience of classroom and MOOC-based learning identified the following themes: advantages and issues with MOOCs.

India has millions of students pursuing science and engineering; not everyone can access quality content/material. Our analysis of the faculty survey provides evidence supporting the advantages of MOOC-based learning. According to them, MOOCs offer quality content, flexibility, and convenience, easing learning pressure. According to them, quality MOOC courses enhance critical thinking and knowledge creation and deepen students' understanding by covering content beyond the syllabus. Thus, making MOOCs useful supplementary material.

Even though MOOCs have advantages, faculty members have raised issues about it. They argue that the lack of student-instructor or peer-to-peer interactions hinders explanations, discussions, and knowledge elicitation (Dillenbourg, 1999; Jacobs, 2013). The faculty members echoed similar issues about MOOCs lacking peer-to-peer or student-faculty interactions in our survey. They reiterated the value of student engagement for clearing doubts and enhancing conceptual understanding of the subject matter.

Besides theoretical lessons, engineering and science include real-life experiments and hands-on experience, which MOOC-based learning lacks (Belanger & Thornton, 2013). The faculty members raised similar concerns about MOOCs in the survey. In its present form, MOOC-based learning is insufficient for practical skill development.

Consequences of Using MOOC-Based Learning

The faculty members are increasingly concerned that overuse of MOOCs may stymie students' personality development, social skills, and professional communication. They believe that interactions in traditional settings foster knowledge and enhance students' ability to articulate their understanding effectively. The faculty insists that students must be able to communicate their knowledge of their subject effectively.

MOOCs face severe criticism regarding students' assessment mechanisms and learning authenticity. Snyder and Young have highlighted the concerns about cheating and plagiarism in online education (Snyder, 2012; Young, 2012). Even though the MOOC platform asks students to uphold and abide by the honour code (Coursera, 2021; edX, 2019), assessment mechanisms have raised doubts about the integrity of student learning (Hew & Cheung, 2014; Young, 2012). align with these concerns, as many faculty members questioned the fairness of online proctoring and assessment. Some suggested in-person proctored exams at designated test centres for MOOC learners (Hew & Cheung, 2014), a method already implemented by NPTEL/SWAYAM for course-end exams (NPTEL, 2022). However, the assessment of weekly assignments on NPTEL remains questionable, as it still relies on students' honour codes.

Lastly, the faculty members are increasingly concerned about the MOOC policy and its over-reliance on MOOCs. Anxiety about potential job losses is growing. Teachers in both public and private colleges fear that offering courses through MOOCs will result in faculty job losses as technology replaces human roles. Although the policy does not explicitly recognise this consequence, faculty members believe that job loss will be an unintended outcome of the MOOC initiative.

Students' Perception of MOOCs vs. Classroom

Our students' survey data analysis revealed three themes when comparing MOOC-based learning to classroom learning. They are convenience, pedagogical benefits, and drawbacks.

The supporters of MOOCs have often proclaimed convenience as an advantage for pursuing MOOC courses (Cole & Timmerman, 2015; Jacobs, 2013). Our analysis revealed that convenience is a significant advantage of MOOCs for students as they provide flexibility, self-paced learning, reduced stress, and easily accessible resources. They valued the option to revisit lectures, which is impossible in a classroom setting, allowing MOOC-based learning to transcend time and space.

Students acknowledge that MOOCs provide better learning resources and material than regular classroom courses and content. They believe MOOC content and knowledgeable MOOC instructors provide better learning resources, which helps to build a comprehensive understanding of the subjects. In addition, the students learn from instructors of different quality who offer similar courses.

While students in our survey embraced MOOCs for their benefits, they also recognised several drawbacks. They echoed faculty concerns about the lack of discussions and interactions with teachers and peers, leaving them with unresolved doubts due to the absence of immediate faculty support in classrooms. Many students preferred a physical classroom environment for better learning and felt that online learning often leads to distractions. Based on survey data, student opinions on whether MOOCs can replace traditional classrooms are divided and unconvincing.

Conclusion and Recommendations

Although faculty and students recognise the benefits of MOOCs, our study suggests that considering them as an alternative to classroom learning is overly optimistic. They have highlighted several shortcomings with current MOOC platforms: lack of peer interaction, discussion, and hands-on learning opportunities critical for engineering and science disciplines. Our analysis reaffirms the confidence in traditional education, casting doubt on the viability of MOOCs. Policymakers, therefore, must consider stakeholders' feedback, as evident from this study, when formulating MOOC policies. Based on our analysis, we recommend the following measures for using MOOC-based learning in engineering and science education:

- Introduce weightage for experiments or laboratory assessments before awarding credit for MOOC-based courses.
- Change the use of SWAYAM MOOC from semester course weightage to percentage of total credit.
- Empower college faculty members to use MOOCs based on their pedagogy preference.
- Promote new pedagogical methods (e.g., Blended learning: 30%-50% MOOCs with the rest as classroom learning) tailored to course requirements.
- Allow college instructors to assess students who complete NPTEL/SWAYAM MOOCs. The total grade should include NPTEL/SWAYAM MOOC completion grades, practical assessments, and the institute instructor's evaluation.

Though this study provides insights into stakeholders' perceptions and recommendations, it has limitations. This study applies to engineering and science disciplines and does not generalise to humanities or non-technical disciplines. Second, the study is based on India's education system and laws. Third, the rise of generative AI is changing the learning paradigm; hence, further research is needed. Nonetheless, our analysis can be a reference for future research and help educational institutions and governments make policy decisions for MOOC-based learning.

References

Agarwal, A. (2014). *Why massive open online courses (still) matter*. Ted. https://ted2srt.org/talks/anant_agarwal_why_massive_open_online_courses_still_matter

AICTE (Credit Framework for online learning course through SWAYAM) Regulations 2016, Pub. L. No. 171415 (2016). https://egazette.nic.in/WriteReadData/2016/171415.pdf

Anderson, J. E. (2003). *Public Policymaking* (Fifth). Houghton Mifflin Company.

Belanger, Y., & Thornton, J. (2013). *Bioelectricity: A quantitative approach Duke University's first MOOC*. 1–528. http://dukespace.lib.duke.edu/dspace/bitstream/handle/10161/6216/Duke_Bioelectricity_MOOC_Fall2012.pdf

Bhandari, P. (2021). *Multistage Sampling*. Scribbr. Retrieved on March 15, 2023 https://www.scribbr.com/methodology/multistage-sampling/

Birkland, T. A. (2006). Agenda Setting in Public Policy. In F. Fischer, G. J. Miller, & M. S. Sidney (Eds.), *Handbook of Public Policy Theory, Politics, and Methods* (pp. 63–78). CRC Press.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3* (2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Breslow, L., Pritchard, D. E., DeBoer, J., Stump, G. S., Ho, A. D., & Seaton, D. T. (2013). Studying Learning in the Worldwide Classroom Research into edX's First MOOC. *Research & Practice in Assessment*, *8*(Summer), 13–26. http://eds.b.ebscohost.com.library.esc.edu/eds/pdfviewer/pdfviewer?vid=1&sid=2c170537-bede-422a-b10f-3df29e48915e%40sessionmgr198&hid=112%5Cnhttp://www.rpajournal.com/dev/wp-content/uploads/2013/05/SF2.pdf

Chen, Y. H., & Chen, P. J. (2015). MOOC study group: Facilitation strategies, influential factors, and student perceived gains. *Computers and Education*, *86*, 55–70. https://doi.org/10.1016/j.compedu.2015.03.008

Cole, A. W., & Timmerman, C. E. (2015). What Do Current College Students Think about MOOCs ? *Journal of Online Learning and Teaching*, *11*(2), 188–202.

Coursera. (2021). *Coursera Honor Code*. https://learner.coursera.help/hc/en-us/articles/209818863-Coursera-Honor-Code

CSDS. (2019). *Social media and political behaviour*. Retrieved on March 18, 2023 from www.csds.in%7Cwww.lokniti.org

Department of Higher Education. (2015). MOOCs Massive Open Online Courses: An initiative under National Mission on Education through Information Communication Technology (NME-ICT) Programme. In *Ministry of Human Resources Development Department of Higher Education*.

Department of Secondary and Higher Education. (2007). *National Programme on Technology Enhanced Learning (NPTEL)* (Issue July 2003). https://archive.nptel.ac.in/resources.html

Dillahunt, T. R., Ng, S., Fiesta, M., & Wang, Z. (2016). Do Massive Open Online Course Platforms Support Employability ? *CSCW'16*, 233–244. https://doi.org/http://dx.doi.org/10.1145/2818048.2819924

Dillenbourg, P. (1999). *What do you mean by collaborative learning? Collaborative-Learning: Cognitive approaches*. *1*(January 1999).

Dye, R. T. (2013). *Understanding Public Policy* (Fourteenth). Pearson Education, Inc.edX. (2019). *edX Terms of Service*. EdX. https://www.edx.org/edx-terms-service

Evans, S., & Myrick, J. G. (2015). How MOOC instructors view the pedagogy and purposes of massive open online courses. *Distance Education*, *36*(3), 295–311. https://doi.org/10.1080/01587919.2015.1081736

Garg, V. K. (2019). Analysis of Cluster and Multistage Sampling : A Survey on Higher Education Discontinuity in Rural Areas using Cluster Sampling. *Think India Journal*, *22*(12), 67–79.

Guion, L. A. (2002). *Triangulation: Establishing the Validity of Qualitative Studies. Institute of Food and Agricultural Sciences: University of Florida*. 1–3.

Haber, J. (2013). *MOOC attrition rates running the numbers*. HuffingtonPost. http://www.huffingtonpost.com/jonathan-haber/mooc-attrition-rates-runn_b_4325299.html?

Hew, K. F., & Cheung, W. S. (2014). Students' and instructors' use of massive open online courses (MOOCs): Motivations and challenges. *Educational Research Review*, *12*, 45–58. https://doi.org/10.1016/j.edurev.2014.05.001

HM Treasury. (2020). *Magenta book. Central Government guidance on evaluation* (Issue March). https://www.gov.uk/government/publications/the-magenta-book

Jacobs, A. J. (2013, April 20). Two Cheers for Web U! *The New York Times*, 6.

Jaschik, S., & Lederman, D. (2014). Faculty Attitudes on Technology. *Inside Higher Ed*, 1–44.

Jordan, K. (2015). Massive Open Online Course Completion Rates Revisited: Assessment, Length and Attrition. *International Review of Research in Open and Distributed Learning*, *16*(3). https://doi.org/https://doi.org/10.19173/irrodl.v16i3.2112

Kant P., & Mehra A. (1970). A Critical Evaluation of the National Programme on Technology Enhanced Learning (NPTEL): The Flagship Indian Massive Open Online Courses (MOOCs) Programme ISSN: 2188-1162 *The European Conference on Education 2022: Official Conference Proceedings (pp. 529-547*) https://doi.org/10.22492/issn.2188-1162.2022.43

Koller, D., Ng, A., & Chen, Z. (2013). *Retention and Intention in Massive Open Online Courses: In Depth*. EDUCAUSE Review. https://er.educause.edu/articles/2013/6/retention-and-intention-in-massive-open-online-courses-in-depth

Kolowich, S. (2010). *The Human Element*. Inside Higher Ed. https://www.insidehighered.com/news/2010/03/29/human-element

Laerd Statistics. (2018). *Mann-Whitney U Test using SPSS Statistics*. Lund Research Ltd. https://statistics.laerd.com/spss-tutorials/mann-whitney-u-test-using-spss-statistics.php

Littlejohn, A., Hood, N., Milligan, C., & Mustain, P. (2016). Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *Internet and Higher Education*, *29*, 40–48. https://doi.org/http://dx.doi.org/10.1016/j.iheduc.2015.12.003

Nachmias, D. (1979). *Public Policy Evaluation: Approaches and Methods*. St. Martin's Press, New York.

NPTEL. (2022). *About NPTEL*. NPTEL Website. https://archive.nptel.ac.in/about_nptel.html

NPTEL PIC. (2014). Minutes of the NPTEL PIC Meeting On 23 November 2014-At Senate Room Building, IIT Delhi. In *NPTEL Website*. Retrieved on September 30, 2022 from https://archive.nptel.ac.in/resources.html

Onah, D. F. O., Sinclair, J., & Russell, B. (2014). Dropout rates of massive open online courses: Behavioural patterns. *6th International Conference on Education and New Learning Technologies*, 5825–5834.

Penn State Eberly College of Science. (2023). *Multi-Stage Sampling: Two Stages with S.R.S at Each Stage*. Pennsylvania State University. Retrieved on March 12, 2023 from https://online.stat.psu.edu/stat506/lesson/9/9.1

Peters, B. G. (2015). *Advanced Introduction to Public Policy*. Edward Elgar Publisher.

Savga, L., Krykliy, O., & Kyrychenko, K. (2018). The Role of Internal and External Stakeholders in Higher Education System in Ukraine. *Business Ethics and Leadership*, *2*(1), 32–43. https://doi.org/10.21272/bel.2(1).32-43.2018

Shapiro, H. B., Lee, C. H., Wyman Roth, N. E., Li, K., Çetinkaya-Rundel, M., & Canelas, D. A. (2017). Understanding the massive open online course (MOOC) student experience: An examination of attitudes, motivations, and barriers. *Computers and Education*, *110*, 35–50. https://doi.org/10.1016/j.compedu.2017.03.003

Sharrock, G. (2015). Making sense of the MOOCs debate. *Journal of Higher Education Policy and Management*, *37*(5), 597–609. https://doi.org/10.1080/1360080X.2015.1079399

Snyder, M. D. (2012). State of the profession: Much Ado about MOOCs. *Academe*, *98*(6), 19–21.

Sreevatsan, A., & Venugopal, V. (2016, January). Online learning set for big leap. *The Hindu*. Retrieved on October 10, 2022 from https://www.thehindu.com/features/education/issues/online-learning-set-for-bigleap/article2844705.ece

Turner, P., & Turner, S. (2017). Triangulation In Practice 2 . Triangulation in Presence Research. *Triangulation In Practice*, 1–13.

Vedung, E. (2013). Six Models of Evaluation. In E. A. Jr., S. Fritzen, M. Howlett, M. Ramesh, & X. Wu (Eds.), *Routledge Handbook of Public Policy* (pp. 387–400). Routledge.

Walsh, R. S., McClean, B., Doyle, N., Ryan, S., Scarborough-Lang, S. J., Rishton, A., & Dagnall, N. (2019). A thematic analysis investigating the impact of positive behavioral support training on the lives of service providers: "it makes you think differently." *Frontiers in Psychology*, *10*(OCT). https://doi.org/10.3389/fpsyg.2019.02408

Wang, Y., & Baker, R. (2015). Content or platform: Why do students complete MOOCs? *Journal of Online Learning and Teaching*, *11*(1), 17.

Watkins, M. W. (2018). Exploratory Factor Analysis: A Guide to Best Practice. *Journal of Black Psychology*, *44*(3), 219–246. https://doi.org/10.1177/0095798418771807

Watted, A., & Barak, M. (2018). Motivating factors of MOOC completers: Comparing between university-affiliated students and general participation. *Internet and Higher Education*, *37*, 11–20. https://doi.org/https://doi.org/10.1016/j.iheduc.2017.12.001

White, E. M. (2014). MOOC as Threat and Promise. In S. Krause & C. Lowe (Eds.), *Invasion of the MOOCs- The Promise and Perils of Massive Open Online Courses* (pp. 150–155). Parlor Press, Anderson, South Carolina.

Young, J. R. (2012, September 8). Coursera Announces Big Expansions, Adding 17 universities. *The Chronicle of Higher Education*. https://www.chronicle.com/blogs/wiredcampus/coursera-announces-expansion-adding-16-universities

Yuan, L., & Powell, S. (2013). *MOOCs and Open Education : Implications for Higher Education A white paper*.

Contact email: pramathkant.iitb@gmail.com

A Multi-factorial Approach Towards Tackling Plagiarism: A Comparison Between Attitudes and Perceptions Towards Plagiarism at Undergraduate and Postgraduate Taught Level

Carolyn Loveridge, University of Glasgow, United Kingdom
Kimberly Davis, University of Glasgow, United Kingdom
Nathalie Tasler, University of Glasgow, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Academic integrity is a fundamental value of higher education institutions and is a recognised priority in institutional learning and teaching strategies. Plagiarism is an ongoing problem in the HE sector and factors contributing to this complex phenomenon may differentially impact students at different academic levels of study, but this is under-researched. This study aimed to address the identified gap through an investigation of differences in behaviour and attitudes towards plagiarism between undergraduate (UG) and post-graduate taught (PGT) level. Using an inter-subjective, pragmatic and mixed-methods approach, (i) analysis of senate data on levels of plagiarism cases, (ii) an online survey with UG (n= 18) and PGT (n = 32) students and (iii) focus groups with students (n=4) and staff (n=7) were analysed. This paper presents key findings from quantitative analyses of (i) senate data, where statistically significant differences were observed between demographic sub-categories, and (ii) online survey data, where a statistically significant difference was observed between UG and PGT students with respect to academic writing workshops to prevent plagiarism. It further outlines findings from qualitative thematic analyses of open survey questions and focus group discussions – nine common themes between students and staff, and four unique themes for students and staff respectively were identified. Particular areas of concern surrounded (i) student transitions, and (ii) institutional barriers. The paper finishes with an overview of the key recommendation from this work: an eight-point, multi-factorial approach to address the problem of plagiarism, and key implications for educators.

Keywords: Plagiarism, Undergraduate, Post-graduate Taught

iafor
The International Academic Forum
www.iafor.org

1. Introduction

1.1 Definition

When trying to understand the multi-factorial and highly complex phenomenon of plagiarism, it is first important to define what it is. Academic integrity relates to upholding the standards and values of an ethical code of conduct, whereas academic misconduct relates to a breach or violation of this code and behaviour that lacks honesty (Mahmud & Ali, 2023). While there is still discourse in the academic community regarding a precise definition of plagiarism, the working definition used for the purpose of this study is that plagiarism is as a sub-set of academic misconduct that involves someone taking text or ideas from someone else then passing them off as their own without acknowledging the original author or source. (Eaton, 2021; Husain et al., 2017).

1.2 Underlying Motivation for, Types, and Consequences of Plagiarism

With respect to underlying motives for plagiarism, it is accepted that while some cases of plagiarism are deliberate, in a lot of cases it can be accidental or unintentional. Gullifer & Tyson (2014, p. 1203) note that "students are genuinely perplexed about the concept of plagiarism". Furthermore, Yang et al. (2019, p. 589) highlight that "plagiarism is often the result of students' misunderstanding of the rules for using and citing sources, rather than deliberate theft of others' ideas and writing". There is also acknowledgement in the literature that some students have difficulty with expressing ideas and concepts in their own words (Jereb et al., 2018).

Plagiarism is known to manifest in various forms, which have been categorised as being 'simple', where they can be easily detected using computer software, or 'complex' in cases where they cannot be detected by such software (Perkins et al., 2019, p. 2-4). Simple plagiarism includes: (i) copying without acknowledgement, (ii) self-plagiarism – submitting the same work to different courses, (iii) directly/verbatim copying work of another student (with or without consent); (iv) patchwriting – minimal editing from original texts; (v) quoting, summarising or paraphrasing without citing the associated source. Complex plagiarism includes: (i) collusion with others, (ii) copying translated text, (iii) referring to a source cited in an article that was not itself directly accessed, (iv) technical tricks to bypass plagiarism detection software; (v) use of a third party (e.g. essay mill service) to complete the assessment (also called contract cheating or ghost writing).

Plagiarism has consequences and implications at three levels: 1. for students – not only does plagiarism impact their learning in a negative manner (Halak & El-Hajjar, 2019), the process and consequences of being disciplined for plagiarism can have emotional, psychological, social and economic impacts e.g. being expelled and unable to complete their degree programme could greatly affect their future employment prospects; 2. for staff – plagiarism results in increased workload and emotional strain from referring cases to senate and having to re-grade assignments (Vehviläinen et al., 2018; Wang, 2023), and can also impact the lecturer-student relationship; 3. for the institution – plagiarism can impact the reputation of the University, it de-values the worth of a degree, and it necessitates cost and resources in terms of staff and computer software to help police it (Collins et al., 2007; Orluwene & Magnus-Arewa, 2020).

1.3 The Scale of the Problem and Underlying Reasons for Plagiarism

Plagiarism continues to be a significant issue not just at the University of Glasgow but in higher education institutions worldwide (Jereb *et al.*, 2018). The exact incidence of plagiarism is unknown but levels of academic misconduct among students are documented as being from a small as 1% to as much as 90% (Harris et al., 2020; ICIA, n.d.). There are various factors which have been identified in the literature as contributing to plagiarism behaviour. Mbutho & Hutchings (2021, p. 68) recognise that plagiarism is affected by "…. culture, politics, context, historical, social, ideological and language conditions". Furthermore, a systematic literature review conducted by Husain et al. (2017) identified five factors that contribute to plagiarism behaviour: (i) institutional factors relating to educational teaching practice and policies on plagiarism; (ii) academic factors linked to students' knowledge, skills and ability to understand course material and complete their assignments; (iii) external pressures linked to factors out with students' academic studies; (iv) personal factors associated with individual traits, tendencies and behaviours of students; and (v) technological elements relating to the influence of information technology and the internet on student behaviour.

It is important to consider that different factors may differentially affect plagiarism levels among students at different levels of study, but this is not adequately addressed in the literature. Furthermore, it is acknowledged that post-graduate taught (PGT) cohorts are under-researched in the literature (Coneyworth et al. 2020) and there are few studies comparing plagiarism between undergraduate (UG) and PGT level. One previous study by Sheard et al. (2003), which compared cheating behaviours between UG and graduate information technology (IT) students, found that student maturity and motivation were key differentiating factors between UG and graduate students. However, many questions remain unanswered.

1.4 Study Aim, Research Questions and Hypothesis

The aim of this project was to investigate differences in plagiarism between undergraduate (UG) and post-graduate taught (PGT) level in MVLS at the University of Glasgow. The specific research questions were to:

1. Investigate the incidence and broad demographics of plagiarism in MVLS since 2014/15 academic session according to:
    a) Academic level (UG vs PGT)
    b) Age
    c) Nationality
    d) Gender

2. Compare MVLS student (UG and PGT) and staff perceptions regarding:
    a) The types of plagiarism which are occurring.
    b) The underlying reasons for plagiarism behaviour.
    c) Whether knowledge and understanding of what constitutes plagiarism and its policing influences the occurrence of plagiarism.
    d) The level of support which is available and how this should be offered to help reduce plagiarism.

The hypothesis was that on balance, there may be no significant difference in plagiarism incidence between UG and PGT students because although PGT students are more mature and experienced than UG students, they also face additional unique challenges. However, it is likely that differences exist between the two cohorts with respect to their attitudes and perceptions of plagiarism. The collective output from the research was expected to provide novel insights for how to prevent plagiarism.

2. Methodology

2.1 Theoretical Stance and Methodological Approach

My research is framed in the ontological position of pragmatism and epistemological position of inter-subjectivism. Shannon-Baker (2016, p. 322) defines pragmatism as a process of "shared meaning-making in order to create practical solutions to social problems". Maarouf (2019, p. 6) defines inter-subjectivism as "being subjective and objective at the same time, accepting both the existence of one reality and that individuals have multiple interpretations of this reality". Plagiarism is a very complex phenomenon, with many influencing factors – it cannot be broken down into a series of elements that could be viewed as a part of a simple mathematical-style problem. A practical approach is required to consider different perspectives, viewpoints and factors that impact plagiarism.

Both quantitative and qualitative data is required to address the research questions of this study and pragmatism provides the reasoning and justification for adopting a mixed-methods approach (Maarouf, 2019). The mixing of approaches allows for triangulation and complementarity, enabling a more wholistic understanding of the phenomenon while mitigating limitations compared to using either approach alone (e.g. Bryman, 2006; Watkins & Gioia, 2015).

2.2 Mixed Methods Research Study Design

This mixed methods study adopted a mixture of convergent and explanatory sequential design (Creswell and Plano Clark, 2018) (Figure 1). Initially, both quantitative and qualitative data were collected and analysed together, followed by collection and analysis of additional qualitative data to further explain the findings of the initial data. In the final stage, the data was interpreted collectively.

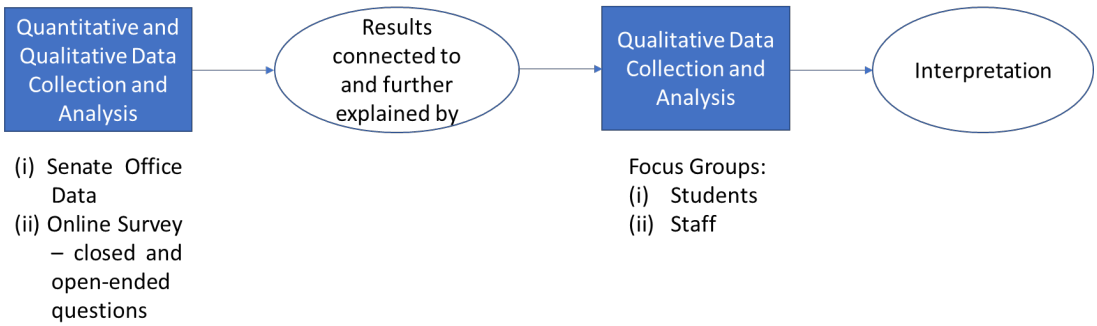


Figure 1 – Mixed methods study design
Quantitative data (from Senate Office) and a mixture of Quantitative and Qualitative data (from online survey) were collected and analysed together before further qualitative data was collected (from focus groups with students and staff) and analysed to help explain the initial data. The entirety of data collected was evaluated and interpreted as a whole at the end.

2.3 Ethical Approval

Relevant guidelines on ethics for educational research studies (e.g. British Educational Research Association (BERA), 2018; Cleaver et al., 2014; Cohen et al., 2018) were consulted as part of the project design process and ethical approval for the study was applied for and obtained from the School of Education Research Ethics Committee at the University of Glasgow before research commenced.

2.4 Senate Office Data

Senate Office data was requested (Table 1) on incidence of plagiarism from 2014-15 to 2021-22 academic sessions. In accordance with GDPR regulations, no personal data or data which could cumulatively lead to the identification of an individual could be released. For this reason, data obtained for the demographic categories of age, nationality and gender were for the combined cohort of UG and PGT students because additional breakdown of plagiarism cases into UG and PGT sub-categories could potentially have led to identification of participants.

Question	Data Requested
1	Can you provide detail of the total number of UG and PGT students which were enrolled in MVLS in each year from 2014/15 to 2021/22.
2	Can you provide detail of the total number of cases of plagiarism among UG and PGT students in MVLS in each year from 2014/15 to 2021/22.
3	Can you provide breakdown for points 1 and 2 regarding: (i) the level of study (UG or PGT), (ii) the age of the students [whether they were not mature (≤25 years) or mature (>25 years)]; (iii) their nationality (UK, EU or other international); and (iv) their gender (according to male, female)

Table 1 – Senate Office Data Request

2.5 Online Survey

An online survey was selected to address aspects of the second research question by obtaining quantitative, standardized, numerical data. Such data allows differences to be analysed between variables/groups to determine if these are statistically significant (Cohen et al., 2018).

I based my own questionnaire upon adaptation of three previously published instruments (Jereb et al., 2018; Maxwell et al., 2008; Sheard et al., 2003), as these are tried and tested tools, ensuring the validity of collected data (Cohen et al., 2018). Sheard et al.'s (2003) and Maxwell et al.'s (2008) instruments required participants to identify cheating or plagiarism behaviour from lists of provided scenarios. These scenarios were relevant to the present study and the papers highlighted the suitability of the approach of using scenarios to examine students knowledge of this issue. Lickert-style statements in the instruments by Sheard et al. (2003) and Jereb et al. (2018) were connected to factors identified in the literature that are implicated in plagiarism behaviour and thus were relevant for the second research question in this study.

The final questionnaire comprised a mixture of (i) closed, Lickert-type questions, to enable quantification of participant responses to provided statements (Bishop & Herron, 2015), and (ii) open-ended questions to allow students to add detail relating to the reason for their choice

of answers to some of the lickert-type questions (George & Cowan, 1999). A summary of the key themes/questions is presented in Table 2.

Question Number	Theme	Theme/Questions
1-2	Participant Consent	Acknowledge have read plain language statement (Q1) and upload completed consent form (Q2).
3-8	Generic Participant Information	• UG or PGT (Q3) • Year of study (UG only) (Q4) • School/research institute (Q5) • Not mature/mature (Q6) • Gender (Q7) • Nationality (Q8)
9-10	Knowledge and Understanding of Types of Plagiarism	• Are provided scenarios plagiarism? (Lickert; 14 scenario statements) (Q9) • Which is most serious and why? (Open) (Q10)
11-17	Reasons for Plagiarism	• IT and internet (Lickert; 7 statements) (Q11) • Academic skills (Lickert; 5 statements) (Q12) • Pressures (Lickert; 10 statements) (Q13) • Pride (Lickert; 8 statements) (Q14) • Teacher factors (Lickert; 5 statements) (Q15) • Any other factors not covered? (Open) (Q16) • What is major reason underlying plagiarism and why? (Open) (Q17)
18-19	Policing of plagiarism	• Factors relating to policing of plagiarism (Lickert; 7 statements) (Q18) • Any other factors not covered? (Open) (Q19)
20-22	Prevention of plagiarism	• Factors relating to prevention of plagiarism (Lickert; 10 statements) (Q20) • What is most important factor and why? (Open) (Q21) • Any other way to prevent plagiarism not outlined? (Open) (Q22)

Table 2 – Summary of Online Survey Question Themes

2.6 Focus Groups

Focus groups were chosen to address the research question components concerning participant perceptions because these involve the collection of in-depth, qualitative data (Cohen et al., 2018). Student and staff focus groups were approximately 1hr 15 min in duration and took place synchronously online via Zoom. The emphasis of the focus groups was to seek clarification of and extend upon online survey results and student focus group findings (staff focus group only). A series of guiding questions were prepared in advance of student and staff focus groups – these related to the themes in the online survey (Table 2; Q9-22). An additional topic was also raised at both focus groups – that of staff attitudes towards plagiarism.

2.7 Participant Recruitment

For the student survey and focus group, the population of interest was current UG and PGT students in MVLS at the University of Glasgow (5,246 UG and 1,659 PGT students; 2021-22). I adopted a convenience sampling approach due to the relative ease of access to this total population (Cohen *et al.*, 2018) via mass e-mail. This chosen sampling approach presumes that only a certain proportion of the total number of students would volunteer to participate in the study and so a limitation to acknowledge is that the final sample may not be generalizable to the total population. Final student participant numbers and demographic distribution for the online survey and focus group are outlined in Table 3 and Table 4 respectively.

	Academic Level of study		**Age**		**Nationality**			**Gender**	
	UG	**PGT**	**≤25**	**>25**	**UK**	**EU**	**Other International**	**Male**	**Female**
	18 (36%)	32 (64%)	27 (54%)	23 (46%)	24 (48%)	6 (12%)	20 (40%)	14 (28%)	36 (72%)
TOTAL	50 (100%)		50 (100%)		50 (100%)			50 (100%)	

Table 3 – Sample distribution of student survey participants according to academic level of study, age nationality and gender.

	Academic Level of study		**Age**		**Nationality**			**Gender**	
	UG	**PGT**	**≤25**	**>25**	**UK**	**EU**	**Other International**	**Male**	**Female**
	0 (0%)	4 (100%)	0 (0%)	4 (100%)	1 (25%)	0 (0%)	3 (75%)	1 (25%)	3 (75%)
TOTAL	**50 (100%)**		**50 (100%)**		**50 (100%)**			**50 (100%)**	

Table 4 – Sample distribution of student focus group participants according to academic level of study, age nationality and gender.

For the staff focus group, my population of interest was staff who teach at UG and PGT level in MVLS. I decided to adopt a purposive sampling strategy (Cohen *et al*., 2018) to selectively target degree programme co-ordinators/directors (28 UG and 65 PGT staff) because they are likely to be experienced members of staff who act as advisors of study and will have encountered plagiarism during their academic career. A total of 7 participants (1 UG; 6 PGT) took part in the staff focus group.

2.8 Data Analysis

2.8.1 Quantitative Data Analysis

The proportions of the numbers of cases of plagiarism for the combined cohort of UG and PGT students within demographic sub-categories [level of study (UG, PGT); age (≤25, >25); nationality (UK, EU, other international); gender (male, female)] according to the total numbers of students within these demographic sub-categories were calculated for each academic session from 2014-15 to 2021-22 and converted to percentages by multiplying by a factor of 100. Bar plots of percentage data for each of the demographic categories were generated using Microsoft Excel.

Chi-square test was used to evaluate differences in plagiarism incidence between sub-groups within demographic categories (Cohen et al., 2018). However, in some comparisons, the expected values in some cells in Chi-square analyses were <5 and so Fisher Exact test was used instead for those comparisons (Cohen et al., 2018; McDonald, 2009). R (Version 4.2.1) and R studio (Version 2022.07.1+554) (R Core Team, 2022) were employed using the functions 'chisq.test' and 'fisher.test' to perform the analyses. Benjamini-Hochberg false discovery rate method is accepted for adjusting p values in the case of multiple comparisons (Lee & Lee, 2018) – this was employed for nationality demographics as there were three independent variables.

SPSS software (Version 26) was employed to analyse data from the Lickert-style questions in my survey following recognised guidelines (e.g. Hartas, 2010). After input of gathered data, variables were categorised (e.g. nominal, ordinal, scale) and data transformed (e.g. the 5 point Lickert scale responses from Strongly Disagree to Strongly Agree were converted to numerical values from 1-5) to allow further analysis. Data was initially investigated using 'cross-tabs' function to evaluate frequencies, range and median of responses according to specified variables e.g. level of study (UG or PGT). The Shapiro-Wilk test was chosen to evaluate normality of data distribution (Cohen et al., 2018) and because my data had a non-normal distribution, the non-parametric Kruskal-Wallis test was employed to evaluate the differences between variables and calculate p values (Buckler & Moore, 2023). Graphs were automatically generated in SPSS as part of analyses which were performed.

For all statistical analyses, the significance level Alpha was set at 0.05 as the 5% level is generally accepted as the maximum threshold at which to determine statistical significance and reject the null hypothesis in favour of the alternative hypothesis (Cohen et al., 2018). This means that p values < 0.05 were considered as significant.

2.8.2 Qualitative Data Analysis

Thematic analysis was employed to analyse qualitative data from open survey questions and focus group transcripts as this is an established and recognised method for analysing such data (e.g. Braun & Clarke, 2006). I followed the three main stages and processes of thematic analysis, as described by Castleberry & Nolen (2018), namely compiling, disassembly and reassembly. The associated steps I performed are outlined in Table 5.

Stage	Process	Description
1	Compiling	• Data was transformed into a suitable format for its analysis o Open survey responses were exported from Microsoft Forms to Microsoft Excel o Automatically generated transcripts from Microsoft Zoom were reviewed and corrected using Microsoft Word.
2	Disassembly	• Transformed qualitative data from Stage 1 (from focus group transcripts or open survey responses) was manually annotated with 'codes' [words or short sentences that indicated the key point and meaning which I derived from that piece of data (Saldaña, 2014)] in Microsoft Word by highlighting relevant text and adding a comment with the code, or in Microsoft Excel by adding the codes in a new column next to the original responses. • In all cases, I read over the original text several times until no new codes could be assigned.
3	Reassembly	• Codes were manually grouped together under the headings of broader 'categories' using Microsoft Excel • Categories were next linked to each other to formulate wider 'themes' which reflected the meaning I inferred from the data (Lichtman, 2014) manually using Microsoft Excel.

Table 5 – Summary of Thematic Analysis Stages and Processes

3. Results

3.1 Senate Data

Quantitative analysis of senate office data was employed to generate an overall impression of plagiarism occurrence in MVLS from 2014-15 to 2021-22. The data was evaluated by determining proportion (%) of plagiarism that occurred in in each academic session in the following demographic sub-categories: academic level, maturity, nationality and gender (Figure 2).

With respect to academic level, Figure 2(A) indicates a tendency for higher levels of plagiarism among PGT compared to UG students in all academic sessions. There is also a visible trend that plagiarism levels in UG and PGT students have increased substantially from academic session 2016-17 to 2021-22, with levels rising from 0.19% to 0.64% for UG and 1.56% to 8.12% for PGT students between these two years respectively.

Looking at student maturity, Figure 2(B) indicates a general pattern of higher levels of plagiarism in students who are mature (> 25 years) compared to those who are not mature (≤ 25 years) in all academic sessions. Again, there appears to be a steep rise in the number of plagiarism cases in both mature and not mature students from academic session 2016-17 to 2021-22. Levels have risen from 0.22% to 1.33% for not mature and from 1.61% to 10.92% for mature students between these two years respectively.

With regards to participant nationality, Figure 2(C) illustrates a trend of higher incidence of plagiarism among EU and other international students compared to UK students in all academic sessions. Furthermore, there appears to be overall trends for rising levels of plagiarism from 2016-17 to 2021-22 in all nationality categories. Levels have risen from 0.19% to 1.07% (UK), 0.94% to 3.3% (EU) and 0.93 to 5.64 % (other international) between these two years respectively.

Finally, with regards to student gender, Figure 2(D) suggests that there are no obvious major differences in levels of plagiarism according to male or female gender. As with other demographic characteristics, there is a trend of increasing levels of plagiarism in both males and females from academic session 2016-17 to 2021-22, with levels rising from 0.57% to 2.59% (males) and 0.27 to 2.43 % (females) between these two years respectively.

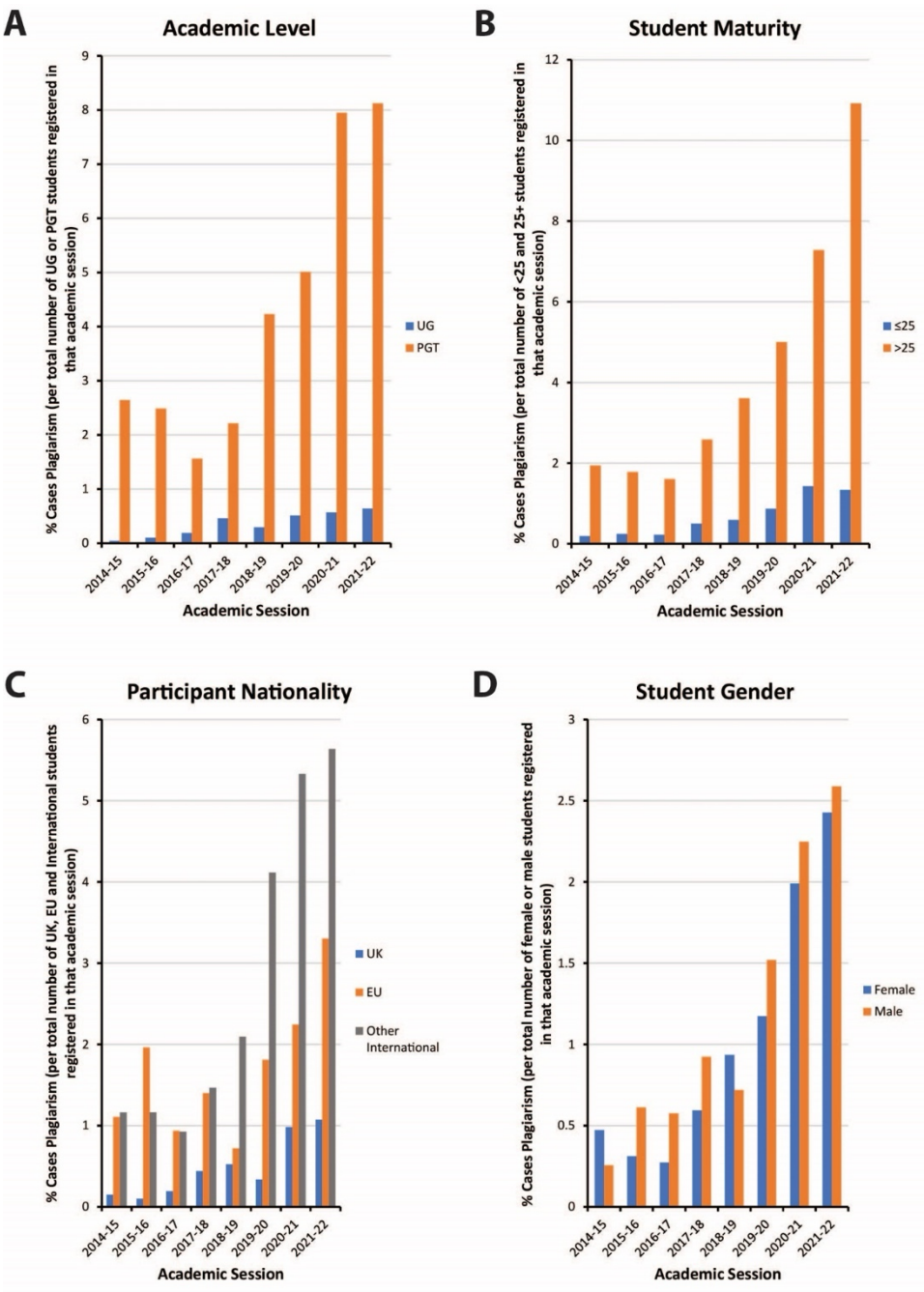


Figure 2 – Incidence of Plagiarism in MVLS
Analysis of reported cases of plagiarism in MVLS from academic sessions 2014-15 to 2021-22 according to (A) level of academic study [Undergraduate (UG) or Post-graduate taught (PGT)]; (B) student maturity (≤25 yrs or >25 years); (C) student nationality (UK, EU or Other International) and (D) student gender (Female and Male). In all case bars represent % of reported cases of plagiarism within the stated sub-categorisations with respect to the total number of students enrolled in MVLS within each sub-categorisation in the stated academic session.

To investigate the statistical significance of observed differences in proportions of levels of plagiarism (i) between demographic sub-categories and (ii) within demographic sub-categories over time, two proportion Chi-square or Fisher exact tests (where expected cell counts were <5) were performed. The year 2016-17 was used as a baseline, because counts for cases of plagiarism within some demographic sub-categories were <5 in previous academic sessions and so they could not be used, and 2021-22 was used for comparison as this was the year where levels were highest.

Results indicate statistically significant higher levels of plagiarism at both 2016-17 (Table 6) and 2021-22 (Table 7) time points in: UG vs PGT students, mature vs younger students, and UK vs both EU and other international students (p values are <0.05 for all comparisons). This suggests that differences which were present in 2016-17 continue to be present in 2021-22. There were no statistically significant differences in levels of plagiarism between males and females or between EU and other international students at either time point (p values were >0.05 for all comparisons here).

	Chi Square			**Fisher Exact Test**		
Demographic	**X^2**	**df**	**p value**	**Estimate: Odds Ratio**	**95% CI**	**p value/ adjusted p value[a]**
Level of Study						
UG vs PGT	N/A			4.595024	(2.369999, 9.766401)	**2.75e-07******
Age						
≤25 vs >25	N/A			7.346327	(2.784679, 19.134540)	**3.08e-05******
Nationality						
UK vs EU	N/A			4.903602	(1.076039, 18.394197)	**0.03*[a]**
UK vs Other International	N/A			4.847208	(1.655222, 14.481143)	**0.0051**[a]**
EU vs Other International	N/A			0.9883259	(0.2739551, 4.4165688)	1[a]
Gender						
Male vs Female	2.3053	1	0.1289	N/A		

Table 6 – Chi Square/Fisher exact test statistics comparing levels of plagiarism between demographic characteristics in year 2016-17

Notes: p values in bold are statistically significant

(* Significant at p<0.05; ** Significant at p<0.01; **** Significant at p<0.0001)

[a] these are adjusted p values with Benjamini Hochberg FDR correction for multiple comparisons

	Chi Square			Fisher Exact Test		
Demographic	**X^2**	**df**	**p value**	**Estimate: Odds Ratio**	**95% CI**	**p value/ adjusted p value[a]**
Level of Study						
UG vs PGT	288.54	1	**1.04e-64******	N/A		
Age						
≤25 vs >25	266.89	1	**5.39e-60******	N/A		
Nationality						
UK vs EU	N/A			3.147934	(1.461459, 6.212454)	**0.00304****[a]
UK vs Other International				5.505682	(3.872142, 7.923570)	**4.02e-24******[a]
EU vs Other International				1.748463	(0.925437, 3.648957)	0.0846[a]
Gender						
Male vs Female	0.0966	1	0.756	N/A		

Table 7 – Chi Square/Fisher exact test statistics comparing levels of plagiarism between demographic characteristics in year 2021-22
Notes: p values in bold are statistically significant
(** Significant at p<0.01; **** Significant at p<0.0001)
[a] these are adjusted p values with Benjamini Hochberg FDR correction for multiple comparisons

Looking at changes in plagiarism levels over time, results in Table 8 indicate that there are statistically significant higher levels of plagiarism among students within all demographic sub-categories (UG, PGT, younger (≤25), mature (>25), UK, EU, other international, male, female) when comparing proportions of plagiarism cases in 2016-17 to those in 2021-22 (p values for Chi-square tests are <0.05 for all comparisons).

	Chi Square		
Demographic	X^2	df	p value
Level of Study			
UG	11.237	1	**0.0008019*** **
PGT	38.704	1	**4.93e-10**** **
Age			
≤25	39.544	1	**3.21e-10**** **
>25	46.265	1	**1.03e-11**** **
Nationality			
UK	24.677	1	**6.78e-07**** **
EU	4.2617	1	**0.03898* **
Other International	35.588	1	**2.44e-09**** **
Gender			
Male	24.162	1	**8.86e-07**** **
Female	63.911	1	**1.30e-15**** **

Table 8 – Chi Square test statistics comparing levels of plagiarism within demographic sub-categories between years 2016-17 to 2021-22.
Note: p values in bold are statistically significant
(*** Significant at p<0.001; **** Significant at p<0.0001)

3.2 Online Survey

To assess students' knowledge and understanding of plagiarism, one of the online survey questions (Q9) provided participants with a list of scenarios (Appendix 1; Table A1) and they were asked if they considered these to be plagiarism or not, or if they were not sure. Responses indicated that the majority (range of >45% to >70%) of UG and PGT students correctly identified scenarios of plagiarism and the one scenario that was not plagiarism (statement 9.3) (Figure 3A). There were no statistically significant differences between UG and PGT responses for all statements.

Participants were asked which scenario they felt was the most serious and why (Q10). The highest proportions of UG (33.3%) and PGT (21.9%) students considered scenarios 8 (paraphrasing without acknowledgement) and 14 (hiring someone else to sit an exam) to be the most serious respectively (Figure 3B). The main reasons underlying this were that these represent poor academic practice, and that the use of a third party is a deliberate act. For example, one survey participant stated "As a scientist we need to give a credits for another scientist invention/work by citing the source properly." Referring to the scenario of a third party sitting an exam on a students behalf, another participant wrote:

> ".... because 100% of the work assignment is completed by someone else. I feel this is more serious than paraphrasing 5% of the assignment without a reference - that could just be an accident or forgetting to reference something appropriately. It is still plagiarism .... but the reason for the plagiarism is not blatantly malicious."

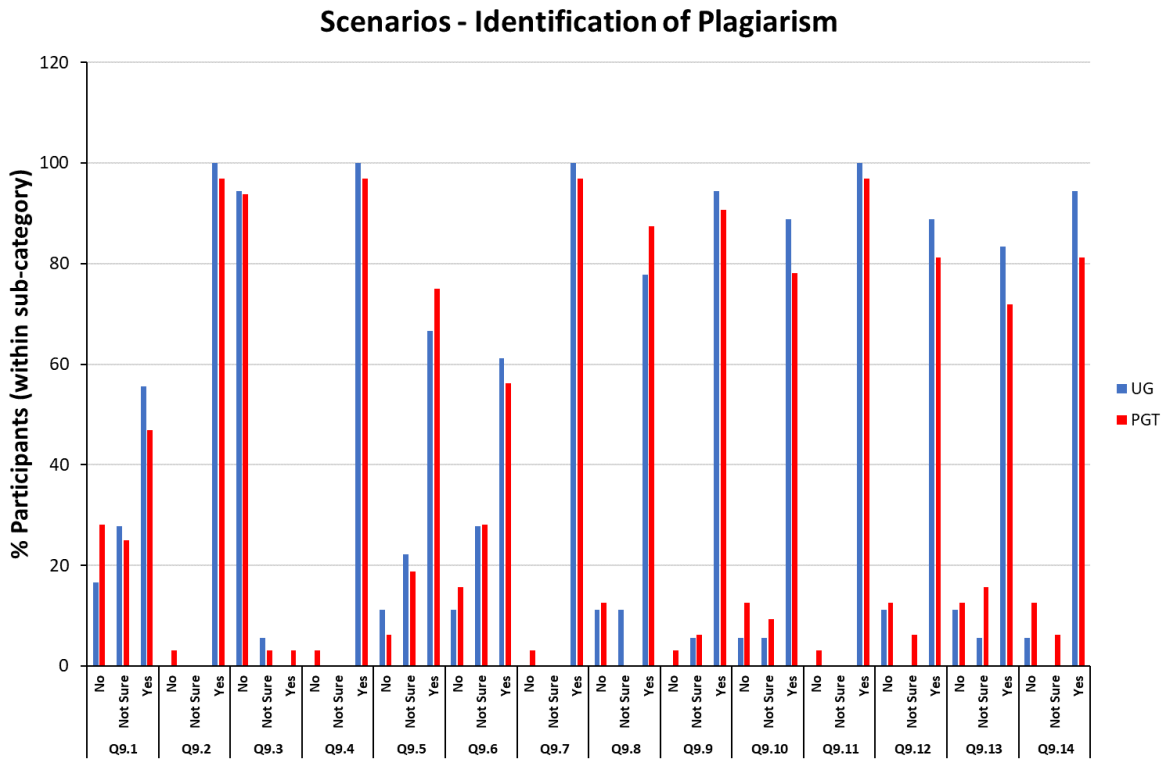


Figure 3A

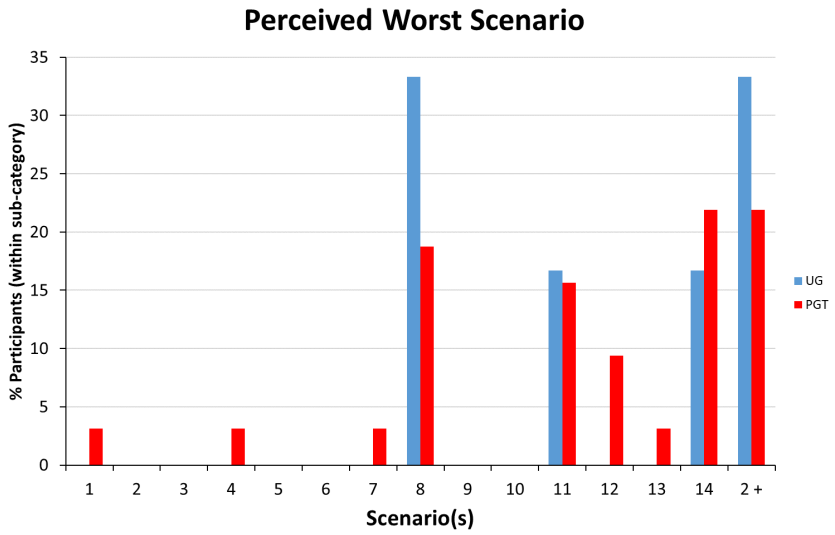


Figure 3B

Figure 3A, 3B – Students knowledge of plagiarism based on presented scenarios (A) Analysis of students' knowledge of scenarios of plagiarism according to participant level of study. Bars represent % of students within each sub-categorisation who opted for each of the three possible responses (No; Not Sure; Yes). (B) Analysis of students' perception of which was the worst scenario from the provided list. Bars represent % of students within each sub-categorisation who stated specified scenarios. 2 + = students who stated 2 or more scenarios. For A and B, UG n = 18; PGT n = 32.

From the responses to lickert-style questions (Q11-15, 18, 20), only one statistically significant difference was found between UG and PGT students – PGT students agreed more strongly (median = 4) compared to UG students (median = 3.5) that academic writing workshops could help prevent plagiarism (p = 0.025) (Figure 4, Table 9).

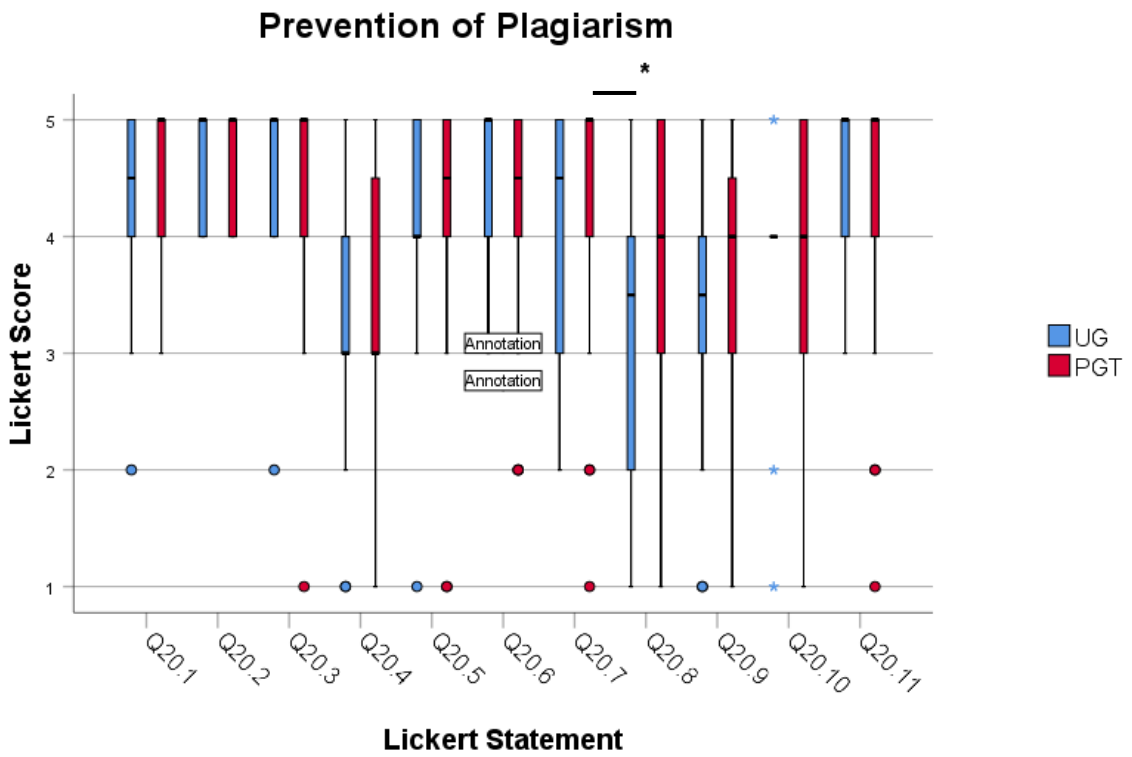


Figure 4 – Student perceptions relating to prevention of plagiarism
Analysis of students' perceptions relating to prevention of plagiarism according to participant level of study (blue = UG; red = PGT). Shown is a box-whisker plot of Lickert question responses. Score represents level of agreement/disagreement with statements which students were asked to consider (1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; 5 = strongly agree). Solid line represents the median; upper and lower quartiles are represented by the coloured boxes; whiskers extend to non-outlying values; outliers are represented by data points (filled circles); extreme cases are represented by blue asterisk. Kruskal Wallis test was used to compare UG and PGT responses and calculate p values (See Table 17) and those with significance are shown. Black asterisk indicates $p < 0.05$.

Statements: Prevention of Plagiarism		UG		PGT		Kruskal Wallis	
		Median	IQR	Median	IQR	*H*	*p*
20.1	Pride in own original work	4.5	1	5	1	0.299	0.585
20.2	Can get good marks without plagiarising	5	1	5	1	0.068	0.795
20.3	Against moral values	5	1	5	1	0.431	0.511
20.4	Against religious beliefs	3	1	3	2	0.102	0.749
20.5	Fear of humiliation by peers/staff/family if found out	4	1	4.5	1	0.058	0.810
20.6	Penalties are too high if was referred to senate for plagiarism	5	1	4.5	1	1.832	0.176
20.7	Clear guidance from academic staff on what constitutes plagiarism would prevent me breaking the rules	4.5	2	5	1	0.292	0.589
20.8	Attendance at academic writing workshops	3.5	2	4	2	5.025	**0.025***
20.9	Attendance at stress management workshops	3.5	1	4	2	0.934	0.334
20.10	Attendance at time and priority management workshops	4	1	4	2	0.064	0.800
20.11	Ability to run a draft of an assignment through Turnitin before submission of the final entry	5	1	5	1	0.378	0.539

Table 9 – Statistical analysis of Q20

Note: p values in bold are statistically significant (* Significant at $p<0.05$)

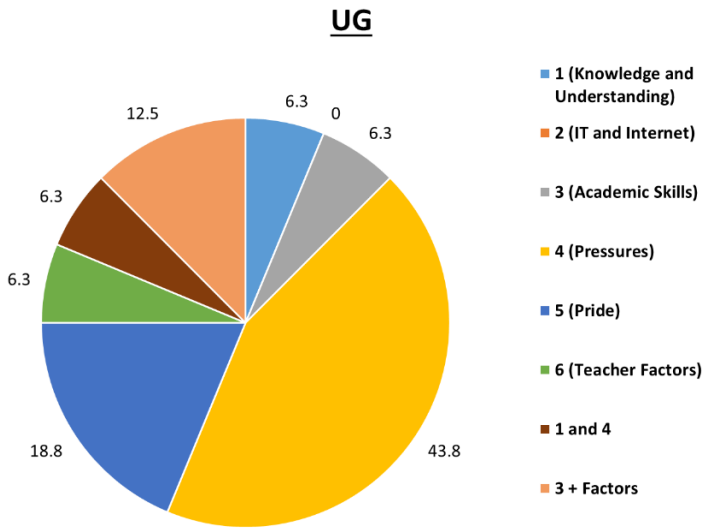


Figure 5A

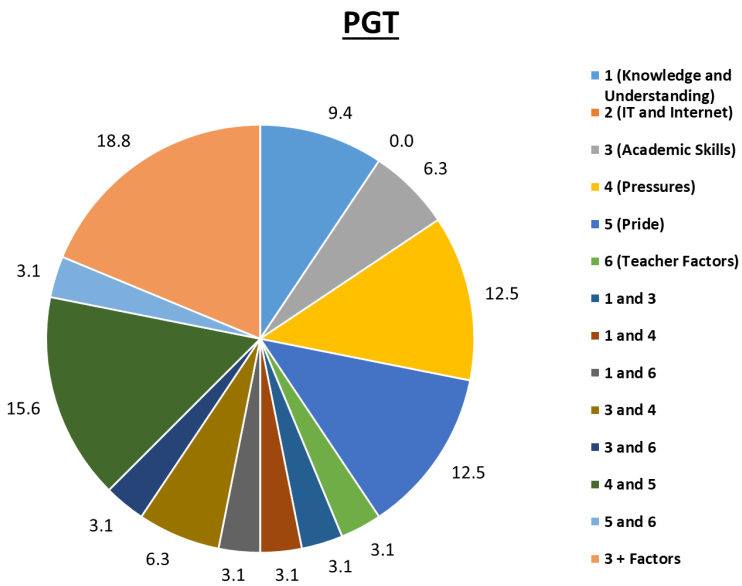


Figure 5B

Figure 5A, 5B – Student perceptions of the most significant contributing factors to plagiarism behaviour

Pie charts representing the percentage of (**A**) UG (n = 16) and (**B**) PGT (n = 32) participants whose responses matched to the five categories from survey Questions 11-15 – IT and internet (1); Academic skills (2), Pressures (3); Pride (4) and Teacher Factors (5) or combinations of these factors.

From the supporting quotes (Table 10), it can be seen that pressures included: time pressures to complete assignments; pressure to pass, financial pressures, and mental health issues. With regards to pride, the perception was that plagiarism can occur because students lack pride in their own work – they only want to put in minimal effort to pass without trying to synthesise their own ideas and can be indifferent to the potential of misconduct being identified.

Factor	**Supporting Quotes**
Pressures	*"…. pressures of turning assignments in on time. Students will be afraid of failure, especially at higher levels of education, and this will impact on their judgement."* *"Pressure to succeed and not to fail (from a variety of sources including self), especially given the financial implications of failing/having to re-sit a year."* *"If a student is struggling with mental health, has anxiety and is very afraid that they will not be able to fit the standards …. it might cause them to plagiarise."*
Pride	*"In general, students have become very lazy to think deeper and generate their own ideas based on information from others."* *"…. looking for an easy way to complete assignments for credit - just wanting to pass."* *"…. in my experience there is a certain amount of nonchalance in that [plagiarism] will never be found out and I totally disagree with that. Simply make the effort do the reading and submit your own work and take pride in your submissions."*

Table 10 – Supporting Quotes for Pressures and Pride as Key Contributing Factors for Plagiarism Behaviour

Students were asked in the online survey what they felt was the most important factor that would prevent plagiarism behaviour and why (Q21). Responses were coded (a total of 21 codes emerged) and the number of times a particular code was stated was analysed quantitatively according to participant level of study (Table 11). The top codes by rank (highlighted in red in the table) for UG students were: 1. pride in own work (25%), 2. being able to submit a draft of an assignment to Turnitin (25%), 3. clear assessment guidance (12.5%) and 4. penalties not being worth the risk (12.5%). In contrast, the top codes by rank for PGT students were: 1. clear guidance about what constitutes plagiarism (29.03%), 2. clarity about penalties for plagiarism (25.81%) and 3. pride in own work (19.35%).

Code	% Respondents For Stated Factor	
	UG (n=16)	PGT (n=31)
Clear Guidance On What Constitutes Plagiarism	6.25	**29.03**
Pride In Own Work	**25**	**19.35**
Clarity About Penalties	0	**25.81**
Turnitin Draft	**25**	3.23
Clear Assessment Guidance	**12.5**	9.68
Academic Writing Workshops	6.25	9.68
Penalties Not Worth Risk	**12.5**	3.23
Examples	0	6.45
Support Originality	0	6.45
Academic Skills Development	6.25	3.23
Support For Students Experiencing Difficulties	6.25	3.23
Time Management Guidance	6.25	3.23
Controlled Exam Environment	6.25	0
Personal Values and Beliefs	0	3.23
In-person Lessons	6.25	0
Self-identity	0	3.23
Can Get Good Marks Without Plagiarism	0	3.23
Longer Time Period for MSc studies	0	3.23
Less Workload	6.25	0
Alternative/Authentic Assessments	0	3.23
Additional Support For Using Turnitin	6.25	0

Table 11 – Analysis of 'open' survey Q21

3.3 Student and Staff Focus Groups

To gain a more in-depth understanding of student perceptions of plagiarism behaviour and how these aligned with the views of staff, thematic analysis was conducted as outlined in the methodology section on data from student 'open-ended' online survey responses (Question 10, 16, 17, 19, 21, 22) and student and staff focus group discussions. During the analyses, it became clear that there were common categories between student and staff data but also some which were unique to each group. These categories were sorted into themes which were common for both students and staff (a total of nine) and those which were unique to either students (a total of four) or staff (a total of four) (Figure 6).

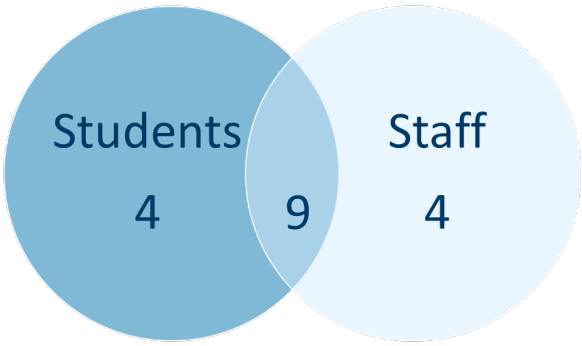


Figure 6 – Results of Thematic Analyses
Venn diagram indicating the number of themes which were identified from student open survey responses and focus group discussions, staff focus group discussions and common themes between students and staff.

The identified themes, which will be described in more detail in the following section, are outlined in Table 12 and supporting quotes are provided in Appendix 2 (Table A2-A5).

Unique to Students	**Unique to Staff**	**Common Between Staff and Students**
1. Plagiarism is a wrongful behaviour. 2. Need for good signposting and regular reminders of support infrastructure 3. Discussions with peers are a source of learning 4. Mentor scheme	1. Subject-specific considerations 2. Time limitations 3. Lack of certainty about referrals for plagiarism 4. Variation in stringency among staff regarding plagiarism	1. Plagiarism is poor academic practice – it is not always intentional. 2. Negative impact of plagiarism upon student learning 3. Student transitions (from overseas to UK and from UG to PGT) 4. Pressures faced by students 5. Good assessment and feedback practice can help prevent plagiarism 6. Necessity for staff to have strict attitude towards plagiarism 7. Turnitin barriers 8. Institutional barriers 9. Current provision of guidance is not effective

Table 12 – Summary of common and unique themes among students and staff identified from qualitative analysis

3.3.1 Unique Student Themes

Theme 1 was that plagiarism is a wrongful behaviour. Strong negative language terms were used e.g. 'stealing', 'illegal', 'fraudulent' with respect to perceptions of this behaviour. It was also voiced that plagiarism can have consequences and impact other students where someone's work was copied.

Theme 2 identified a need for signposting and regular reminders of support infrastructure. The perception was that support for academic studies and personal wellbeing is needed before and after referral to senate and that reminders should be provided throughout the programme of study.

Theme 3 indicated that student discussions with their peers are a source of learning. Such discussions were perceived to promote learning, providing boundaries are not crossed and can even help raise self-awareness of plagiarism.

Theme 4 highlighted that a mentor scheme for students would be of benefit to help prevent plagiarism. Students voiced the opinion that they would feel more comfortable asking for advice about plagiarism from a more experienced student than from a member of academic staff.

3.3.2 Unique Staff Themes

Theme 1 for staff was that there are subject specific considerations for plagiarism. For example, in computing disciplines, the re-use of code is encouraged but that is contradictory to the concept of avoiding plagiarism. It is also very difficult to detect plagiarism of computer codes.

Theme 2 was time limitations faced by staff. Concerns were raised about (i) the time it takes to check Turnitin reports, complete paperwork and resolve problems relating to senate referrals, (ii) the capacity of staff to make new resources to help prevent plagiarism, (iii) discussing plagiarism during class time when the curriculum takes up the full allocated time.

Themes 3 and 4 highlighted that staff have a lack of certainty about plagiarism referrals and that there is a variation in stringency among staff regarding plagiarism respectively. Staff are not sure which cases should be referred to senate, have a range of perceptions concerning the seriousness of plagiarism, and differ with respect to how strict they are about the issue.

3.3.3 Common Themes Between Staff and Students

The first common theme for students and staff was that while plagiarism is perceived as poor academic practice, it is not always intentional. It was voiced that although all types of plagiarism are encountered in all types of assessment, some cases of plagiarism can genuinely be accidental because students are unfamiliar with good academic writing conventions.

Theme 2 identified the negative impact of plagiarism upon student learning. It can be indicative that students lack understanding subject material, concepts and intended learning outcomes (ILOs). It also associates with a lack of criticality, which was highlighted as a key differentiating factor between UG and PGT level.

Theme 3 concerned student transitions, from overseas to UK and from UG to PGT level. Students and staff recognised the diversity of educational and cultural backgrounds of students, especially at PGT level. International students face a language barrier, may lack prior training on plagiarism, and it is difficult for them to break cultural norms where it is seen as a mark of respect to use the words of others who are held in esteem. Any gap between UG and PGT studies was also highlighted as an area of concern.

In keeping with survey results, theme 4 concerned pressures faced by students. It was acknowledged that there are significant pressures which are faced by students during their period of study, including: additional life pressures e.g. having a family, caring responsibilities; the pressure to pass; time pressures due to the intensive nature of 1 year PGT study. It was also highlighted that it is difficult for students to learn about plagiarism at the same time as studying.

Theme 5 identified good assessment and feedback practice can help prevent plagiarism. Clear assessment guidelines and diverse, authentic assessments without exemplars were perceived to encourage student originality, criticality and pride in their own work. A need for alternatives to online exams and the use of feedback as opposed to referral for minor cases of plagiarism were voiced.

Theme 6 was the necessity for staff to have a strict attitude towards plagiarism. It was highlighted that students are taught academic skills and about plagiarism, with the perception that staff having a strict attitude towards this issue highlights to students how important and serious it is.

Theme 7 related to barriers encountered with Turnitin. Both students and staff indicated they have a lack of prior experience and/or training in using Turnitin. Students experience difficulties with interpreting Turnitin reports, particularly surrounding the scores that are generated. When technical issues occur with the software, these can be poorly communicated by the institution. Staff have uncertainty about where responsibility lies for checking the Turnitin reports.

Theme 8 identified institutional barriers. It was perceived that (i) there is a need for clear and fair policies on plagiarism, (ii) the institution should raise awareness of the penalties of plagiarism and (iii) there is a lack of resources/support to tackle plagiarism when faced with increasing student numbers.

The ninth and final theme highlighted that current provision of guidance is not effective. In-class discussions on this area are too short and students lack understanding of detail surrounding plagiarism. Furthermore, the timing of guidance provision is not ideal for PGT students and should be at start of the degree programme. It was perceived that more support is needed than signposting to the central Student Learning Development (SLD) service and that resources on this topic could have more active learning components.

4. Key Recommendations

Plagiarism is a complex phenomenon and the results in this study indicate a multi-factorial approach involving students, staff and the institution is required to address this issue. A series of eight key recommendations for such an approach are outlined in Table 13. These

approaches are supported by other studies in literature but the key argument of this study is that all of these are required – no single approach will be sufficiently effective.

Recommendation	Reason	Supporting Literature
1. Educational/corrective approach	• To enhance students' knowledge and understanding of plagiarism and how to avoid it	• Babaii & Nejadghanbar (2017) • Kashian et al. (2015) • Liu et al. (2018) • Perkins et al. (2019)
2. Raising awareness of the issue.	• To highlight the moral/ethical dimension of the seriousness of the issue	• Babaii & Nejadghanbar, (2017) • Kashian et al. (2015) • Selemani et al. (2018)
3. Sanctioning approach with policing (e.g. using Turnitin) and appropriate penalties	• To act as a deterrent.	• Hillermann (2023) • Kashian et al. (2015)
4. Policy-driven approach	• To ensure rules are fair, clear, well signposted and consistently applied	• Bašić et al. (2019) • Bing et al. (2012) • Levine & Pazdernik (2018)
5. Assessment-focused strategies	• To design out opportunities for plagiarism • To enhance student assessment feedback literacy • To encourage student pride in their own work	• Bretag et al. (2019) • Macdonald & Carroll (2006) • Verhoef & Coetser, (2021)
6. Provision of academic writing skills training	• To enhance students' skills and ability to synthesize ideas and write in their own words • To encourage student pride in their own work	• Levine & Pazdernik (2018) • Mbutho & Hutchings, (2021)
7. Institutional support for staff professional development	• To help overcome barriers linked to reporting of plagiarism	• De Maio et al. (2020) • Morris (2018) • Perkins et al. (2019)
8. Enhanced scaffolding of support for students	• To help students cope with pressures they are facing to mitigate them resorting to plagiarism	• Gravett & Kinchin, (2020)

Table 13 – Summary of Key Recommendations of this Study and Supporting Literature.

5. Conclusion

In conclusion, this study identifies that plagiarism is more prevalent at PGT than UG level in MVLS at the University of Glasgow. Student nationality and age are key influencing demographics, with plagiarism being more prevalent in international and mature students compared to domestic and younger students respectively. While closed question survey results did not reveal any major differences in perceptions of plagiarism between UG and PGT students, open survey responses and focus group results highlighted specific challenges faced by (i) PGT international students and (ii) for students who have had a long gap in study, who are more likely to be mature. Further research is warranted with these specific cohorts of students to gain more detailed insight of their support needs.

There is a need for additional and more timely provision of support to bring international PGT students in particular to the same level of knowledge and understanding about plagiarism, as many have not received prior training. Not only do students require additional

education on plagiarism, but there is a need for the institution to (i) support students with development of their academic skills, wellbeing and (ii) support staff by providing training, development and resource to enable them to tackle the issue of plagiarism fairly and consistently. It is also critical that we as staff design authentic assessments that allow students to fulfil their academic potential and have pride in their own work, particularly in the face of fast-paced developments in the field of generative AI.

6. Acknowledgements

I would like to acknowledge the Senate Office, Freedom of Information (FOI) office and Planning, Insight and Analytics Department for providing essential data for this project.

I would like to acknowledge support from Mr Jack Scott in MVLS administration for assistance with contacting undergraduate programme leads with regards to staff focus group recruitment and also for help with information relating to undergraduate cases which are dealt with at school level.

I would like to acknowledge advice and support from Dr Michael McEwan, George Vazenelis and Dr Jo Ferrie regarding statistical analyses of senate data.

Appendices

Appendix 1 – Online Survey Q9 Statements

Statement	Options
1. Student A and Student B collaborate on an assignment that is meant to be completed individually.	Yes; No; Not Sure
2. Student A does some work themselves on an assignment but copies the majority of the assignment from Student B.	Yes; No; Not Sure
3. Student A is having difficulties with their assignment – they contact the lecturer and show them what they have done to ask for guidance.	Yes; No; Not Sure
4. Student A submits a friend's (Student B) assignment from a previous year the course ran.	Yes; No; Not Sure
5. Student A re-submits an assignment from course X which they completed last year for course Y which they are currently studying.	Yes; No; Not Sure
6. Student A copies a sentence directly from text book, journal article or website into their assignment. The student acknowledges the author and date of publication or website in brackets after the sentence but they do not include quotation marks or a page number.	Yes; No; Not Sure
7. Student A copies material directly from a book, journal article or website into their assignment but does not acknowledge the author and date of publication or website after the sentence or use quotation marks.	Yes; No; Not Sure
8. Student A reads some information from a journal article and paraphrases it before writing it in their assignment without acknowledging the source of information.	Yes; No; Not Sure
9. Student A experiences technical difficulties for a tutorial assessment (worth 5%) and so uses their classmate, student B's answer.	Yes; No; Not Sure
10. Student A gets student B to complete a coursework assignment on their behalf.	Yes; No; Not Sure
11. Student A and Student B meet for lunch. Student B has to step aside temporarily for a phone call. While student B is distracted, student A takes a copy of student B's work and subsequently submits it as their own.	Yes; No; Not Sure
12. Student A has to write an essay for course X and goes to the internet – they find and subsequently pay a website to write the essay for them.	Yes; No; Not Sure
13. Student A and student B are sitting an online exam. They message each other during the exam to exchange their answers.	Yes; No; Not Sure
14. Student A hires someone to sit an exam on their behalf.	Yes; No; Not Sure

Table A1 – Scenarios Provided in Online Survey Q9

Appendix 2 – Supporting Quotes for Thematic Analyses

Theme	**Supporting Student Quotes**
1. Plagiarism is a wrongful behaviour	Terms used in online survey responses included: *'theft', 'cheating', 'stealing', 'violation of privacy', 'deceitful', 'deception', 'dishonest', 'fraudulent', 'betrayal of trust', 'unfair leveraging of wealth', 'ruined the integrity of honours courses', 'cynical', 'cruel', 'ethically reprehensible'.* *"[Referring to copying another students work] …. It's also intentionally lagiarizing isn't it. It's like yeah copying and it's unfair on the other student as well …. It would impact potentially on them as well"* (Student A)
2. Need for good signposting and regular reminders of support (academic and wellbeing) infrastructure	*"…. Support's needed more upstream than what at the point of referral to senate, because at that stage it's almost, well it's late for that particular piece of work isn't it …."* (Student A) *"…. Maybe after each module has been completed, also before the assessment, I think a reminder, refresher should also be done."* (Student B) *"…. Regular reminders of the support that's out there because what generally happens is that when you've got a key piece of work to submit and if you've got issues, then it all kind of comes to a head around that time of submission. But you want it again more upstream, just a reminder …."* (Student A)
3. Discussions with peers are a source of learning	*"…. If you get the work …. To just get the context, not the full content …. It can be a very good source of learning, especially in peer to-peer study sessions."* (Student D)
4. Possibility of a mentor scheme	*"I think in order to support the student before going to the senate …. Can we just provide the mentorship program …. For the purpose of treating the plagiarism thing …. What is the cause of the problem can be sought out from the student in very comfortable environment. Because we know student and mentor is usually very close compared those student to lecturer."* (Student D)

Table A2 – Supporting Quotes for Unique Student Themes

Theme	**Supporting Staff Quotes**
1. Subject-specific considerations for plagiarism e.g. for computer coding	*"I teach primarily programming and it's difficult because we, when you teach programming good practice emphasizes code reuse and obviously that's kind of contrary to what we teach them about plagiarism and a lot of the students find it very hard to walk that line."* (Staff F) *"So Turnitin doesn't work for code at all, it just doesn't even return a score*." (Staff F)."
2. Time constraints	"[Referring to creation of new resources] …. *again it's just time, its time and effort …. but we can't do everything, we can't teach everything [Laughs]. I mean and at what point do, where do we do it."* (Staff D). "[Referring to senate referrals for minor cases] *And it's just difficult and then it's like the kind of paperwork that's all involved in it ….*" (Staff D) *"[Referring to existing resources] …. that's part of the reason that I've shied away from revisiting a lot of it in class …. within that kind of valuable class time that we've got for our content."* (Staff G) *"[Referring to a problem with Turnitin] …. we've had issues …. But then we have to go through the Turnitin, like every single bit of it you know to check it all. And it's just time, it takes so much time."* (Staff E)
3. Lack of certainty about referrals for plagiarism	*"…. it comes back to at what point …. what we should forward on, what we shouldn't forward on …. if …. there's one sentence in it that's paraphrased badly, is that the same or is that the case to be referred to senate or not"* (Staff D) "[Referring to a suspected case of accidental plagiarism] …. *do you just give them a warning or what do you do with that? So I think that's where the blurred lines are a bit, you know, how far do you take it through the processes?*" (Staff E)
4. Variation in stringency among staff regarding plagiarism	*"…. sometimes I feel what I might deem as not that serious, someone else may say that is clearly serious."* (Staff E) *"…. I'm very much like no, you should not get credit for something that is not yours. But …. I have colleagues …. who would be much more like 'oh yeah that's something I should do isn't it'"* (Staff A)

Table A3 – Supporting Quotes for Unique Staff Themes

Theme	**Supporting Student Quotes**
1. Plagiarism is poor academic practice - it is not always intentional	*"…. there is like intentional plagiarism and various, there is one like we can call like the unintentional plagiarism"* (Student C)
2. Negative impact of plagiarism upon student learning	*"Because like student who plagiarise like other student work like lost opportunity to gain understanding by stealing research …. it's very, very serious problem …. how to train your critical thinking if you like plagiarise like other student work?" (Student C)*
3. Student transitions (from overseas to UK and from UG to PGT)	*"…. students that are …. from developing countries …. don't have the idea of plagiarism, which affects them when they're coming to the UK for studies …. it's actually challenging for developing …. countries that were not exposed during their undergraduate level coming to postgraduate studies …."* (Student B) *"…. there is a big gap between …. undergraduate and doing like the post-graduate…. So, like maybe we don't know about oh, this is how to write very colourfully how to paraphrase and how to reference. Because …. there is like very, very long time for the gap …. So I thought it's not different between undergraduate and postgraduate student then."* (Student C)
4. Pressures faced by students	"*…. they are trying to learn at same time as plagiarism. Which, you may be exhausted with you know, as a post-graduate student some might be having families and having some other issues you know. It does contribute and affect you psychologically during the study …. you might find yourself caught and it's just unfortunate.*" (Student B)
5. Good assessment and feedback practice can help prevent plagiarism	*"…. having clarity of …. key things of what's expected at that level should help and encourage students to be more original perhaps in their writing and just yeah push those boundaries a bit more I'd say."* (Student A) *"The current practice of taking online exams have so many flaws that needs to be addressed."* (Survey Participant)
6. Necessity for staff to have strict attitude towards plagiarism	*"…. our lecturer very, very care …. about the plagiarism because yeah plagiarism is the most important thing in academic …. field, especially for when it comes to writing …. My lecturer is very strict when it's about the plagiarism.*" (Student C)
7. Turnitin barriers	*"I've never actually had anyone run through explaining what the report generated means and have had to work out what to disregard or pay attention to myself."* (Survey Participant)
8. Institutional barriers	*"I honestly don't know much about the penalties except that you can get in a lot of trouble and likely expelled."* (Survey Participant)
9. Current provision of guidance is not effective	*"In terms of additional support, the signposting to SLD, it's OK but perhaps more could be done …."* (Student A)

Table A4 – Supporting Student Quotes for Common Themes with Staff

Theme	**Supporting Staff Quotes**
1. Plagiarism is poor academic practice - it is not always intentional	"*.... 99.9% of the time they say "I didn't mean to" ...."* (Staff A) *"[Referring to a case of self-plagiarism] .... I genuinely don't think the student knew that that would still be classed as plagiarism"* (Staff E). *"In terms of the in-course assessment, I mean, we have come across everything from collusion to self-plagiarism."* (Staff B) *"..... when I used to teach undergrads .... it was very rare that I came across issues with plagiarism .... But as soon as it went to PGT .... it just exponentially blew up"* (Staff D)
2. Negative impact of plagiarism upon student learning	*"..... sometimes I do think it's a fundamental lack of a grasp of the ILOs that you've got there and so they're taking big chunks of text because they can't express that they haven't understood the ideas"* (Staff G)
3. Student transitions (from overseas to UK and from UG to PGT)	*"..... the majority of students that we see plagiarising at PGT are students that .... don't have English as a first language and have come from other educational backgrounds. Not always, but I think that probably is the majority of the students that have issues with this."* (Staff B)
4. Pressures faced by students	*"..... for some of our international students who've been funded to come here, the pressure to pass is immense and there are like very you know real life consequences for them if they don't successfully complete ...."* (Staff G)
5. Good assessment and feedback practice can help prevent plagiarism	*"I think there's real ways in which we could be diversifying assessment to allow them to be proud of it, rather than them just writing yet another essay on a topic ...."* (Staff D) *"..... getting rid of the exemplars is positive in terms of encouraging people to give their own response, you know, and telling them that what we're looking for is critical thinking ...."* (Staff G)
6. Necessity for staff to have strict attitude towards plagiarism	*"..... I say that it's [referring to plagiarism] a .... serious kind of .... poor academic practice that can affect their grade. I'm very threatening with it to be honest. I say it can affect whether or not they can progress or complete the course"* (Staff G).
7. Turnitin barriers	"*I found a glitch in Turnitin .... a very you know nondescript message was sent out on Teams .... I felt like there could be loads of course coordinators who didn't even see the message .... glitches in the system don't necessarily get communicated well ...."* (Staff A)
8. Institutional barriers	"*.... the pressure for increasing student numbers, the more you increase student numbers the less support we can provide. They're not going to equip staff they're not going to hire staff, they're not going to allow staff to provide the time and investment in students ....*" (Staff D)
9. Current provision of guidance is not effective	"*I think the problem with pointing students to*[existing] *resources .... they're quite dry .... I don't think they're ideal .... there's a need for better resources as well that students can be actively using rather than just reading a load of text."* (Staff B) "[Referring to academic writing workshops] *I don't think those weaker students are going out and taking those additional courses*" (Staff C)

Table A5 – Supporting Staff Quotes for Common Themes with Students

References

Babaii, E., & Nejadghanbar, H. (2017). Plagiarism Among Iranian Graduate Students of Language Studies: Perspectives and Causes. *Ethics & Behavior*, *27*(3), 240–258.

Bašić, Ž., Kružić, I., Jerković, I., Buljan, I., & Marušić, A. (2019). Attitudes and Knowledge About Plagiarism Among University Students: Cross-Sectional Survey at the University of Split, Croatia. *Science and Engineering Ethics*, *25*(5), 1467–1483.

Bing, M. N., Davison, H. K., Vitell, S. J., Ammeter, A. P., Garner, B. L., & Novicevic, M. M. (2012). An Experimental Investigation of an Interactive Model of Academic Cheating Among Business School Students. *Academy of Management Learning & Education*, *11*(1), 28–48.

Bishop, P. A., & Herron, R. L. (2015). Use and Misuse of the Likert Item Responses and Other Ordinal Measures. *International Journal of Exercise Science*, *8*(3), 297–302.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101.

Bretag, T., Harper, R., Burton, M., Ellis, C., Newton, P., Rozenberg, P., Saddiqui, S., & van Haeringen, K. (2019). Contract cheating: A survey of Australian university students. *Studies in Higher Education*, *44*(11), 1837–1856.

British Educational Research Association (BERA). (2018). *Ethical Guidelines for Educational Research, fourth edition (2018)*. https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research*, *6*(1), 97–113. https://doi.org/10.1177/1468794106058877

Buckler, S., & Moore, H. (2023). *Essentials of research methods in education* (1st ed.). SAGE Publications Ltd.

Castleberry, A., & Nolen, A. (2018). Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning*, *10*(6), 807–815.

Cleaver, E., Lintern, M., & McLinden, M. (2014). What About Ethics and Safety? In E. Cleaver, M. Lintern, & M. McLinden (Eds.), *Teaching and learning in higher education: Disciplinary approaches to educational enquiry* (First edition, pp. 54–71). SAGE Publications Ltd.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research methods in education* (Eighth edition). Routledge.

Collins, A., Judge, G., & Rickman, N. (2007). On the economics of plagiarism. *European Journal of Law and Economics*, *24*(2), 93–107.

Coneyworth, L., Jessop, R., Maden, P., & White, G. (2020). The overlooked cohort? – Improving the taught postgraduate student experience in higher education. *Innovations in Education and Teaching International*, *57*(3), 262–273.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (Third Edition). SAGE Publications Inc.

De Maio, C., Dixon, K., & Yeo, S. (2020). Responding to student plagiarism in Western Australian universities: The disconnect between policy and academic staff. *Journal of Higher Education Policy and Management*, *42*(1), 102–116.

Eaton, S. E. (2021). *Plagiarism in higher education: Tackling tough topics in academic integrity*. Libraries Unlimited, an imprint of ABC-CLIO, LLC.

George, J. W., & Cowan, J. (1999). *A handbook of techniques for formative evaluation: Mapping the student's learning experience*. Kogan Page ; Stylus Publishing, Inc.

Gravett, K., & Kinchin, I. M. (2020). Referencing and empowerment: Exploring barriers to agency in the higher education student experience. *Teaching in Higher Education*, *25*(1), 84–97.

Gullifer, J. M., & Tyson, G. A. (2014). Who has read the policy on plagiarism? Unpacking students' understanding of plagiarism. *Studies in Higher Education*, *39*(7), 1202–1218.

Halak, B., & El-Hajjar, M. (2019). Design and evaluation of plagiarism prevention and detection techniques in engineering education. *Higher Education Pedagogies*, *4*(1), 197–208.

Harris, L., Harrison, D., McNally, D., & Ford, C. (2020). Academic Integrity in an Online Culture: Do McCabe's Findings Hold True for Online, Adult Learners? *Journal of Academic Ethics*, *18*(4), 419–434.

Hartas, D. (Ed.). (2010). *Educational research and inquiry: Qualitative and quantitative approaches*. Continuum.

Hillermann, A. L. (2023). Factors Influencing Plagiarism Amongst Undergraduate Students at an Institution of Higher Learning: Kwazulu-Natal. In M. Makua, M. Akinlolu, M. Sithole, P. Gumede, & C. Nyondo (Eds.), *Proceedings of The Focus Conference (TFC 2022)* (pp. 60–71). Atlantis Press SARL.

Husain, F. M., Al-Shaibani, G. K. S., & Mahfoodh, O. H. A. (2017). Perceptions of and Attitudes toward Plagiarism and Factors Contributing to Plagiarism: A Review of Studies. *Journal of Academic Ethics*, *15*(2), 167–195.

ICIA. (n.d.). *Facts and Statistics*. Retrieved May 19, 2023, from https://academicintegrity.org/resources/facts-and-statistics

Jereb, E., Perc, M., Lämmlein, B., Jerebic, J., Urh, M., Podbregar, I., & Šprajc, P. (2018). Factors influencing plagiarism in higher education: A comparison of German and Slovene students. *PLOS ONE*, *13*(8), e0202252.

Kashian, N., Cruz, S. M., Jang, J., & Silk, K. J. (2015). Evaluation of an Instructional Activity to Reduce Plagiarism in the Communication Classroom. *Journal of Academic Ethics*, *13*(3), 239–258.

Lee, S., & Lee, D. K. (2018). What is the proper way to apply the multiple comparison test? *Korean Journal of Anesthesiology*, *71*(5), 353–360.

Levine, J., & Pazdernik, V. (2018). Evaluation of a four-prong anti-plagiarism program and the incidence of plagiarism: A five-year retrospective study. *Assessment & Evaluation in Higher Education*, *43*(7), 1094–1105.

Lichtman, M. (2014). *Qualitative Research for the Social Sciences*. SAGE Publications, Inc. https://doi.org/10.4135/9781544307756

Liu, G., Lu, H., Lin, V., & Hsu, W. (2018). Cultivating undergraduates' plagiarism avoidance knowledge and skills with an online tutorial system. *Journal of Computer Assisted Learning*, *34*(2), 150–161.

Maarouf, H. (2019). Pragmatism as a Supportive Paradigm for the Mixed Research Approach: Conceptualizing the Ontological, Epistemological, and Axiological Stances of Pragmatism. *International Business Research*, *12*(9), 1.

Macdonald, R., & Carroll, J. (2006). Plagiarism—A complex issue requiring a holistic institutional approach. *Assessment & Evaluation in Higher Education*, *31*(2), 233–245.

Mahmud, S., & Ali, I. (2023). Evolution of research on honesty and dishonesty in academic work: A bibliometric analysis of two decades. *Ethics & Behavior*, *33*(1), 55–69.

Maxwell, A., Curtis, G. J., & Vardanega, L. (2008). Does culture influence understanding and perceived seriousness of plagiarism? *International Journal for Educational Integrity*, *4*(2), 25–40.

Mbutho, N. P., & Hutchings, C. (2021). The complex concept of plagiarism: Undergraduate and postgraduate student perspectives. *Perspectives in Education*, *39*(2), 67–81.

McDonald, J. H. (with Delaware, U. of). (2009). *Handbook of Biological Statistics*. Sparky House Publishing.

Morris, E. J. (2018). Academic integrity matters: Five considerations for addressing contract cheating. *International Journal for Educational Integrity*, *14*(1), 15.

Orluwene, G. W., & Magnus-Arewa, A. E. (2020). Attitude of Postgraduate Students towards Plagiarism in University of Port Harcourt. *Asian Journal of Education and Social Studies*, *7*(2), 28–38.

Perkins, M., Ulas Basar Gezgin, & Gordon, R. D. (2019). Plagiarism in higher education: Classification, causes and controls. *Pan-Pacific Management Science*, *2*, 3–20.

Saldaña, J. (2014). Coding and Analysis Strategies. In P. Leavy (Ed.), *The Oxford Handbook of Qualitative Research* (pp. 580–598). Oxford University Press.

Selemani, A., Chawinga, W. D., & Dube, G. (2018). Why do postgraduate students commit plagiarism? An empirical study. *International Journal for Educational Integrity*, *14*(1), 7.

Shannon-Baker, P. (2016). Making Paradigms Meaningful in Mixed Methods Research. *Journal of Mixed Methods Research*, *10*(4), 319–334.

Sheard, J., Markham, S., & Dick, M. (2003). Investigating Differences in Cheating Behaviours of IT Undergraduate and Graduate Students: The maturity and motivation factors. *Higher Education Research & Development*, *22*(1), 91–108.

Vehviläinen, S., Löfström, E., & Nevgi, A. (2018). Dealing with plagiarism in the academic community: Emotional engagement and moral distress. *Higher Education*, *75*(1), 1–18.

Verhoef, A. H., & Coetser, Y. M. (2021). Academic integrity of university students during emergency remote online assessment: An exploration of student voices. *Transformation in Higher Education*, *6*, a132.

Wang, X. (2023). Like Riding a Roller Coaster: University Teachers' Emotional Experiences Dealing with Student Plagiarism. *International Journal of Environmental Research and Public Health*, *20*(4), 3276.

Watkins, D., & Gioia, D. (2015). *Mixed Methods Research*. Oxford University Press.

Yang, A., Stockwell, S., & McDonnell, L. (2019). Writing in your own voice: An intervention that reduces plagiarism and common writing problems in students' scientific writing. *Biochemistry and Molecular Biology Education*, *47*(5), 589–598.

Contact email: carolyn.loveridge@glasgow.ac.uk

Assessment of Students' Experiences and Viewpoints in Using Chatbots for Education Practice: A University Case of a Developing Country

Sichelesile Moyo, National University of Science and Technology, Zimbabwe
Phillip Nyoni, National University of Science and Technology, Zimbabwe
Belinda Ndlovu, National University of Science and Technology, Zimbabwe
Sibusisiwe Dube, National University of Science and Technology, Zimbabwe
Catherine Sibanda, National University of Science and Technology, Zimbabwe
Mary Dzinomwa, National University of Science and Technology, Zimbabwe

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Artificial Intelligence (AI) based chatbots have transformed education globally with several different chatbots becoming popular. However, adoption has been met with differing perceptions, particularly in developing countries' education. AI can assist these countries as higher education institutions in these areas suffer from a high rate of lecturer turn-over and brain drain. Few studies have recorded developing countries' students' perceptions of chatbots, which is a gap this study fills. Using the Technology Acceptance Model (TAM) as a theoretical lens, quantitative data were collected using an online survey from 212 participants. The analysed results showed students had positive perceptions towards using chatbots, particularly ChatGPT. There is a general willingness to adopt AI chatbots despite some not knowing about chatbots. They also emphasised that using AI chatbots will reduce their workload and help them to understand their work. Additionally, few students are afraid to use chatbots due to plagiarism concerns and falsely generated information. These findings are useful for policymakers who must make informed decisions when formulating policies and guidelines for AI adoption in universities. The research findings guide university management on how to regularise and standardise the adoption and usage of innovative AI technologies, chatbots in particular, which students are currently using informally.

Keywords: Artificial Intelligence, Chatbots, Learning Assistants, Artificial Intelligence, Technology Acceptance Model

iafor
The International Academic Forum
www.iafor.org

1. Introduction

The COVID-19 pandemic caused an unprecedented shift in higher education, requiring a quick switch to distance learning. Previous studies have examined the difficulties and advantages encountered by educators in their teaching endeavors during this time (Dube et al., 2023) and put up a model for successfully transitioning to online classrooms (Mutunhu et al., 2022). These research emphasised the urgent requirement for creative pedagogical methods and strong technology assistance to improve student involvement and academic achievements in distant settings. Although these studies provide insight into the opinions of instructors, it is essential to also comprehend the experiences and perspectives of students in utilising technological innovations to meet their educational requirements. This study explores the prospect of chatbots as a tool to tackle the difficulties described in prior research, based on the lessons acquired from the COVID-19 incident.

As artificial intelligence (AI) technology continues to advance, chatbots are likely to play an increasingly important role in our lives (Velankar et al. 2024). Chatbots can be used to provide us with information, assistance, and companionship (Casheekar et al., 2024). They can also be used in the education sector as they are helpful to students (Al Husaeni et al., 2024; Traymbak et al., 2024; Hwang & Chang, 2023). The term chatbots, which is short for chat robots, refers to computer programs created to mimic human dialogue and communicate with people through text- or speech-based interfaces (Hussain et al., 2019). To comprehend and react to user requests or orders, chatbots make use of artificial intelligence (AI) technologies including natural language processing (NLP) and machine learning (Ayanouz, Abdelhakim & Benhmed, 2020).

Chatbots have become popular in both business and healthcare settings in developed countries (Traymbak et al., 2024). They are also being used to help students learn new material and to provide entertainment for people of all ages (Hwang & Chang, 2023). However, the use of chatbots within educational settings is still limited in both developing and developed countries (Gikunda, 2023). Universities can benefit from chatbots as they offer enhanced engagement, personalized learning and enhanced student experiences for learners (Kumar et al., 2024; Wan Ismail et al., 2023; Dube et al., 2024). In some developed countries, chatbots have been successfully used not only to develop students' interaction skills but also to assist teaching faculty by bringing automation (Gökçearslan, Tosun & Erdemir, 2024; Okonkwo and Ade-Ibijola, 2021; Dsouza et al., 2019). It has also been noted by (Ondas et al., 2019) that the use of chatbots in education also increases connectivity, and efficiency, and reduces uncertainty in interactions (Gökçearslan, Tosun & Erdemir, 2024; Lombardi et al., 2021).

Despite all these benefits associated with the adoption of chatbots, there has been little action taken by African universities to adopt this technology (Gikunda, 2023). It is important to adopt the use of these chatbots at NUST to keep up with the fast pace of artificial intelligence (Wan Ismail et al. 2023). This study aims to get insights into students' experiences and perspectives on the use of chatbots in education. It specifically focuses on understanding the impact of this technology in a developing nation context. The goal is to maximize the learning experience, particularly in the post-pandemic era. The findings can inform the strategic adoption of chatbots within NUST and potentially serve as a roadmap for wider adoption across Africa. This, in turn, can contribute to a more engaging, efficient, and personalized learning experience for students and a more supportive environment for educators.

2. Related Work

2.1 Adoption of Chatbots in Higher Education

Chatbots are being rapidly adopted in higher education worldwide as institutions acknowledge their ability to improve student assistance, customize instructional experiences, and expedite administrative procedures (Labadze, Grigolia, & Machaidze, 2023). While still in its early stages. Universities worldwide are incorporating chatbots for diverse purposes, ranging from administrative tasks like course registration and financial aid queries to offering academic support, personalised learning recommendations, and mental health guidance (Gökçearslan, Tosun & Erdemir, 2024).

The early adopters of AI chatbots are institutions like MIT, Stanford, and Cambridge have been at the forefront, showcasing successful chatbot implementations. However, the spread is uneven, with many universities yet to explore this technology (Chen et al., 2024). Chatbots provide 24/7 access to information and support, catering to students across time zones and learning styles which leads them to accessibility and convenience (Casheekar et al., 2024; Kumar et al., 2024). In personal learning, chatbots can tailor responses and recommendations based on individual needs and preferences, fostering a more engaging learning experience (Al Husaeni et al., 2024). By automating routine inquiries and tasks, chatbots can free up staff time for more complex interactions and strategic initiatives. As stated by Chen et al. (2024), low teacher-student ratios can make it challenging for students to get prompt and engaging assistance.

Unfortunately, information specifically about the adoption of chatbots in higher education in Southern Africa is limited. While the global trend suggests rising interest and implementation, data pinpointing specific regions like Southern Africa is scarce (Gikunda, 2023). Based on available information, it appears that the widespread implementation of chatbots in Zimbabwean universities is still in its early stages. There are also indications of growing interest in AI-powered solutions in South African universities, including chatbots. Examples include the University of Pretoria's Libby Robot and the University of Johannesburg’s SPOT robot, showcasing a willingness to explore technological advancements (University of Pretoria, 2019; University of Johannesburg, 2021).

2.2 Factors Influencing Adoption or Resistance

Several studies have examined factors influencing the adoption or resistance to using chatbots for education (Al Husaeni et al., 2024; Traymbak et al., 2024; Hwang & Chang, 2023; Dube et al., 2024). The technology acceptance models of TAM and UTAUT/UTAUT2 are commonly applied theoretical frameworks when discussing the adoption of new technologies (Zhang & Wareewanich, 2024; Al-Maatouk et al., 2020). The key characteristics that have been discovered include performance expectancy (the perceived usefulness of a product or service), effort expectancy (the ease of use), social impact, and enabling conditions relating to technological compatibility and support (Goli et al, 2023). Additional attributes like hedonic motivation (perceived enjoyment), price value, habit and experience also play a role. Institutional-level support and expertise, technological maturity, interface design quality and privacy/security features further impact adoption decisions (Parsakia, 2023).

Another research gap is in the development of chatbots that can handle complex and nuanced conversations. While current chatbots can handle single-turn tasks effectively, they often struggle with multi-turn conversations that involve back-and-forth exchanges (Wu et al., 2023). Improving the dialogue management capabilities of chatbots to handle more dynamic and interactive conversations is an important area of research (Hwang & Chang, 2023).

3. Methodology

Data was collected using a structured questionnaire that was developed based on a systematic review of existing literature on AI chatbot adoption in higher education. It was distributed physically to participants over a 2-month period, on campus by the researchers. The questionnaire was also pre-tested with a small group of students to ensure it was easy to understand.

The population for this study was university students currently enrolled at the National University of Science & Technology (NUST) in Bulawayo. NUST was selected as the research site because it is a recognised institution in science and technology education in the country. Students were selected as their experiences will provide insights into the reasons for chatbot by them.

A convenience sampling strategy was used to select participants from the target population. This meant that participants who were readily accessible and willing participated in the study (Sukmawati, Salmia and Sudarmin, 2023). A sample size of participants was calculated from a total population of 5000 which led to a sample size of approximately 212 participants. The collected data was then analysed using descriptive statistics such as distribution, frequencies, means, and standard deviations. The researchers used the statistical software IBM SPSS (Statistical Package for the Social Sciences), as it easily generated descriptive statistics for this study.

The study was conducted in accordance with the ethical guidelines of NUST. Ethical considerations were observed during the research process to ensuring the protection of participants' rights and welfare (Creswell & Creswell, 2022). Informed consent was obtained from all participants, and the researchers assured them of their confidentiality and anonymity.

4. Results and Discussion

The following are results on the data collected on students' perceptions on the adoption of AI chatbots in education. The results have been summarised using tables and frequencies and illustrated in a chart where necessary.

4.1 Participant Demographics

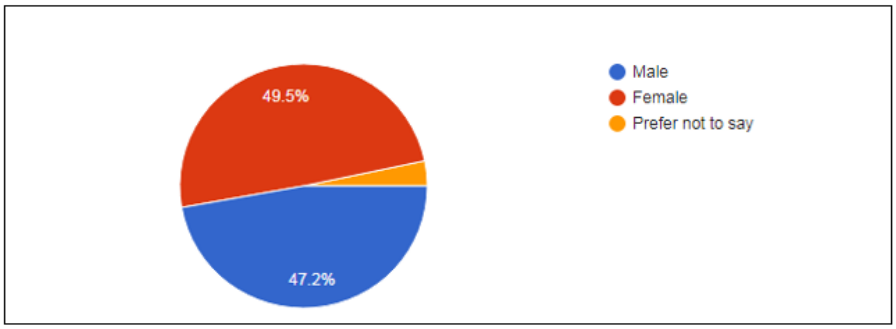


Figure 1: Participants Gender

Figure 1 represents the number of students and gender who responded to a survey questionnaire on the adoption of AI chatbots. Out of 212 responses, the biggest number were females at 49.5% followed by males which has 47.2 % and lastly, those who prefer not to say 3.3 %.

4.2 AI Chatbots Used

Participants indicated how they were alerted to the AI chatbot, 55 female students were through friends, 36 through the internet, 19 through social media, and then zero from advertisement whilst 39 male students knew it through friends and the internet 19 from social media, and one from advertisement. ChatGPT has the highest number of students using it and also has the lowest number of people who don't use it, Bard has the second highest number, followed by iAsk, Gemini and Perplexity has the least number. Perplexity seems not to be known but has the biggest number to those who said they do know it followed by Bard, Gemini, iAsk and lastly ChatGPT.

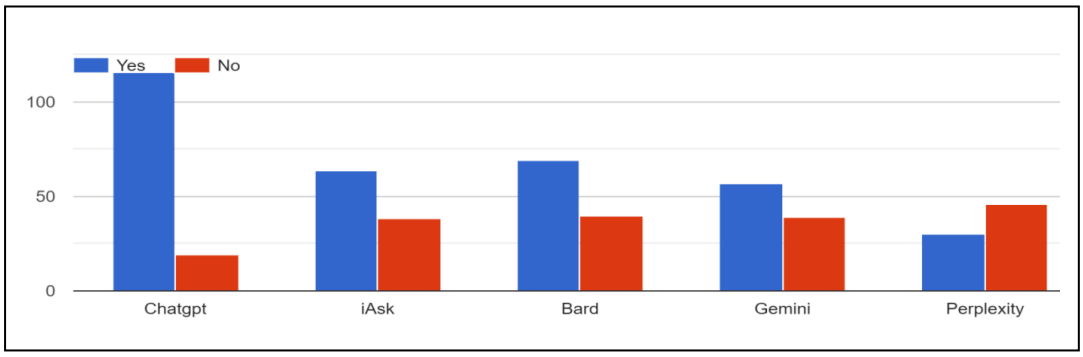


Figure 2: Chatbots Used

These findings suggest that AI chatbots have become increasingly prevalent and integrated into the educational landscape (Chen et al., 2024). However, the study also revealed that a small percentage (9.5%) of students are still unaware of AI chatbots, highlighting the need for continued awareness-raising and educational initiatives to ensure all students can benefit from these technological advancements (Malik et al., 2021).

The high rate of AI chatbot usage (93.37%) among the surveyed students further reinforces the growing adoption of these tools in higher education by the students themselves. This widespread usage can be attributed to the various perceived benefits that students associate

with AI chatbots, such as enhanced learning experiences, increased engagement, and improved learning outcomes (Labadze, Grigolia & Machaidze, 2023).

4.3 Students' Perceptions of AI Chatbots

The study reveals that students hold generally positive views towards AI chatbots, with 66.67% expressing positive sentiment, 25% negative, and 8.33% neutral. This indicates a strong potential for AI chatbots to be embraced as valuable tools in the educational landscape. While the overall sentiment towards AI chatbots is positive, the presence of negative perceptions (25%) and privacy concerns (13.33%) cannot be ignored. Addressing these concerns through transparent communication, robust data security measures, and ethical development practices is crucial for building trust and fostering wider acceptance (Cerny, 2023).

Perception of students on AI chatbots	**Strongly disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
AI Chatbots provides personalised learning experiences for students.	12(6.4)	11(5.85)	47(25.0)	94 (50.0)	24(12.8)
AI Chatbots can enhance student engagement and motivation.	95(50.8)	15(8.0)	33(17.7)	95(50.8)	33(17.6))
AI Chatbots can improve student's learning outcomes	11(5.9)	5(2.7)	41(22.0)	29(15.6)	100(53.8)
AI Chatbots can bring efficiency and productivity gains to a student's learning	10(5.3)	9(4.8)	43(22.9)	102(54.3)	24(12.8)
AI Chatbots can improve the quality of students 'assignments and research	12(6.4)	5(2.7)	37(19.8)	103(55.1)	30(16.0)

Table 1: Perception of Students on AI Chatbots

Table 1 shows students perceive numerous benefits associated with AI chatbots. Enhanced learning experience (50%), increased engagement (25%), and quick access to information (33.33%) emerge as the top three advantages. These findings highlight the potential of AI chatbots to improve student learning outcomes and engagement.

The high level of perceived benefits highlights the transformative potential of AI chatbots in education, as they can positively impact various aspects of learning (Kumar et al., 2024). Educational institutions and policymakers should leverage these positive perceptions to promote the adoption and integration of AI chatbots, ensuring that students can fully benefit from their advantages (Gökçearslan, Tosun & Erdemir, 2024).

4.4 Identifying Influencing Factors

Ease of use (41.67%) and perceived usefulness (50%) are identified as the most crucial factors influencing student adoption of AI chatbots. Availability (25%), technical support (8.33%), and integration with existing systems (16.67%) also play significant roles. Addressing these factors is essential for maximising the adoption and impact of AI chatbots in educational settings.

Educational institutions should focus on enhancing the user-friendliness of AI chatbots, ensuring their perceived usefulness, and seamlessly integrating them with existing educational platforms and systems (Al-Maatouk et al., 2020). Additionally, providing adequate technical support and clear communication around the availability and functionalities of AI chatbots can further facilitate their adoption.

4.5 Determining Successful Integration Strategies

Training and awareness programs (33.33%), clear communication and guidelines (41.67%), and collaboration with faculty (25%) are identified as the most effective strategies for successful AI chatbot integration. Customisation and personalisation (16.67%), continuous improvement, and feedback (8.33%) also contribute to successful implementation.

Collaboration with faculty emerged as a critical factor for successful AI chatbot integration. This underscores the importance of involving educators in the development and implementation process (Zhang & Wareewanich, 2024). By working together, educators and chatbot developers can ensure that AI chatbots align with pedagogical goals and seamlessly integrate into existing learning environments.

The data emphasises the importance of continuous improvement and feedback mechanisms. By actively soliciting feedback from students and educators, developers can refine and enhance the capabilities of AI chatbots, ensuring they remain relevant and effective in the ever-evolving educational landscape (Malik et al., 2021).

5. Limitations and Future Research

This study offers a valuable snapshot of students' perspectives and attitudes regarding AI chatbots in higher education. Nevertheless, it is crucial to recognize the constraints of the study. The study was done at a singular university, and the conclusions may not apply to different educational situations. Moreover, the data collection was constrained to a certain period, and the swift progress in AI technology could have led to alterations in student perspectives and usage trends since the data was gathered.

Future studies should investigate the longitudinal experiences of students with AI chatbots, specifically analyzing the long-term effects on learning results, engagement, and overall educational experiences. Engaging in cross-institutional research can enhance our awareness of how AI chatbots are adopted and integrated into various educational environments, leading to a more thorough comprehension. Integrating these chatbots with University Recommender Systems Ndlovu et al. (2023) can offer important insights into student personalities and provide improved advice in proposing appropriate degree programs. Furthermore, the research might further investigate the precise methods and techniques used to design, implement, and evaluate AI chatbots in higher education, which are crucial for their effective integration.

There is a further need for future research to address the ethical implications of adopting Chatbots in higher education. University policies and existing privacy and security awareness frameworks (Mutunhu et al., 2022; Maguraushe et al., 2024) need to address how these emerging technologies can be fostered in a university setup whilst upholding responsible use.

6. Conclusion

The findings this paper has discussed on students' perceptions towards AI chatbots can help universities as they develop policies towards artificial intelligence. The findings suggest a growing awareness and usage of these technologies among the student population, with generally positive perceptions and a strong recognition of their potential benefits. However, the study also highlights the need to address key influencing factors and implement effective integration strategies to ensure the successful and widespread adoption of AI chatbots in the educational landscape.

Beyond their current applications, AI chatbots hold immense potential for various other educational purposes. They can be used to provide personalised tutoring, facilitate peer-to-peer learning, offer career guidance, and even support mental health and well-being. Exploring these possibilities can unlock the full potential of AI chatbots in transforming the educational experience.

References

Al Husaeni, D. F., Haristiani, N., Wahyudin, W., & Rasim, R. (2024). Chatbot artificial intelligence as educational tools in science and engineering education: A literature review and bibliometric mapping analysis with its advantages and disadvantages. *ASEAN Journal of Science and Engineering,* 4(1), 93-118.

Al-Maatouk, Q., Othman, M. S., Aldraiweesh, A., Alturki, U., Al-Rahmi, W. M., & Aljeraiwi, A. A. (2020). Task-technology fit and technology acceptance model application to structure and evaluate the adoption of social media in academia. *Ieee Access*, *8*, 78427-78440.

Ayanouz, S., Abdelhakim, B. A., & Benhmed, M. (2020, March). A smart chatbot architecture based NLP and machine learning for health care assistance. In *Proceedings of the 3rd international conference on networking, information systems & security* (pp. 1-6).

Casheekar, A., Lahiri, A., Rath, K., Prabhakar, K. S., & Srinivasan, K. (2024). A contemporary review on chatbots, AI-powered virtual conversational agents, ChatGPT: Applications, open challenges and future research directions. *Computer Science Review,* 52, 100632.

Cerny, M. (2023). Perceptions of the Design and Use Chatbots for Educational Purposes: A Dialogue Partner. *Journal of Educators Online*, *20*(4), n4.

Chen, Y., Jensen, S., Albert, L. J., Gupta, S., & Lee, T. (2023). Artificial intelligence (AI) student assistants in the classroom: Designing chatbots to support student success. *Information Systems Frontiers*, *25*(1), 161-182.

Creswell, J and Creswell, D. (2022). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. Los Angeles, CA: SAGE.

Dube, S., Dube, S., Ndlovu, B. M., Maguraushe, K., Malungana, L., Kiwa, F. J., & Muduva, M. (2024). *Students' Perceptions of ChatGPT in Education: A Rapid Systematic Literature Review BT - Intelligent Computing* (K. Arai (ed.); pp. 258–279). Springer Nature Switzerland. https://doi.org/ttps://doi.org/10.1007/978-3-031-62273-1_18

Dube, S., Mutunhu, B., & Dube, S. P. (2023). Lecturers' Experiences in Teaching STEM Courses Online During COVID-19: Case of a Zimbabwean University. *The IAFOR Conference on Educational Research & Innovation: 2023 Official Conference Proceedings*, *July*, 53–65. https://doi.org/10.22492/issn.2435-1202.2023.5

Dsouza, R., Sahu, S., Patil, R., & Kalbande, D. R. (2019, December). Chat with bots intelligently: A critical review & analysis. In *2019 international conference on advances in computing, communication and control (ICAC3)* (pp. 1-6). IEEE.

Gikunda, K. (2023). Empowering Africa: An In-depth Exploration of the Adoption of Artificial Intelligence Across the Continent. *ArXiv, abs/2401.09457*

Gökçearslan, S., Tosun, C., & Erdemir, Z. G. (2024). Benefits, challenges, and methods of artificial intelligence (AI) chatbots in education: A systematic literature review. *International Journal of Technology in Education*, *7*(1), 19-39.

Goli, M., Sahu, A. K., Bag, S., & Dhamija, P. (2023). Users' acceptance of artificial intelligence-based chatbots: an empirical study. *International Journal of Technology and Human Interaction (IJTHI)*, *19*(1), 1-18.

Hussain, S., Ameri Sianaki, O., & Ababneh, N. (2019). A survey on conversational agents/chatbots classification and design techniques. In *Web, Artificial Intelligence and Network Applications: Proceedings of the Workshops of the 33rd International Conference on Advanced Information Networking and Applications (WAINA-2019) 33* (pp. 946-956). Springer International Publishing.

Hwang, G. J., & Chang, C. Y. (2023). A review of opportunities and challenges of chatbots in education. *Interactive Learning Environments*, *31*(7), 4099-4112.

Kumar, D., Haque, A., Mishra, K., Islam, F., Kumar Mishra, B., & Ahmad, S. (2023). Exploring the Transformative Role of Artificial Intelligence and Metaverse in Education: A Comprehensive Review. Metaverse Basic and Applied Research.

Labadze, L., Grigolia, M., & Machaidze, L. (2023). Role of AI chatbots in education: systematic literature review. *International Journal of Educational Technology in Higher Education*, *20*(1), 56.

Lombardi, T., North, M., Orange, N. B., Coulanges, K., & Johnson, J. (2021). VIRTBot: exploring chatbot design for promoting scientific initiatives. *Issues in Information Systems*, *22*(4).

Maguraushe, K., da Veiga, A., & Martins, N. (2024). A personal information privacy perceptions model for university students. *Information Security Journal: A Global Perspective*, *33*(4), 394–424. https://doi.org/10.1080/19393555.2024.2329554

Malik, R., Shrama, A., Trivedi, S., & Mishra, R. (2021). Adoption of chatbots for learning among university students: Role of perceived convenience and enhanced performance. *International Journal of Emerging Technologies in Learning (iJET)*, *16*(18), 200-212.

Mutunhu, B, Dube, S., Ncube, N., & Sibanda, S. (2022). Cyber Security Awareness and Education Framework for Zimbabwe Universities: A Case of National University of Science and Technology. *Proceedings of the International Conference on Industrial Engineering and Operations Management Nsukka, Nigeria*, 5–7. https://ieomsociety.org/proceedings/2022nigeria/111.pdf

Mutunhu, Belinda, Dube, S., Dube, S. P., & Mpofu, S. (2022). A Framework for Transitioning to Virtual Classes During Life-Threatening Pandemics Like COVID-19. *European Conference on E-Learning*, *21*(1), 279–287. https://doi.org/10.34190/ecel.21.1.900

Ndlovu, B., Migioni, Z. T., Dube, S., & Nyoni, P. (2023). Betr Selektr: A University Program Recommender System Utilising Personality Type and Academic Results. *The Barcelona Conference on Education 2023: Official Conference Proceedings*, *November 2023*, 701–715. https://doi.org/10.22492/issn.2435-9467.2023.55

Okonkwo, C. W., & Ade-Ibijola, A. (2021). Chatbots applications in education: A systematic review. *Computers and Education: Artificial Intelligence*, *2*, 100033.

Ondáš, S., Pleva, M., & Hládek, D. (2019, November). How chatbots can be involved in the education process. In *2019 17th international conference on emerging elearning technologies and applications (ICETA)* (pp. 575-580). IEEE.

Parsakia, K. (2023). The effect of chatbots and AI on the self-efficacy, self-esteem, problem-solving and critical thinking of students. *Health Nexus*, *1*(1), 71-76.

Sukmawati, S., Salmia, S., & Sudarmin, S. (2023). Population, sample (quantitative) and selection of participants/key informants (qualitative). *Edumaspul: Jurnal Pendidikan*, *7*(1), 131-140.

Traymbak, S., Sharma, M., Anand, A., & Shukla, A. (2024). Chatbot technology in the education sector: a bibliometrics analysis using VOS viewer. *International Journal of System Assurance Engineering and Management,* 1-12.

University of Johannesburg. (2021, Sept 10). *UJ the first university in South Africa to secure AI robot 'dog'.* University of Johannesburg. https://news.uj.ac.za/news/uj-the-first-university-in-south-africa-to-secure-ai-robot-dog-spot-2/

University of Pretoria. (2019, July 18). *Libby the library robot is on duty at UP.* University of Pretoria https://www.up.ac.za/alumni/news/post_2825427-libby-the-library-robot-is-on-duty-at-up

Velankar, M. R., Mahalle, P. N., & Shinde, G. R. (2024). Natural and Artificial Intelligence: Overview. *Cognitive Computing for Machine Thinking,* 1-11.

Wan Ismail, W.S., Awang, N.A., & Mohd Pauzi, N. (2023). An overview of the use of artificial intelligence (AI) tools in higher education. *International Journal on e-Learning and Higher Education*.

Wu, Q., Bansal, G., Zhang, J., Wu, Y., Zhang, S., Zhu, E., ... & Wang, C. (2023). Autogen: Enabling next-gen llm applications via multi-agent conversation framework. *arXiv preprint arXiv:2308.08155*.

Zhang, X., & Wareewanich, T. (2024). A Study of the Factors Influencing Teachers' Willingness to Use Generative Artificial Intelligence Based on the UTAUT Model. *International Journal of Interactive Mobile Technologies*, *18*(6).

Counselling Strategies for Improving Self-Esteem Among Secondary School Students in Enugu State, Nigeria

Chinonye Egbo, Enugu State University of Science and Technology, Nigeria

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The study investigated counsellors' perceptions of counselling strategies for improving self-esteem among secondary school students in Enugu State (SFISASSSIES). These students should be taught self-esteem, as it is a crucial quality for adolescents' academic and general success. Every child's academic performance is heavily influenced by their self-perception and mannerisms or SELF-ESTEEM. In my capacity as a counsellor, I have seen that these students' persistent academic deficiencies stem from a lack of self-worth, which in turn leads to a lack of confidence and ongoing academic failure. This research specifically sought to ascertain whether counsellors perceive Cognitive Restructuring (CR), Group Counselling (GC), and SQ3R Robinson Method (SRM), as strategies for enhancing self-esteem among sss in Enugu State. This was done with particular reference to the gender, counsellor's experience and location of the schools of the respondents. The population of the study is 105 counsellors currently serving in the 291 government-owned secondary schools(ss) in Enugu State. 96 copies were returned signifying 91.43% and used to collect the data for the study using a self-structured questionnaire developed by the researcher called Counselling Strategies for Enhancing Self-esteem Scale (CSESES). The instrument was face-validated by three experts: one in the Department of Education Faculty, Enugu State University of Science and Technology, Enugu. Cronbach Alpha Reliability estimate was used to ascertain the internal consistency of the instrument. A descriptive survey research design was used and data collected for this study were analyzed using mean, grand mean and standard deviation, to answer research questions. The result showed that counsellors perceive CR, GC&SRM as effective SFISASSSIES.

Keywords: Counselling Strategies, Self-Esteem, Schools

iafor
The International Academic Forum
www.iafor.org

Introduction

There is societal worry over young people especially those in secondary schools worldwide regarding social problems and their consequences. As in previous generations, the social issues facing today's youths can have significant effects on how these young people will eventually turn out as they reach adulthood (Royaweb, 2015). The social problems, according to Royaweb (2015), include drug abuse, alcohol abuse, smoking and new designer drugs which are being introduced in the black market daily. Similarly, sex and sexual issues are discussed and practised openly against acceptable norms of society.

These self-destructive activities have affected the thought lines of secondary school students, caused distractions and removed their focus from serious academic activities. The behaviours listed above are social problems which include drug abuse and the like and these are found manifesting in young people who have no confidence in themselves as to look beyond their predicaments for solutions**.** Research by Branden (2013), showed that lack of faith in students results in a complete loss of acceptance of self, leading to destructive behaviours that affect mental health. They verbalize negative things to themselves and hold onto those negative things. Branden (2013) asserted that self-esteem deficit contributes to mental health problems, making one think that he or she is undeserving, inappropriate, lacks confidence, makes negative choices and sets wrong goals. Branden went further to observe that all these lead to destructive behaviours and a complete loss of faith in one's self and life.

Again, a study by Mohaned (2014), referred to self-esteem as an overreacting view of the self. Mohaned added that the development of healthy self-esteem is significant for young people to be happy and successful. According to Mohaned, the term, 'self-esteem' has received a significant portion of attention in both educational and social fields. In a similar vein, research carried out by Rodewalk and Tragakis (2003), looked at self-esteem as an ongoing phenomenon that withstands criticism and endures controversies. Rodewalk et al asserted that the ability of self-esteem to endure controversy is an indicator of importance.

The researcher perceives self-esteem as the way one feels and thinks about oneself translates into every situation and encounter one has. The ability to create and make an impression showing positive attitude and self-confidence is the key to one's success whether it is professional or personal. An individual needs to be sure of himself or herself before trying to inspire others. Having the confidence that one is capable, worthy, courageous and assertive despite the person's circumstances is what self-esteem portrays.

An individual is not born with any certain level of self-esteem or confidence. What one feels about oneself is developed early in life as messages from family, friends, media, and culture are presented and that automatically begins to shape the way the individual sees him or herself including the world around. Depending on whether one had a pleasant or unpleasant childhood and growing up experiences, one needs to be comfortable with oneself and do the best to have a healthy self-worth. Any view one has about oneself takes one to adulthood therefore one needs to learn to deal with it as much as possible. Self-acceptance is paramount in the journey through life and in growing healthy self-esteem.

In other words, the importance of healthy self-esteem for the foundation of an individual's existence cannot be underestimated. Self-esteem is important because it has an impact on one's life decisions and choices. An individual desiring to work hard in pursuit of a better life brings to mind one whose self-esteem is high; living creatively and using his or her potential

(Brain, 2009). That is to say that if self-esteem is enhanced in secondary school students, it will enrich students' creative abilities and also elicit the best out of their characters. Be it as it may, not all secondary school students have attained this level of development and as such, the researcher believes that those who have not, need counselling.

Guidance and counselling as a global term is defined as a process of helping individuals discover and develop their educational, vocational and psychological potentialities and thereby achieve an optimal level of personal happiness and social usefulness.

In other words, with guidance and counselling one discovers his or her potential in educational, vocational and social aspects of development which will culminate into personal happiness or fulfilment in the end. This is achievable because guidance and counselling are carried out by trained guidance counsellors who are equipped with different counselling skills and techniques with which to help individual clients discover themselves.

Guidance and counselling refers to the services and programmes that promote personal, social, educational and career development. Through guidance lessons and counselling, students are helped to overcome social or behavioural problems. Students who have social problems are counselled and through behaviour medication, they tend to improve on their negative behaviour traits.

The Guidance counsellors employ different strategies to ensure success in their work. The ability and knowledge of counselling strategies employed depend on their academic qualifications, abilities and experiences. The choice of these counselling strategies may vary between counsellors considering their experiences and differences in the way and manner they perceive and utilize them in the counselling relationship**.**

In this study therefore the researcher sought to find out counsellors' perception of counselling strategies for enhancing self-esteem among secondary school students in Enugu State.

Some of the already existing counselling strategies which guidance counsellors are expected to choose from and are of interest to the researcher are cognitive restructuring, group counselling and Robinson's SQ3R method. The counsellors' choice depends on their perception of the available counselling strategies which they acquired during their training. They however improve on them as they utilize each of them in the one-to-one relationship, assisting clients to resolve the problems they meet in their growth process.

Cognitive restructuring is another strategy of choice for counsellors. It was propounded by a psychologist, Albert Ellis in the 1950s, based on the earlier work of others and it is a core component in Cognitive Behavioural Therapy (CBT).

Group counselling is vital in counselling sessions where individuals who have similar experiences or issues come together to meet with a professional therapist. The counsellor or therapist runs the session, but generally, everyone contributes their little quota to the issue(s) raised and listens to others as they make their contributions, (Mobile Friendly, 2016).

Robinson's SQ3R method is yet another counselling strategy that has academic correction in students and their self-esteem. Similarly, Krumboltz and Thoresen (1969) refer to Robinson's SQ3R method as a systematic reading strategy propounded by Robinson (1941). For

clarification, S represents Survey, Q represents Question, 1st R stands for Read, 2nd R stands for Recite, and 3rd R stands for Review.

What then can be done to salvage these young people and channel them towards the right direction in life? If truly children's vulnerability requires adult intervention, protection and support and if one of those needs is the capacity to develop 'self'; which group of adults can be entrusted with such responsibility? Counsellors' perception of counselling strategies as a topic, however, is simply directing the responsibility of counselling the students out of the depleting state of vulnerability they find themselves to guidance counsellors in schools. This is re-echoed in the National Policy on Education (2013).

The researcher considered some variables such as guidance counsellors' experiences, location of schools and gender respectively to see how they can affect counsellors' perception of counselling strategies for enhancing self-esteem among secondary school students in Enugu State. Concerning experiences, Denga (2001), in a related study found out that hardly can guidance counsellors with little or no experience were able to apply counselling strategies during counselling sessions.

Guidance counsellors in schools, however, have acquired adequate qualifications and work experiences at different levels. The minimum qualification is a first degree while some have strived to obtain a Masters (M.Ed) and Doctor of Philosophy (PhD) in guidance and counselling respectively. These are currently in the services of the state Government within the Ministry of Education under the Post-Primary Schools Management Board (PPSMB).

Unfortunately, according to the Educational Services Department, Guidance and Counselling Division of the P.P.S.M.B, Enugu (2015), secondary schools in Enugu state have 105 guidance counsellors in the 291 government-owned secondary schools in the state. This to a very large extent is likely to hinder the work of counselling in secondary schools in Enugu State. This means that most secondary schools in the state are likely not to have trained counsellors who are competent and qualified to handle the problems students face in their growth process. The few trained ones are overworked as they try to reach out to vulnerable youths in schools. Some schools are yet to enjoy the presence of guidance counsellors and so may not even know their functions. Guidance counsellors are experts in applied psychology and professionally trained to take care of educational, vocational and socio/personal aspects of client's life.

With regards to location, research carried out by DuBois (2002), recorded that environment plays an important role in determining trajectories (developments) of secondary school students' self-esteem. The school as it were is regarded as a 'gateway', where almost every child is expected to pass through to become respectable citizens in the society. Guidance counsellors operate in these schools which are located either in the urban or rural environments.

Regarding gender, Baumeieter (2003), carried out research with the findings that a wide range of Western countries have determined that adolescent females on average have a sense of self-esteem than adolescent males. Females generally tend to link self-esteem to the quality of their relationships while males link self-esteem to their achievements. Incidentally, the guidance counsellors in this study are both males and females.

The researcher identifies the gap in this study as determining counsellors' perceptions of counselling strategies for enhancing self-esteem among secondary school students in Enugu State. The argument has been that guidance counsellors have not come to grips with the strategies that enhance self-esteem among secondary school students. Guidance counsellors need to show their perception of the given counselling strategies as this will encourage stakeholders like teachers and principals who are concerned adults and responsible for the educational, vocational and social developments of secondary school students in Enugu State to have confidence in them. This will go a long way in creating awareness that will eventually help the stakeholders to have a good understanding of how the issue of self-esteem can be tackled. Students' self-esteem, however, comes under the personal/social component of guidance and counselling. Since self-esteem affects all facets of individuals' lives, seeking to boost or enhance it in young people is a deserving task that this study has sought to take care of.

It was seen by Shallcross (2012) that utilization of counselling strategies by a guidance counsellor is related to his attributes. Unfortunately, the subjective perception of counselling strategies by counsellors may influence the counsellors' choice of counselling strategies for enhancing self-esteem in students. These differences in perception and application of counselling strategies may influence the outcome of counselling interactions with students regarding self-esteem enhancement. If all guidance counsellors understand and perceive counselling strategies in similar ways and apply them accordingly, there will be no challenge in the application and outcome of the counselling relationship. This is the crux of this study which tried to ascertain counsellors' perception of counselling strategies for enhancing self-esteem among secondary school students in Enugu State.

Regarding this study, two schools of thought emerged. One school argued that guidance counsellors are well at home with the strategies for enhancing self-esteem but the problem is that they are handicapped by the high dearth of guidance counsellors in schools. The other school has argued that guidance counsellors have a vague perception of strategies that enhance self-esteem among secondary school students as their employers (P.P.S.M.B, Enugu) have only organized two workshops since the inception of guidance and counselling in schools in 1982. This group has argued strongly that it is because of this ambiguous perception of strategies that makes it difficult for them to inculcate self-esteem traits in students.

Consequently, students leave secondary schools with low self-esteem of themselves. This, according to this group fits into the adage that you do not give what you do not have. Most students aspire to excel in their academic pursuits but this might become an illusion unless it is equally nursed and nurtured by counsellors who have a clear-cut perception of strategies that enhance self-esteem. It is against this background that this study was undertaken. The problem of this study is therefore, put in a question form, "What are counsellors' perceptions of counselling strategies for enhancing self-esteem among secondary school students in Enugu State?"

Purpose of the Study

The main purpose of this study is to find out counsellors' perceptions of counselling strategies for enhancing self-esteem among secondary school students in Enugu State.

Specifically, the study aims at;

1. determining counsellors' perception of cognitive restructuring as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State,
2. ascertaining counsellors' perception of group counselling as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State,
3. determining counsellors' perception of SQ3R Robinson method as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State.

Research Questions

1. What are the perceptions of guidance counsellors on cognitive restructuring (which is an aspect of Rational Emotive Behavioural Therapy) as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?
2. How do guidance counsellors perceive group counselling as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?
3. What are the perceptions of guidance counsellors on the SQ3R Robinson method as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?

Research Method

Research Design

The researcher adopted the survey research design for this study. According to Nwogu (2006), the survey research design is one in which a group of people or items are considered to be representative of the entire group being studied and the findings are generalized to the whole group. Survey research design is best suited for this study because it permits the collection of original data and description of its condition as they exists in their natural setting. It also helps to homogenize the population and affords all the respondents an equal chance of being chosen.

This study was conducted in all the six education zones of Enugu State with a total of 291 Government-owned secondary schools. These zones are Agbani, Awgu, Enugu, Nsukka, Obollo Afor and Udi.

Enugu State became the choice area for this study because there are numerous educational challenges among the secondary school students in the state. These challenges have not only affected the academic performances of secondary school students, they have also affected their relationships with others. The general social problems these students manifest daily show the state of their thought lines. From observation, they lack confidence and to a great extent, secondary school students find it extremely difficult to assert themselves. These and other traits that are in the negative are found manifesting in the lives of young people leading them constantly to low academic pursuits.

To put a check on the devastating character traits that accompany a lack of self-confidence, the self-esteem status of secondary school students became a necessary concern to the researcher.

The population for this study comprised 105 practising guidance counsellors in all the 291 government-owned secondary schools in the 6 Education zones of Enugu State (Source:

Educational Services Department, Guidance and Counselling Division P.P.S.M.B, Enugu, 2015).

The population of 105 guidance counsellors is a manageable number therefore; the researcher used all of them for this study. As such no sampling was done.

An instrument developed by the researcher called the Counselling Strategies for Enhancing Self-Esteem Scale (CSESES) was employed in collecting data for the study. It is self-reporting and has two sections A and B. Section A contains 3 items designed to elicit personal information from the respondents. Section B is divided into 5 parts and contains 25 items structured to answer the research questions. The response format for the instrument is a 4-point scale of strongly agree, agree, disagree and strongly disagree. Each response option has a numerical value assigned to it as follows:

Strongly Agree	(SA) =	4 points
Agree	(A) =	3 points
Disagree	(D) =	2 points
Strongly Disagree	(SD) =	1 point

The respondents were requested to tick the options that best match their opinion on each item. An introductory letter stating the reasons for the study was attached to the instrument for the respondents (See Appendix A).

To ascertain the face validity of the instrument, the researcher gave the instrument to two experts in the Guidance and Counselling Department and one in Measurement and Evaluation. These experts are all from Enugu State University of Science and Technology, Enugu.

To ascertain the internal consistency of the instrument, the researcher used the Cronbach Alpha reliability estimate. The researcher conducted a trial test using 20 guidance counsellors from Ebonyi State owned secondary schools, (10 males and 10 females). This served as a similar population for the study. During the trial test, the researcher administered the instrument once to the respondents with an introductory letter acquainting them with the rationale for the study. The respondents were assured of complete confidentiality of all the information they supplied. The respondents that had time were allowed to complete the instrument on the spot, while appointments were booked with those that were busy for collection at a later day agreed upon by the respondents and the researcher. Finally, out of the 20 copies of the instrument distributed during the trial test, the researcher was able to retrieve 17 duly filled copies (85% returns).

The researcher used the Cronbach Alpha method of establishing the reliability of an instrument to analyze the data collected. As a result of the fact that section B of the instrument is divided into 5 parts, each treating a different aspect of the study, the researcher used the above method of establishing reliability to ascertain the internal consistency of the instrument. The reliability coefficient obtained for part 1 is .73, part 2 is .81, part 3 is .68, part 4 is .67 and part 5 is .72. The researcher then ascertained the reliability coefficient of the entire instrument and found it to be .72. The researcher regarded the coefficient as high and so decided to use the instrument to collect the much-needed data for the study.

Results

Research Question 1: What are the perceptions of guidance counsellors on cognitive restructuring (which is an aspect of Rational Emotive Behavioural Therapy) as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?

Table 1: Mean Perception Scores (**X**) and Standard Deviation (SD) of Guidance Counsellors on Cognitive Restructuring as a Counselling Strategy for Enhancing Self-Esteem among Secondary School Students in Enugu State.

N = 96

S/ N	Cognitive Restructuring as a strategy for Enhancing Self Esteem among Secondary Decision School Students are based on:	SA 4	A	D 3	SD 2	X 1	SD	
1	Knowing they can change their negative thinking pattern	5	11	19	61	1.58	0.89	Disagree
2	Dropping irrational thoughts for rational ones	49	27	13	7	3.22	0.94	Agree
3	Developing self-confidence	47	33	9	7	3.25	0.90	Agree
4	Having a change of feelings	27	54	9	6	3.06	0.79	Agree
	Grand Mean				**2.77**			**Agree**

Results from Table 1 showed that the respondents agreed with 3 out of the 4 items raised (2, 3 and 4) as guidance counsellors' perception of counselling strategies that are related to cognitive restructuring as appropriate for enhancing self-esteem among Secondary School Students in Enugu State. The respondents' mean scores for these items 3.22, 3.25 and 3.06 are above the cut-off points. They were accepted as agreed based on the decision that their mean ratings were more than the cut-off point of 2.50. The Table showed that the respondents disagreed with the remaining 1 item (1) with 1.58 as their mean score. Their standard deviation is small in all the items signifying that the respondents' responses are homogenous. The table also indicated a grand mean score of 2.77. Based on the guideline for the interpretation of the respondents' data, the answer to research question 1 is that Cognitive restructuring is an effective counselling strategy for enhancing self-esteem among Secondary School Students in Enugu State.

Research Question 2: How do guidance counsellors perceive group counselling as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?

Table 2: Mean Perception Scores (**X**) and Standard Deviation (SD) of Guidance Counsellors on Group Counselling as a Counselling Strategy for Enhancing Self-Esteem among Secondary School Students in Enugu State.

N = 96

S/ N	Group Counselling as a strategy for Enhancing Self-Esteem among XSecondary School Students are Decision based on: 4 3	SA 2	A 1	D	X	SD	SD	
5	Helping the group's negative self-talk by applying 'stopping techniques'	51	21	19	5	3.22	0.94	Agree
6	Logically stating reasons for students to become more passionate about themselves	43	29	16	8	3.11	0.97	Agree
7	Stressing the need to be focused	3	23	33	37	1.91	0.86	Disagree
8	Assisting students to be goal-oriented	41	34	19	2	3.18	0.82	Agree
	Grand Mean						**3.18**	**Agree**

Table 2 shows that the respondents agreed with 3 out of the 4 items raised (5, 6 and 8) on guidance counsellors' perception of group counselling as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State. The respondent's mean scores for these items are 3.22, 3.11 and 3.18. They were accepted as agreed based on the decision that their mean ratings were more than the cut-off point of 2.50. The Table showed that the respondents disagreed with the remaining 1 item (7) with 1.91 as their mean score. Their standard deviation is small in all the items signifying that the respondents' responses are homogenous. The table also indicated a grand mean score of 3.18. Based on the guideline for the interpretation of the respondents' data, the answer to research question 2 is that group counselling is a counselling strategy for enhancing self-esteem among Secondary School Students in Enugu State.

Research Question 3: What are the perceptions of guidance counsellors on the SQ3R Robinson method as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State?

Table 3: Mean Perception Scores **(X)** and Standard Deviation (SD) of Guidance Counsellors on SQ3R Robinson Method as a Counselling Strategy for Enhancing Self-Esteem among Secondary School Students in Enugu State.

N = 96

S/ N	SQ3R Robinson Method as a strategy for Enhancing Self Esteem among Secondary School Students are based on:	SA 4	A 3	D 2	SD 1	X	SD	Decision
9	Encouraging students with realistic plans	7	11	29	49	1.75	0.92	Disagree
10	Helping students to adopt time-tabling as a way of improving study habits	36	45	12	3	3.18	0.77	Agree
11	Assisting students in learning how to read systematically	3	6	36	51	1.59	0.74	Disagree
12	Encouraging students to acquire the skill of writing down sets of questions	24	54	12	6	3.00	0.79	Agree
13	Encouraging students to read with the Intent of remembering	42	36	6	15	3.06	1.06	Agree
	Grand Mean					**2.51**		**Agree**

Of the 5 items that make up SQ3R Robinson's method is a counselling strategy for enhancing self-esteem among secondary school students. Guidance counsellors in Enugu State rated all of them positively as their mean scores (3.18, 3.00 and 3.06) are well above the cut-off point of 2.50. They however disagreed with 2 of the items (9 and 11) with mean scores of (1.75 and 1.59). Their standard deviation is small in all the items signifying that the respondents' responses are tightly clustered around the mean. This shows that the respondents' responses are similar. Table 3 also indicated that the respondents recorded a grand mean score of 2.51.

Concerning the decision rule, the answer to research question 3 is that guidance counsellors perceive counselling strategies that conform to the SQ3R Robinson method positively as those for enhancing self-esteem among secondary school students in Enugu State.

Conclusion

1. Rational Emotive Behavioural Therapy is perceived by Guidance counsellors as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State.
2. Cognitive restructuring is perceived by guidance counsellors as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State.
3. Group Counselling is perceived by Guidance Counsellors as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State.
4. Guidance Counsellors perceive the SQ3R Robinson method as a counselling strategy for enhancing self-esteem among secondary school students in Enugu State.

Recommendations

Based on the implication of the study, the following recommendations were made:

1. Universities should be encouraged by the Ministry of Education to market guidance and counselling education to candidates during orientation of New Year 1 students especially those who are not too sure of the courses they are to offer.
2. The Post Primary Schools Management Board (PPSMB) should assist teachers who hitherto have been serving as school counsellors by appointment to acquire a university education in guidance and counselling for self-improvement.

References

Branden, N. (2013). What self-esteem is and is not. Retrieved October 18, 2015, from *http://www.nathanielbranden.com/what-self-esteem-is-and-is -not*

Denga, D. I. (2001). *Guidance and Counselling in school and non-school* settings.2nd ed. Port Harcourt Double Diamond publication.

Dubois, D. L., (2002). *Self-Esteem and Academic Achievement of Adolescents* by S. Joshi – Cited by 24 – Related articles boys (Carlson, Uppal & Prosser 2000).

Krumboltz, J. D., & Thoresen, C. E. (1969). *Behavioural Counselling: Cases and Techniques.* New York: McGraw Hill.

Mohaned, (2014). Self-Esteem. An often overlooked issue with crucial implications. In M. Kennis (Ed.), *Self-esteem issues and Answers: A sourcebook of current perspectives.* New York: Psychology Press.

Nwogu, B.G. (2006). *Educational Research: Basic Issues and Methodology*, Nsukka: University Trust Publishers.

Olando, O, A. B. & Odera P. (2014). Effectiveness of Guidance and Counselling Services on Adolescent Self-Concept in Khwisero District. Kakamega Country. *International Journal of Human Resource Studies 62 – 68*.

Post Primary School Management Board (PPSMB), (2015). *Educational Services Department, Guidance and Counselling Unit.*

Robinson, F.P. (1941). *Landmark Publication of Diagnostic and Remedial Techniques for Effective Study.* London: Longman Press.

Royaweb, (2015). *Empowering Youth* (Social Problems Today's Youth. *www. royaweb.org/blog/a-look-at-the-most-serious-social-issues-facing-today's-youth*

Shallcross, L. (2012). What the future holds for the counselling profession. Counselling Today. Retrieved from *http://ct.counselling.org/2012/03/what-the-future-holds-for-the-counselling-profession*/

Contact emails: Chinoo.egbo@gmail.com
Egbo.emmanuella@esut.edu.ng

Entrepreneurship and Creativity in Education: Why Current European Educational Reforms Are Aiming in the Opposite Direction?

Barbara Stamenković Tadić, Callegari Italian School of Fashion and Design, Croatia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The paper problematizes current European educational reforms that, under the agenda of European qualification framework, aim at establishing occupational and qualification standards. While providing a mechanism for measurement, evaluation, and comparison of qualifications and learning outcomes between the state members, enabling permeability in education for EU citizens in and across the member states, it is also creating an overly rigid, slow, traditional, and bureaucratically burdened system of education that cannot address the market and societal needs for extremely fast transformations and adaptations required by 4th industrial revolution (4IR). On one side, 4IR requires innovative and creative approaches from education stakeholders, dedicated to providing highly transversal skills with emphasis on critical, entrepreneurial, and creative thinking for majority of occupations that do not exist at present time and even cannot be anticipated, regarding necessity for a few changes in technological ecosystem and even of professions in an individual's course of life. On the contrary, the current educational reforms with top-down approach aim at standardization of present occupations and formalization of qualification framework that overly predefines educational goals, thus diminishing creative and entrepreneurial potential of educational stakeholders and prolonging adaptation to 4IR. There is a justified concern that the key words in European educational strategies such as creativity, innovation, entrepreneurship, autonomy, and responsibility of stakeholders have only nominal meaning with little potential for real impact. The aim is to raise awareness and encourage discussion about these discrepancies, corroborating it with examples and experiences from our adult learning institution.

Keywords: Educational Reforms, Fourth Industrial Revolution (4IR), European Qualification Framework (EQF), Croatian Qualifications Framework (CQF), Occupational Standards, Qualification Standards, Creativity in Education, Entrepreneurship in Education, Holistic Learning

iafor
The International Academic Forum
www.iafor.org

Introduction

The Fourth Industrial Revolution (4IR) is transforming global economies and societies at an unprecedented pace, demanding rapid adaptation and innovation across all sectors, particularly in education. This revolution necessitates a workforce equipped with highly transversal skills such as critical, entrepreneurial, and creative thinking. Despite these pressing needs, current European educational reforms, particularly those aligned with the European Qualifications Framework (EQF), appear misaligned with the dynamic demands of the 4IR.

This paper aims to critically examine the discrepancies between the rapid transformations necessitated by 4IR and the current European educational reforms, with a specific focus on Croatia. By analyzing the recent educational policies and reforms within the Croatian context, this paper highlights the potential pitfalls of a rigid, top-down approach that prioritizes standardized outcomes over creative and entrepreneurial education. Despite the largest investment in education in modern Croatian history (an investment cycle of 2.7 billion euros is launched, from kindergartens to universities) and strategic priorities outlined in Croatia's *National Development Strategy until 2030* (NN 13/2021), which emphasizes education as one of the key goals, there are substantial objections to the implementation of reforms, particularly in the preschool curriculum, vocational secondary education, and adult education sectors. The paper points out the insufficient adaptability of EQF to new job markets driven by AI and technological advancements, as well as argues that the current system's emphasis on standardization and evaluation is at odds with the intrinsic nature of learning.

Drawing from the experiences of the adult learning institution *Callegari – Italian School of Fashion and Design* in Croatia, this paper argues for a more flexible, bottom-up approach to educational reforms, advocating for more autonomy and trust in educators, a greater focus on the learning process, and fostering an environment that values creativity, innovation, and lifelong learning. This shift would better align educational outcomes with the rapidly evolving needs of the economy and society.

Discrepancies Between 4IR Requirements and the Croatian Qualifications Framework (CQF)

The Fourth Industrial Revolution has significantly disrupted the labor market, necessitating a workforce skilled in critical, entrepreneurial, and creative thinking. According to the *McKinsey Global Institute report* (Ellingrud et al., 2023), the US labor market experienced 8.6 million occupational shifts during the pandemic (2019–22), 50 percent more than in the previous three-year period, with projections suggesting that up to 30% of hours currently worked across the US economy could be automated by 2030, and that an additional 12 million occupational transitions may be needed by 2030. In addition to many declining occupational categories, projections are that new technologies driven by AI will generate millions of new jobs and occupations in the future. This necessity for few changes in the technological ecosystem and in professions during an individual's course of life, requires us to focus in education on highly transversal skills, and to educate today for occupations that do not exist at present and cannot even be anticipated yet.

In this context, the rigid, time-consuming and bureaucratically burdened Croatian Qualifications Framework (CQF), strongly emphasizing its alignment with the European Qualification Framework (EQF), appears ill-suited to meet these dynamic demands. The CQF's emphasis on predefined educational goals, both in terms of overall top-down approach and in

the number of prescribed details, diminishes the creative and entrepreneurial potential of educators and students alike. In our on-going educational reform, aiming at the standardization of present occupations and formalization of the qualification framework, we are witnessing the inability to accommodate to 4IR requirements and to keep up with the speed of changes in the labor market. Instead of boldly and creatively envisioning new occupations and qualifications, we are oriented on standardizing and formalizing the existing ones (the same ones that are most probably declining and vanishing). Because standardization/evaluation and creativity/entrepreneurship inherently lay on the opposite poles of human endeavors, each being an adaptive and desirable response at certain times (creativity/entrepreneurship in times of transformation and revolution, and standardization/evaluation in times of steady and predictable pace), the 4IR and CQF show themselves as poorly coincidental human ventures, raising great concerns in many educational stakeholders, making it necessary to raise the awareness and encourage the discussion about these discrepancies.

Discrepancies Between *National Development Strategy of the Republic of Croatia* Until 2030, Including *National Strategy of Education, Science, and Technology*, and Current Educational Reforms/Policies

Due to many examples of discrepancies between claims in educational strategies and actual educational policies, there is a justified concern among the educational stakeholders that the key words in European educational strategies such as creativity, innovation, entrepreneurship, autonomy and responsibility of stakeholders have only nominal meaning with little potential for real impact.

Although the Croatian *National Strategy of Education, Science, and Technology* (NN 124/2014) as its basic principle cites the autonomy of all institutions in the field of education and science, as well as the autonomy of all employees, our institutions in on-going educational reforms/policies exclusively use top-down approach. Almost everything is predefined in CQF (sets of learning outcomes and individual outcomes, CSVET points/number of hours necessary for the acquisition of learning outcomes, evaluation procedures and examples, even teaching topics since they must strictly correspond to predefined learning outcomes), therefore, teachers and school principals are reduced to technical operatives. Although the Croatian *National Strategy of Education, Science, and Technology* (NN 124/2014) aims at "strengthening creativity and innovation at all levels and in all types of education", in educational practice we see all elements of standards of qualification being placed at the level of legal obligation and immutability. For example, in a classroom teacher cannot choose particular learning outcome to focus on through teaching, instead, he/she must take outcomes as a complete set; he/she must devote exactly the number of teaching hours as specified; he/she is even discouraged from using own methods of evaluation and specific exam tasks, and instead should use the predefined ones, etc. The entire mandatory methodology (ASOO, 2022) was developed for the development of adult education programs, not with recommendations and guidelines, but with directives which diminish the creative, innovative, and willing engagement of teachers and principals. Absurdly, although some elements of standards are purely developed, even if we have a consensus on this matter, they cannot be changed as long as the standard is in force, regardless of their ineffectiveness and usefulness. Furthermore, although *National Strategy of Education, Science, and Technology* (NN 124/2014) promises to ensure horizontal and vertical permeability in the educational system, in practice advanced training programs in adult education are currently available only to individuals who have completed related secondary vocational schools (again, contrary to 4IR requirements, and contrary to educational priorities claimed in *National Development Strategy* (NN 13/2021) to increase the ability of the

workforce to adapt to rapid changes). In addition, adult learning educational programs intended for post-secondary education need to be aligned mostly with standards of qualifications developed specifically for secondary vocational education, thus becoming only a small fragment of secondary vocational education. Moreover, in practice we see such policy leading to a paradox of entering and exiting educational programs with the same, sometimes even lower, level of qualification, showing us once again that there is no adequate place for adult learning in the CQF. Finally, despite national agenda to promote lifelong learning and increase the number of adults participating in adult education paired with substantial EU funding, in practice we see pumping quantity, through low amounts of educational vouchers given to a large number of adults, at the expense of quality (consequently reducing the value of education and the competitiveness of adult learning institutions).

Similar discrepancies between national strategies and educational reforms/policies can be seen in preschool curriculum. As an example, let's look at the two parallel events in 2024 in Croatia: *Proposal of the National Preschool Curriculum* (MZO, 2024) envisioning an integral nine-year compulsory education and bringing curriculum aimed at reaching and evaluating the standards of expected competences in preschool children, and *Oscar of Knowledge Award*, the biggest and most prestigious award given to students in Croatia for excellent results in national and international competitions (organized by the Education Agency, with the support of the Ministry of Science, Education and Youth, and the Croatian Union of Counties). Although, according to *National Development Strategy* (NN 13/2021), one of the priorities in the field of education policy is encouraging and rewarding innovative, creative, and enterprising endeavors of educational staff and students, the first Croatian kindergarten team that ever competed at the international robotics competition and won 3rd place at the *European RoboCup Junior 2023* (thus innovating robotics curriculum and teaching methodology in preschool), received no *Oscar of Knowledge Award*, simply because they were preschoolers and not schoolchildren. In other words, they were not considered a part of the integral nine-year compulsory education (even though the competition category was *OnStage First Steps* for 5 to 9-year-old children), which contradicts not only the *Proposal of the National Preschool Curriculum* (MZO, 2024), but also the objectives from *National Strategy* (NN 124/2014) of „complete system of education that connects all levels and types of education and research into a harmonious and a transparent whole based on common positive values, principles and goals."

In vocational secondary schools, through introduction of modular teaching (from school year 2025/2026) (MZO, 2024), aiming at moving away from the traditional class-hour-subject system, reinforcing the cooperation between teachers and promoting interdisciplinary cooperation, again, contrary to the claims in educational strategies, we see the exclusive use of top-down approach with overly prescribed and rigidly defined forms of cooperation, while true cooperation is based on personal, authentic contact between involved persons and through their unique competencies and ideas. In spite of claims of autonomy and participation of stakeholders in educational reforms, in practice we see only a month-long public online consultation on extensive curricula that has been developed by the national educational agency for the last six years (a total of 148 curricula and a huge volume of pages: encompassing over 500 pages for stand-alone general education subjects alone, 900 pages for modules for general education subjects, and several hundred pages for each individual vocational curriculum). Also in vocational secondary schools, there is a concern about vertical permeability of students in the educational system. With integration of several subjects (such as Physics, Biology, or Chemistry) into modules and sets of learning outcomes with vocational subjects, and reduction of the general education component of the curriculum, especially its social-humanistic component, there is a concern about students' ability to systematically master the subject

material and their chances of success in the state matriculation exam necessary for entering university level education (there are a significant number of vocational secondary school students aspiring to earn applied university level degrees).

Discrepancies Between the True Nature of Learning/Meaning of Teaching, and Current Educational Objectives and Practices

The *Proposal of the National Preschool Curriculum* (MZO, 2024) to increase compulsory preschool hours from 250 to 700 annually, as an attempt to address the problem of the increasing number of postponements of enrolment in the 1st grade of elementary school (currently every tenth child in Croatia is not ready for school, even five times more than 20 years ago), introduces a school-like curriculum into kindergartens focused on educational expectations, content, and evaluation. This approach risks reducing the intrinsic value of play and the developmental benefits it offers. Moreover, instead of providing targeted professional interventions to solve detected problems of insufficiently developed pre-language, graphomotor and social skills, difficulties in attention and concentration, delays in speech development, motor difficulties, emotional immaturity, we, paradoxically, bring school to children who are initially not ready for school, thus negatively impacting children's development.

In the agenda of EQF and concomitant CQF, there is a general problem of educational focus on the acquisition of learning outcomes and evaluation that neglects the intrinsic and process-oriented nature of learning, present in all educational levels – from preschool, though elementary and secondary school, up to adult education. To a large extent, learning is a process, immersed in the dimension of subjective experience which in principle escapes the predefined outcomes (Recalcati, 2014). Learning is more than just a means to acquire skills, it is an intrinsic craving for knowledge and the expansion of individuals' horizons. The current system's emphasis on evaluation and comparison undermines the deeper purpose of education, which is to foster a passion for knowledge and personal growth. Likewise, teaching is more than a content and expectation, it is a matter of contact between the teacher and the pupil. Effective education, thus, transcends standardized learning objectives and measurements, emphasizing the subjective experience of learning and the dynamic interaction between teachers and students. Therefore, new, different educational agendas are necessary that consider these important and often neglected aspects of learning and teaching.

Conclusions

Main Findings

There are significant misalignments between current European (and concomitant Croatian educational reforms), and the dynamic requirements of the Fourth Industrial Revolution (4IR). The Croatian Qualifications Framework (CQF) is overly rigid and bureaucratic, limiting the adaptability and creativity necessary to meet the rapidly evolving labor market demands driven by new technologies. Moreover, comprehensive nature of qualification standards, which are legally binding and immutable, stifles creativity and innovation capacity among educators, preventing them from envisioning new occupations and qualifications. The focus on standardized outcomes and evaluations limits the potential for personalized and innovative teaching methods.

There are many discrepancies between objectives of national educational strategies, and current educational reforms/policies. Contrary to emphasis on autonomy and innovation, the top-down approach in educational reforms reduces educators to mere implementers of predefined policies that fail to accommodate the diverse needs of learners. The is an overall lack of participation of majority of educational stakeholders in shaping of educational reforms, which is an important prerequisite for their acceptance and implementation. The rigid structure of adult education programs limits vertical and horizontal mobility, thus limiting opportunities for career changes and adaptation to new roles, contradicting the principles of lifelong learning and ensuring educational permeability. There is also a concern about the lack of vertical mobility within the Croatian secondary vocational education resulting from the present reforms and introduction of modular teaching. Despite national agenda (paired with substantial EU funding) to improve the quality and availability of adult education, in practice we witness pumping quantity and building statistics at the expense of educational value. Despite lifelong learning agenda, we find no separate and highlighted place for adult learning in the CQF, since its educational programs are mainly aligned with standards of qualifications developed specifically for secondary vocational education, thus becoming only a fragment of secondary education. Finaly, in practice we find many examples of the absence of the principles of encouraging and rewarding innovative, creative, and enterprising endeavors of educational staff and students.

In current educational objectives and practices, we also find misalignments with the true nature of learning, and the true meaning of teaching. The proposed increase in compulsory preschool hours risks undermining children's psychological and social development by introducing overly structured, school-like curricula at an early age. The modular teaching reform in vocational secondary schools faces criticism not only because of its overly complex and extensive curricula, and logistical challenges, but more importantly for overly prescribing and rigidly defining forms of cooperation, thus, misunderstanding and missing the essence of cooperation – of an authentic contact between involved persons through their unique competencies and ideas. The overall focus on standardized learning outcomes and evaluations neglects the intrinsic value of education, which should prioritize the process of learning, contact between teachers and student, and personal growth of students.

Implications

The rapid advancements of the 4IR necessitate an educational system that is flexible, innovative, and responsive to change. Current European and Croatian educational reforms, with their top-down approach and rigid standards, are misaligned with these needs. By embracing a bottom-up approach that reduces bureaucratic constraints, empowers educators and emphasizes holistic learning, Croatia can better prepare its workforce for the challenges and opportunities of the 4IR. Recommendations include:

- **Empowering Educators:** Allowing teachers and principals more freedom to innovate and adapt teaching methods to meet the evolving needs of students and the labor market.
- **Promoting Flexibility:** Developing flexible guidelines, recommendations, and tools that allow for adaptation and creativity rather than rigid, legally binding standards.
- **Emphasizing Holistic Education:** Shifting the focus from standardized evaluations to the process and intrinsic value of learning, fostering a passion for knowledge and personal growth among students.
- **Facilitating Mobility:** Ensuring vertical and horizontal mobility within education to support lifelong learning and career adaptability.

Limitations

This study primarily focuses on the Croatian educational system and its alignment with European reforms, which may limit the generalizability of the findings to other European countries.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work the author used https://chatgpt.com/ in order to improve readability and language of the work. After using this tool/service, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

References

Ellingrud, K. et al. (2023). AI and the future of work in America. McKinsey Global Institute. https://www.mckinsey.com/mgi/our-research/generative-ai-and-the-future-of-work-in-america

Metodologija za izradu programa obrazovanja odraslih za stjecanje mikrokvalifikacija, djelomičnih kvalifikacija i cjelovitih kvalifikacija financiranih putem vaučera i drugih izvora financiranja, Agencija za strukovno obrazovanje i obrazovanje odraslih (2022). https://www.asoo.hr/wp-content/uploads/2022/07/Metodologija_pdf.pdf

Nacionalna razvojna strategija Republike Hrvatske do 2030. Godine, NN 13/2021 (2021). https://narodne-novine.nn.hr/eli/sluzbeni/2021/13/230

Nacrt prijedloga Nacionalnoga kurikula predškole, Ministarstvo znanosti i obrazovanja Republike Hrvatske (2024). https://esavjetovanja.gov.hr/ECon/MainScreen?entityId=27075

Odluka o donošenju modula općeobrazovnih predmeta u srednjim strukovnim školama na razinama 4.1 i 4.2, Ministarstvo znanosti i obrazovanja Republike Hrvatske (2024). https://esavjetovanja.gov.hr/ECon/MainScreen?entityId=27609

Recalcati, M. (2014). *L'ora di lezione. Per un'erotica dell'insegnamento.* Torino: Giulio Einaudi editore s.p.a.

Strategija obrazovanja, znanosti i tehnologije, NN 124/2014 (2014). https://narodne-novine.nn.hr/clanci/sluzbeni/2014_10_124_2364.html

An Investigative Review: How Well Does the Higher Engineering Education Curriculum Align With the UK's Economic and National Goals?

Mauryn C. Nweke, University College London, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
It is generally believed that there should be a close alignment between a country's national and economic goals and the curriculum delivered in its educational institutions. Historically in the UK, engineering and manufacturing has provided the largest contribution to the economy. It could be argued that at that time, the skills required to work in the industry were relatively rudimental and this was reflected in the how engineers were trained, which initially adopted an apprenticeship style of teaching and later, with the increase in university recruitment, was predominantly teacher-focused and technical-content driven. Advancements in technology, medicine and other fields have brought about the need for a new, flexible type of engineer with skills that go beyond those previously defined. During the time of these advancements, the UK has seen its engineering sector decline economically, which has led to the re-addressing of the engineering curriculum. However, with the UK aiming to significantly increase the contribution of the engineering sector towards the economy, it begs the question - how well does the engineering curriculum now match up with the UK's economic and national goals? This literature review-based study will explore the extent of the alignment of the UK's economic goals with the engineering curriculum in UK universities. It will begin by looking at the historic alignment and subsequent changes to society before discussing the current state of the engineering curriculum. Finally it will assess the economic aims of the UK and provide a thorough discussion on how the alignment could be improved.

Keywords: Engineering Education, Engineering Industry, Engineering Economic Contribution

iafor
The International Academic Forum
www.iafor.org

Introduction – The Evolution of Engineering and the Economy in the UK

In order to understand the importance of engineering and manufacturing to the UK's national identity, it is important to reflect on how this sector has contributed to the making of the UK and its global economic positioning. By understanding this, the rationale behind the UK's current economic goals can be better understood and mechanisms by which these goals can be achieved can be determined via the exploring the state of the engineering curriculum globally.

British manufacturing and engineering as it is known today began with the Industrial Revolution in the late 1700s. Prior to this, manufacturing occurred mostly in small workshops and with the use of hand tools as opposed to machinery (White, 2002) During that time, training and education usually occurred via apprenticeships and learnerships, which typically took a long period of time of at least 7 years or more (Augustyn, 2010). Industrialisation in the UK led to a significant shift from an agriculturally-centered economy to a predominantly machine-powered one and altered attitudes towards training and education. The advancements in engineering technologies and the emergence of factories led to the establishment of systemisation and mass production of goods and gave rise to what is now termed as the manufacturing and engineering 'industry.' Due to societal needs at the time, the main outputs of manufacturing were iron, steel, textiles and chemicals and subsequently the rise of the coal industry, which led to growth in the transportation industry and the construction of railway networks that allowed manufacturers and engineers to transport goods beyond the UK (McFadden, 2018). This modernisation brought forth the need for division of labour and specialised skills. Less-skilled workers were still needed for jobs not requiring formal instruction, however skilled engineers were typically those that had acquired technical expertise from institutions such as universities and therefore automatically qualified for advanced positions in the industry, leading to the introduction of the system of upgrading and vocational careers. Resultantly, in the first half of the 1800s, the UK's export value increased five-fold. At that time, the UK's engineering and manufacturing sector was the biggest globally and the UK were recognised as the *most technologically advanced* country in the world (Maven, 2009).

The beginning of the 20th century saw Germany and the US overtake the UK as global leaders in engineering and manufacturing and this period became known as the second industrial revolution. However despite this, the sector still accounted for approximately half of the national output. In this period, proceeds from oil and gas contributed significantly to the UK's economy (McFadden, 2018). The end of the Second World War saw a significant decline in the UK's engineering and manufacturing sector, both in terms of proportion to national gross domestic product (GDP) and employment and as the UK began to import more goods, the economic contribution of the service industry began to rise rapidly. Furthermore, over the past 30 years, a number of previously British-owned engineering and manufacturing companies were sold to overseas companies, leading to widespread cuts and closures in the sector.

More recent economic statistics provide an unpredictable but optimistic outlook for the UK. At the beginning of the last decade, engineering and the manufacturing sector accounted for 12% of the UK's national output and employed just over 8% of the British workforce and by 2014, the sector accounted for 44% of British exports, which rose to over 50% by 2019 (Scott, 2017). In engineering and manufacturing, as a share of the national GDP, the UK ranks 5th globally behind China, the US, Japan and Germany. Currently, the UK's major

engineering industries are in pharmaceuticals, food, drink and aerospace engineering, a vast change to the main manufacturing outputs during the industrial revolution and this shift has led to the need for a new type of engineer (Sacks, 2016).

The link between technical expertise in engineering and employability potential provided an impetus for more people to seek formal education in universities. The culture of training and education in this era was teacher-centric so naturally, the curriculum in universities was heavily technically focused and taught with teacher-centered approach.

The UK has gone from being the sole global leader in the engineering and manufacturing to seeing its gradual decline in the sector. This begs the question, what is the current state of affairs concerning the curriculum and what needs to be re-addressed to aid alignment?

The Current State and the Re-addressing of the Curriculum

Advancements in social activity, such as the influence of technology on lifestyle choices, pressures on healthcare due to the emergence of new diseases and the need for advanced therapies and a steady increase in population and immigration has led to the need for increased food supply, energy supply, transportation and housing, which have consequently impacted on the environment. Engineers as decision makers and solution creators are now much more closely and directly linked with societal changes and therefore the type of engineer produced today needs to align with that and this links directly with how engineers need to be educated and trained in today's world.

Over the past 20 years, the requirement for broadening of the curriculum has been highlighted by a number of stakeholders including, accreditation bodies, professional institutions, industry and government. All have emphasised the need for a reform in engineering education that encompasses a whole set of transversal skills, from the ability to think critically, to working in teams, socio-economic considerations, sustainability and ethics, all built on deep technical understanding (Mitchell *et al.*, 2019). The past decade has seen an emergence of engineering education research (EER) as a means of re-addressing the engineering curriculum and how engineers of today are being prepared for societal and environmental changes (de Graaff, 2017).

A number of world leading institutions have used EER outcomes to inform practice in the classroom and reform their curriculum. Whilst it is important to bear in mind that the requirements of an engineer may differ slightly from nation to nation, there is a general trend that shows that integrated, multidisciplinary, student-centred curricula is the trajectory. The Singapore University of Technology and Design incorporates this into their curriculum via multidisciplinary design projects, the purpose of which is to integrate and contextualise learning across years of study as well as across modules (SUTD, 2011). This change has had a ripple effect across a number of engineering institutions across the nation and the success of this change has led to Singapore achieving an Engineering Index score of over 60% which places them amongst the top 5 in all of Asia and the Oceania region (Cebr, 2016). One of the most notable programme reforms was implemented by Charles Sturt University - Engineering, Australia. This five and a half programme incorporates 18 months on-campus learning which is built around a number of project-based challenges and proceeded by four years of work-based education, off-campus. The technical and skills-based knowledge is delivered online and students are able to independently access it as and when needed (CSU, 2018). The successful implementation of this programme and similar programmes across

Australia in efforts to address their national goals has led to Australia being considered as an emerging leader in EER (Graham, 2018).

The US is globally considered to have the best institutions for engineering education research and have proved that this research has directly impacted on education reform. Olin College, Massachusetts Institute of Technology (MIT) and Purdue University are consistently ranked in the top 5 for EER, with Purdue University being the first ever university to open a School of Engineering Education with undergraduate, post-graduate and doctoral student intake in 2004 (Perdue-University, 2018). As a result of their research, all have adopted a 'project-centric' approach to their engineering curricula and although the strategy of implementation differs slightly from institution to institution, all focus on the ability to apply knowledge with the demonstration of both technical and professional competence. MIT in particular allow students to choose a 'thread' of interdepartmental courses, which more often than not, means that projects undertaken are multidisciplinary. The curriculum has been revised to focus on 'ways of thinking' and the demonstrated ability to apply knowledge based on ethics, self-learning, critical thinking and creative thinking (MIT, 2017).

The national impact of these successes is that the US by far surpasses all other nations for the number of engineering institutions in the world's top 100, of which 31 are US-based and 4 are in the top 5 according to the *Times Higher Education* World University Rankings. Economically this has meant that for more than half a decade, the US has been ranked the highest for average wages and salaries for engineers as well as being ranked the highest globally for engineering research impact and financial contributions (Cebr, 2016).

Since the establishment of this research area, there has been a gradual but recognizable shift in the understanding of good pedagogic practice in the UK and its application to engineering. A number of centres and research groups have been set up with a sole focus on engineering education; such include: Manchester Science and Engineering Education Research and Innovation Hub, Aston Engineering Education Research Group, Kings College London Centre for Research in Education in STEM, University College London Centre for Engineering Education and a few others (Hauke, 2014). With that said, there is a disconnect between the research in this area and the implementation of its findings in the curriculum. A cyclical model by which research and practice continually influence and develop one another has been proposed by Jesiek et al. (2010) and Borrego and Bernhard (2011), however very few have applied this model by reporting on how the use of their research has had impact and wide-scale application across the engineering curriculum as a whole within their institutions.

In 2014 however, the UCL Faculty of Engineering Sciences became the first research intensive, high-ranking UK institution to successfully implement a complete revision of engineering education across the majority of the faculty via the introduction of the Integrated Engineering Programme (IEP). In this programme all students enter through their disciplinary specialisms but share a common framework that integrates discipline-specific content (technical) with professional skills, design, project and problem-based learning along with a multidisciplinary and student-centred pedagogy throughout the student's degree (see Figure 1).

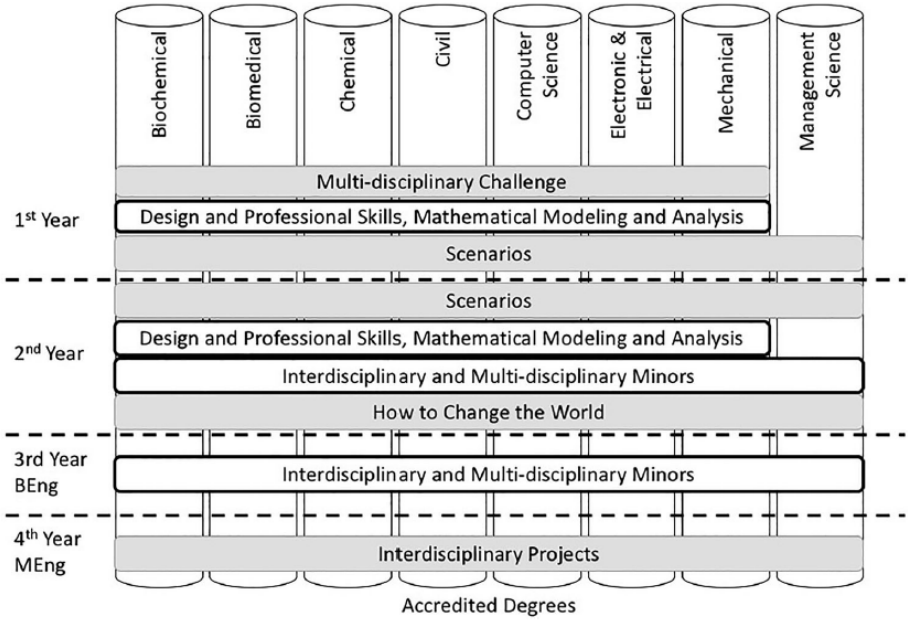


Figure 1: Overall Structure of the Integrated Engineering Programme.
From Mitchell et al. 2019

The programme was designed to directly address the concerns raised by various stakeholders in efforts to produce graduate engineers with the capabilities of tackling global issues of today and beyond. Students are trained in areas that develop effective communication with technical and non-technical specialists, safety and risk, critical and creative thinking, design, decision making and teamwork. Since its implementation, it has seen the graduation of three cohorts of engineering students so far, both at bachelors and Masters levels.

Since then a number of UK institutions have implemented similar revisions to their practice but not on the same scale as UCL. The evidence suggests that if the UK is to remain economically competitive within engineering and possibly see its former glory days, more institutions need to implement these revisions across the engineering curriculum as a whole and furthermore, lessons should be learned from the UK's main global competitors.

How Can the Alignment Be Improved?

The UK is currently ranked 14th in the engineering sector globally according to the Engineering Index, which takes into account several factors such as research, gender balance, engineering employment, wages and salaries, among other factors (Cebr, 2016). Whilst the UK boasts high research impact and digital connectivity, it has one of the lowest proportions of female engineering graduates and overall gender balance in engineering. It could be argued that this is a contributory factor when considering that the number of people studying engineering and the quality of engineers with a wide range of skills to meet societal demands continues to be problematic and stands to reason as to why the UK finds itself in its current position.

Women make up 47% of the overall UK workforce however only 12% of those work in engineering occupations (Neave *et al.*, 2018). Evidence suggests that this underrepresentation could be systemic and one that is formulated in early-stage education (Archer, Moote and MacLeod, 2020). A survey conducted by *Engineering UK* in 2018 reported that only 34% of

girls aged 7-11 expressed interest in becoming an engineer when they were older, compared to almost 60% of the boys their age. By the ages of 16-19 this number had reduced to 25% for the girls, whilst this number was more than double the proportion for boys of the same age. Furthermore, the evidence suggests that there are strong gender differences in educational choices. Statistics show that only 27% of girls made STEM subject choices at A-level compared to 46% of boys and worse still, only 16% of engineering students graduating at first degree level were female. Post-education, there are further leakages in the labour market, leading to the current figures for women in engineering occupations. In a similar vein, statistics show that whilst 25% of engineering students are of a BME background, they only account for 8% of the UK engineering workforce (Neave *et al.*, 2018).

A number of initiatives have been set up as a means of closing the gap of underrepresented groups in the workplace. With particular focus on gender, the Government Equalities office aims to generate a 20% increase of females entering STEM higher education studies, which if successful may in turn lead to the UK rising above Italy and Germany in female workplace recruitment (Cebr, 2016, Neave *et al.*, 2018). To help implement this, a number of initiatives have been rolled out in an attempt to support more girls into engineering. These include organisations such as Women into Science and Engineering Campaign (WISE) and Women Engineering Society (WES) who work to promote visibility and representation mainly via promotional campaigns, visual marketing and inspirational activities such as talks and presentations (Marsh, 2010). There are also a number of stakeholders such as Government agencies (e.g. Teach First, Association of Science Educators), Engineering bodies (e.g. Royal Academy of Engineering, Engineering Council) as well as employers and bodies all with individual initiatives towards closing the gender gap in engineering in the UK. For example, the Careers & Enterprise Company has set an agenda and strategy on increasing the number of STEM A-level subjects taken by girls, whilst other organisations and bodies focus on primary education and some on higher education (Department-for-Education, 2014).

It should be noted that whilst the initiatives are encouraging to see, there is evidence to suggest that there are too many initiatives (600+) and a lack of evidence of impact in order to understand what effect these initiatives are having on the target groups (Neave *et al.*, 2018). A thorough assessment of the efficacy of these engagement activities is needed and closer interactions between the government, industry and the educating community are key in improving the UK's record on diversity and inclusion.

Another way industry could play a role in improving the UK's alignment is through the embedding of work-based education concepts into the curriculum. At the SEFI 47th Annual Conference, 2019 (European Society for Engineering Education), a group of university students challenged a panel of industry experts from various engineering fields on the following topic – "*Should engineering students be treated as engineers*?" The panel experts each presented for 5-10 minutes on the necessary underlying competences needed by today's engineers and the need for a change in traditional university attitudes. The industrial experts suggested that due to the ever-changing societal demands, universities needed to become, what could only be interpreted as, pseudo-engineering cooperations. This change in attitude would enable engineering students to be treated as (learner) engineers and would better align with workplace practice and help reduce the skills shortage. What this panel lacked was a university educator's perspective addressing feasibility and what this would mean in practice.

There are a number of issues with the feasibility of this approach, mostly concerning the time and resource constraints of an academic curriculum and career cycle in the UK. One

approach on addressing this has been more emphasis on work placements and internships from as early as first year of undergraduate studies. In other areas such as social sciences and the arts, work placements and internships are integrated into the curriculum in a number of institutions and make up a higher contribution towards the final degree classification (Hurst and Good, 2010, Newman *et al.*, 2007). Knouse, Tanner and Harris (1999) found that upon graduation, business students that completed regular internships as part of their programme obtained jobs more readily and were more easily incorporated into the workplace. There is a growing urge from accrediting bodies for the UK engineering curriculum to follow suit given the dynamic nature of societal demands on technology and the environment and it may further serve as an approach to close the transition gap and between university and the workplace as well as reducing the skills shortage.

Not unrelated, another route into engineering that could aid to close the skills shortage gap and in so doing, help improve the UK's alignment is apprenticeships. In the recent past, the *Wolf Report* 2011 reported the low qualification value of many apprenticeships and because of that, a lack of alternative routes for learners to navigate towards attaining high value engineering qualifications. However as of 2014, government associated bodies have been working with a number of 'trailblazer' employers to develop new and reformed apprenticeship standards. These standards contain assessment plans produced by the employers and then collated and published by the government for training companies and employers to use. 355 standards were ready as of November 2017, of which 165 have been approved for delivery, leaving 149 remaining. These standards highlight knowledge, skills and professional conduct required for vocational occupation and well-valued qualifications are now mandatory if learners are on the degree apprenticeship path (Neave *et al.*, 2018). It is still too early to learn to know the extent of effectiveness of this government sponsored initiative, however it is a positive step towards closing the skills gap.

A further improvement to the UK's alignment lies in understanding how changes in societal needs have contributed towards the emergence of new engineering fields and allowed for the adaptation of existing fields. With the creation computers, an example of a relatively recent emerging field is computer software engineering. July 2008 saw the release of the first mobile 'app' and since then, the need for engineers in this area has skyrocketed (Strain, 2015). According to *The Bureau of Labour Statistics*, a 17% increase in software engineering employment is expected between 2014-2024 and the growth rate for app developers is yet higher at 19%. Another area of growth is within the biopharmaceutical industry. The global market for pharmaceuticals is projected to reach $1.5 trillion by 2023 and with medicine becoming more personalised, there has been an emergence of the area of biochemical engineering, an interdisciplinary field stemming from a combination of chemical engineering and biotechnology (Basta, 2019). A little over 20 years ago, UCL Biochemical Engineering became the first department of its kind in the UK focusing on industrial biotechnology, macromolecular bioprocessing and cell and gene therapy bioprocessing to address the growing need for personalised medicines (UCL, 2020). Whilst this need continues to exist, there have been few departments dedicated to this focus, with only 2 such departments existing in the UK. If the UK are to improve its national and economic standings in this area, strategies need to be made and implemented to firstly ensure the representation of emerging fields in higher education and to ensure uptake of students and employment in these fields.

As previously mentioned, depending on the needs of a specific country, there is a likelihood that certain engineering skills far outpace the supply meaning that more engineers are required from certain disciplines than from others. According to a study by *Cebr 2016*, in

2014/15, the UK saw a total of just over 45,000 engineering qualifications obtained, of which almost a quarter were in electronic and electrical engineering (EEE). This may suggest that there is a higher demand for engineers with this expertise, however it can also be argued that there may also be an overall greater awareness of this part of the industry. Less popular choices were aerospace engineering and chemical engineering which together amassed less than 15% of degree level qualifications. This may suggest that these areas are perhaps not as well understood as EEE or that the demand for engineers with such skills is low in the UK. However, according to the *Institution of Engineering and Technology (IET)* across the sector, an average of over 50% of engineering employers reported that they are seeking new recruits. As discussed earlier, given the rise in initiatives to get people studying engineering, effective strategies that get these graduates into the engineering workforce have not been shown. In order for the UK to move forward, more clarity is needed on where the future engineering skill shortages will be.

Lastly, whilst there are many more suggestions that could be proposed on ways to improve the UK's alignment, such as questioning the UK's education system as a whole and whether an argument can be made about how early UK students specialise compared to other nations, an equally important point to highlight is related to the perception of engineering in the UK. *The Royal Academy of Engineering 2016* reported that in spite of the noteworthy impact of engineering in society, many developed countries still lack knowledge on the variety of engineering disciplines and their impact. In the UK, this lack of knowledge could be a reason behind the misconception and the broad use of the term 'engineer', which for many does not distinguish between chartered engineers and engineering technicians. Whilst some contributions of the profession to society were recognised, young people particularly lacked understanding of what an engineer's job actually is, which as alluded to earlier, likely has an impact on a young person's decision to study engineering (Cebr, 2016). A lot of work has been carried out by foundations, non-governmental organisations and private companies to improve the perception of engineers and studying engineering. Effective publicising by all stakeholders will aid in allowing the general public to see and understand the positive and significant impact that engineering has on society.

Conclusion

Historically the UK had been globally considered the most technologically advanced country but since the end of the Second World War, the UK's national and economic positioning in engineering began to decline. Since the turn of the century, the changes in societal needs for medicine, food, technology etc. has led to a rising demand for universities to produce engineering students that are well equipped to address these issues. These engineers will need to be leaders, able to create strategic vision, work well with other engineers and related fields and effectively communicate their findings with various audiences (Kerr, 2010). This posed the need to investigate how well the UK's engineering curriculum aligns with its national and economic goals and where necessary, provide recommendations on how the alignment could be improved.

The engineering curriculum is seeing a movement from traditional teacher-centred, technically-focused pedagogy to a student-centred, project-based and multidisciplinary approach. Whilst the UK makes gradual advances in this area and EER, what is clear is that many more institutions need to engage in reforming their curriculum cross-departmentally and furthermore, an improvement of research informed practice is crucial.

Whilst the evidence suggests a misalignment of the UK's goals with its current engineering curriculum, a number of efforts can be implemented so as to allow the UK to remain competitive in this fast moving industry. A range of initiatives have been introduced by stakeholders and associated organisations to encourage the uptake of underrepresented groups, particularly women in engineering as a means of addressing the shortage of engineers in the UK. Whilst encouraging, there is a lack of evidence to shows what impact these initiatives have on the proportion of females studying engineering and importantly, working within the engineering sector. It can be concluded that until such studies are carried out, a definitive link between these initiatives and an improvement in uptake cannot be made.

This report has focused primarily on university education, but it is key to note that there are other entry routes such as apprenticeships that could contribute towards the UK achieving its goals. The government have rolled out a new strategy towards improving the value of apprenticeships in the UK. If successful, it could see the uptake of a significant proportion to the population and help towards addressing the skills shortage. Questions should be asked about the UK education system as a whole and whether there is a need for early specialisation, as there is evidence to suggest that whilst technical expertise is still valued, a greater emphasis on general, interdisciplinary knowledge is emerging and appears to be more compatible with education systems in which students specialise later on, such as in the US and many parts of Europe (Murchie, 2016). Whilst the UK may not be the engineering powerhouse it once was, it still remains a global force in the sector and technologically one of the most advanced in the world and upon the successful implementation of a number of strategies mentioned in this report, there remains every possibility of the UK reaching and sustaining its national and economic target in the engineering sector.

References

Archer, L., Moote, J. and MacLeod, E. (2020). 'Learning that Physics is "Not for Me": Pedagogic Work and the Cultivation of Habitus among Advanced Level Physics Students', *Journal of the Learning Sciences*. doi:10.1080/10508406.2019.1707679

Augustyn, A. (2010). *Apprenticeship*, *Encyclopaedia Britannica*. Available at: https://www.britannica.com/topic/apprenticeship (Accessed: 15 February 2020)

Basta, N. (2019). *The Global Use of Medicine in 2019 and Outlook to 2023*, *Pharmaceutical Commerce*. Available at: https://pharmaceuticalcommerce.com/business-and-finance/global-pharma-spending-will-hit-1-5-trillion-in-2023-says-iqvia/ (Accessed: 21 December 2019)

Borrego, M. and Bernhard, J. (2011). 'The emergence of engineering education research as an internationally connected field of inquiry', *Journal of Engineering Education*, 100(1), pp. 14–47. doi:10.1002/j.2168-9830.2011.tb00003.x

Cebr (2016). 'Engineering and economic growth : a global view', *Royal Academy of Engineering*, (September), pp. 1–80. Available at: https://www.raeng.org.uk/publications/reports/engineering-and-economic-growth-a-global-view

CSU (2018). *Charles Sturt University - Engineering*, *csu.edu.au*. Available at: https://www.csu.edu.au/engineering/curriculum (Accessed: 15 February 2020)

Department-for-Education (2014). *New careers and enterprise company for schools*, *Gov.uk*. Available at: https://www.gov.uk/government/news/new-careers-and-enterprise-company-for-schools (Accessed: 20 January 2020)

de Graaff, E. (2017). 'Ten years in engineering education research: looking back ahead', *European Journal of Engineering Education*. Taylor & Francis, 42(6), pp. 587–590. doi:10.1080/03043797.2017.1408942

Graham, R. (2018). 'The global state of the art in engineering education', *New Engineering Education Transformation*, (March 2018).

Hauke, E. (2014). 'Engineering education research, with a focus on engineering for development', *Global Dimension in Engineering Education*. Available at: https://spiral.imperial.ac.uk/bitstream/10044/1/22116/2/C9_Chapter3.pdf

Hurst, J. L. and Good, L. K. (2010). 'A 20-year evolution of internships: Implications for retail interns, employers and educators', *International Review of Retail, Distribution and Consumer Research*, 20(1), pp. 175–186. doi:10.1080/09593960903498342

Jesiek, B. K., Borrego, M. and Beddoes, K. (2010). 'Advancing global capacity for engineering education research: Relating research to practice, policy and industry', *European Journal of Engineering Education*, 35(2), pp. 117–134. doi:10.1080/03043791003596928

Kerr, I. R. (2010). 'Futures Thinking for Engineering and Engineers Australia's Continuing Professional Development Process', *Australasian Journal of Engineering Education*, 16(1), pp. 13–20. doi:10.1080/22054952.2010.11464038

Knouse, S., Tanner, J. and Harris, E. (1999). 'The relation of college internships, college performance and subsequent job opportunity', *Journal of Employment Counseling*, 36(1), pp. 35–41.

Marsh, T. (2010). *Engaging girls in Engineering*, *Ingenia online*. Available at: https://www.ingenia.org.uk/Ingenia/Articles/40394caa-a85d-48e2-80e4-48f655ce8e8d (Accessed: 13 January 2020)

Maven (2009) *Industrial Revolution*, *History.com*. Available at: https://www.history.com/topics/industrial-revolution/industrial-revolution (Accessed: 23 December 2019)

McFadden, C. (2018). *Industrial Revolution - The Ultimate Guide to This Game Changing Period*, *Interesting Engineering*. Available at: https://interestingengineering.com/industrial-revolution-the-ultimate-guide-to-this-game-changing-period (Accessed: 12 December 2019)

MIT (2017). *MIT Engineering Curriculum*, *New Engineering Education Transformation*. Available at: https://neet.mit.edu/about/curriculum/ (Accessed: 15 February 2020)

Mitchell, J. E. *et al.* (2019). 'Faculty wide curriculum reform: the integrated engineering programme', *European Journal of Engineering Education*. Taylor & Francis, 0(0), pp. 1–19. doi:10.1080/03043797.2019.1593324

Murchie, F. (2016). *Comparing the US and UK education systems*. Available at: https://www.relocatemagazine.com/articles/reeditor-09-d3-2015-7523-comparing-the-us-and-uk-education-systems (Accessed: 23 December 2019)

Neave, S. *et al.* (2018). 'The state of engineering', *Engineering UK*, (2018), p. 284.

Newman, B. S. *et al.* (2007).'Working to learn: Internships for today's social work students', *Journal of Social Work Education*, 43(3), pp. 513–528. doi:10.5175/JSWE.2007.200500566

Perdue-University (2018). *Purdue University - School of Engineering Education*. Available at: https://engineering.purdue.edu/ENE/AboutUs/History (Accessed: 2 January 2020)

Sacks, T. (2016). *UK engineering sector 'generates more than 27% of GDP'*, *Drives & Controls*. Available at: https://drivesncontrols.com/news/fullstory.php/aid/5030/UK_engineering_sector__91 generates_more_than_27_25_of_GDP_92.html (Accessed: 20 December 2019)

Scott, N. (2017). *Leaders discuss the future of UK engineering*, *director.co.uk*. Available at: https://www.director.co.uk/uk-engineering-sector-faces-skills-shortage-22341-2/ (Accessed: 15 February 2020)

Strain, M. (2015). *1983 to today: a history of mobile apps*, *The Guardian*. Available at: https://www.theguardian.com/media-network/2015/feb/13/history-mobile-apps-future-interactive-timeline (Accessed: 3 January 2020)

SUTD (2011). *Singapore University of Technology and Design*, *sutd.edu.sg*. Available at: https://www.sutd.edu.sg/Education/Unique-Academic-Structure (Accessed: 15 February 2020)

Times-Higher-Education (2014). *The World University Rankings*, *The Times*. Available at: https://www.timeshighereducation.com/world-university-rankings (Accessed: 15 February 2020)

UCL (2020). *UCL Engineering History*, *ucl.ac.uk*. Available at: https://www.ucl.ac.uk/engineering/about/history (Accessed: 5 December 2019)

White, S. (2002). *The history of manufacturing in the UK*, *Talk Business*. Available at: https://www.talk-business.co.uk/2019/07/26/the-history-of-manufacturing-in-the-uk/ (Accessed: 1 January 2020)

Enriching and Enhancing Students' Learning Experiences in an Introductory Mechanical Engineering Course Through Demo Kits

Hong Tao, Hong Kong University of Science and Technology, Hong Kong SAR

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Mechanical Engineering for Modern Life is an introductory course designed for Year-1 undergraduate students, aiming to provide them with a comprehensive overview of the field of mechanical engineering and its sub-areas. To bridge the knowledge gap between Year 1 students and the theoretical concepts in different sub-areas of mechanical engineering, we have utilized a series of demonstration kits as visual aids for various theoretical concepts. For instance, we have used model aircraft lift demonstrator to show how lifting force is generated by an airfoil shape; we have applied a four – bar linkage demonstrator to help students understand the number of degree of freedom and visualize the Grashof's condition; we have empolyed a Venturi tube to visualize the Venturi effect and enhance understanding of Bernoulli's equation; we have utilized a mini – robotic arm to show how the manipulator is controlled to move and complete tasks. This study describes the relationship between each demo kit and the corresponding theoretical concept and focuses on analyzing the results of various surveys to evaluate the effectiveness of using the demonstration kits and quantify their impact on students' learning experiences and outcomes. The application of demonstration kits have allowed students to better grasp the theoretical concepts and enhance their performances in quizzes.

Keywords: Demonstration Kits, Learning Experiences, Effectiveness

iafor
The International Academic Forum
www.iafor.org

1. Introduction

The Year-1 level Mechanical Engineering for Modern Life aims to introduce the main sub – area of Mechanical and Aerospace Engineering to prepare the students for essential understanding of this field. This course is designed with four major modules which are Module 1 - Aerospace Engineering; Module 2 - Mechanics and Materials; Module 3 - Design and Manufacturing; Module 4 - Thermofluids. According to the experiences in teaching this course over the past years, one major challenge is to balance the extent and in-depth of the topics covered with the limited theoretical knowledge that Year 1 students have about the field of mechanical engineering. We have tried different ways including using demo videos as well as online quizzes to foster students' learning. To further bridge the gap between the students' knowledge set and the theoretical concepts, promote students' engagement, and enhance their learning experiences, we have applied demonstration kits to elaborate different theoretical concepts. Demonstration kits have been used in other fields. For instance, Kim (2015) incorporated demonstrations in teaching statics course and found it helpful in engaging students in the class activities. Basheer et al. (2017) employed several electro-chemical reaction demonstrations to help junior high school students understand the oxidation and reduction concepts. Kazama (2017) built several hands-on prototypes and demonstration kits to improve students understanding in machine elements such as hydraulic and pneumatic systems. Kumkratug (2018) used portable hardware tool instead of 2D or 3D diagram to demonstrate three-phase armature winding in classroom. Rossiter et al. (2019) innovated the teaching by providing with take-home laboratory kits to enahance their hands-on experiences. Kim (2022) applied an apparatus in an introductory thermodynamics course to show energy conservation during conversion between shaft work and internal energy. Julius Fusic et al (2023) used demonstration kits in learning the three electrical machines, i.e. stepping motors. The contribution of this study lies in linking the application of demonstration kits to students' performance in quizzes.

As modern mechanical engineering is a highly interdisciplinary field and covers a wide range of sub – fields, therefore, this introductory course is divided into four modules, i.e.

(1) Module 1 – Aerospace Engineering, which includes aerodynamics; propulsion systems; gas turbine;
(2) Module 2 – Mechanics and Materials, which elaborates on statics and dynamics; solid mechanics; engineering materials such as metals and polymers;
(3) Module 3 – Design and Manufacturing, which covers control; robotics; engineering design; manufacturing; mechanisms;
(4) Module 4 – Thermo – fluids, which focuses on thermodynamics; heat transfer; fluid mechanics; energy; modern building.

The biggest challenge in providing Year – 1 undergraduate students a comprehensive overview of modern mechanical engineering lies in a good balance of breadth and depth of the chosen topics and to bridge the knowledge gap between Year 1 students and the core concepts under each topic. To tackle this problem, we utilize a series of demo kits as visual aids, through which students can well grasp the principles and enhance their understanding with better learning experiences.

2. Demonstration Kits As Visual Aids

The demonstration kits that are selected for each Module are listed in Figure 1 below.

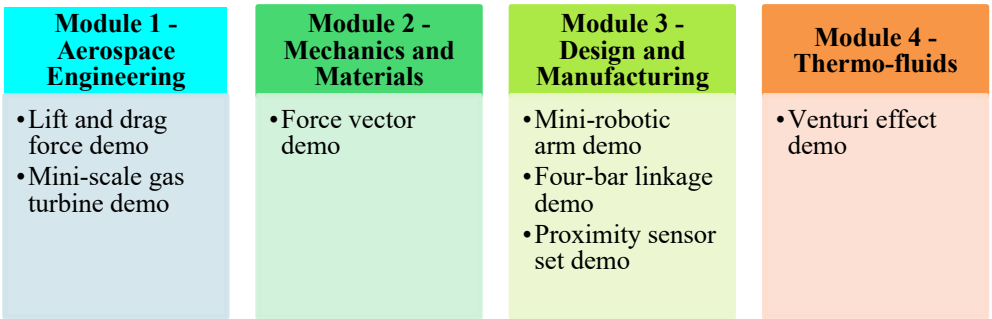


Figure 1. The selected demonstration kits for each Module.

Most demo kits are also small-scale experiments which were shown to students in the classroom. Students also had the opportunity of hands – on experiencing the demo kits, such as adjusting parameters and moving around different parts and to see the cause and effect. Utilizing the demonstration kits serves several purposes in the engineering course teaching and learning environment. Firstly, as an old says goes "a picture is worth a thousand words", i.e. a demonstration kit visualizes the theoretical concepts and makes complex ideas relatively easier to understand. Seocondly, a demonstration kit greatly engages students' attention and increase their motivation to learn. Thirdly, we hope, through the students' active involvement with the demonstration kits, to bridge the knowledge gap between Year 1 students and the theoretical concepts.

2.1. Relationships of Demonstration Kits With Theoretical Concepts

A shown in Table 1, each demonstration kit corresponds to a theoretical concept. For instance, in Module 1 – Aerospace Engineering, a fundamental concept is how the lift and drag forces are generated on an airfoil shape. Therefore, we have choosen a demonstration kit that visually represents an object in an airfoil shape and illustrates how the object is lifted by providing an air flow. Another essential concept in this Module is how the chemical energy in a combustion is converted into mechanical energy, i.e. the thrust force generated by a jet engine and shaft rotation force produced by a gas turbine. To illustrate this concept, we utilize a mini-scale gas turbine that showcases main internal components as part of the demonstration. In Module 4 – Thermo – fluilds, Bernouli equation serves as a key principle governing flow behaviors along a streamline. The demonstration kit in this module consists of a set of glass tubes connected at some reduced cross – sections. When compressed air is introduced, the flow at different cross – sections exhibits different velocity and different pressure. This difference in pressure is visualized by the varying height of liquid in the glass tube accordingly.

Table 1. Matching of Each Demonstration Kit With the Topic and Theoretical Concept

Demonstration kits	Matching topic and theoretical concepts
Lift and drag force demo	• 3D shape of an anfoil object; • how lift and drag forces are generated;
Mini-scale gas turbine demo	• how a gas turbine works;
Force vector demo	• how a force triangle is formed by three concurrent forces acting on an object;
Mini – robotic arm demo	• number of degree of freedom of a joint; • how the robotic arm is manipulated;
Four – bar linkage demo	• number of degree of freedom of a linkage; • shapes that a linkage can trace;
Proximity sensor set demo	• how the position of an object is sensed by optical and magnetic means;
Venturi effect demo	• how pressure and flow velocity change with each other in the Bernoulli equation.

2.2. Results and Discussion

In order to evaluate the effectiveness of utilizing various demonstration kits in this course, we launched a survey after students have completed learning in Module 1 and received feedback with a response rate of 34%. Both the survey questions and the scoring scheme are listed in the following Table 2.

Table 2. Survey Questions for Module 1

Survey questions for Module 1	Score range	Average score
1. *Both Lift and Drage Force demo and MIni-Scale Gas Turbine demo are relevant to Aerodynamics chapter.*	Min. 1 (Strongly disagree); 3 (Neutral); Max 5 (Strongly agree)	4.26
2. *The Life and Drag Force demo visualizes Airfoil and helps me understand how lift and drag forces are generated in Aerodynamics.*	Min. 1 (Strongly disagree); 3 (Neutral); Max 5 (Strongly agree)	3.92
3. *The Mini-Scale Gas Turbine demo visualizes the internal structure of the gas turbine and helps me understand the general working principle of a gas turbine.*	Min. 1 (Strongly disagree); 3 (Neutral); Max 5 (Strongly agree)	3.68
4. *Please help QUANTIFY the difference (if any) in your learning experiences between with the demo kits and without the demo kits.*	Min. 1 (Negative effect – better without demo kit); Max 5 (Significantly better with demo kit)	3.39
5. *This demo kits have helped me to conduct related quizzes and assignment.*	Min. 1 (Strongly disagree); 3 (Neutral); Max 5 (Strongly agree)	3.39
6. *The online quizzes support me further understand the concepts learned in lectures.*	Min. 1 (Strongly disagree); 3 (Neutral); Max 5 (Strongly agree)	3.92

Source: Internal Survey Data (with a response rate of 34%)

The average scores for each survey question is also presented in Figure 2 below. Question 1 has received the highest average score, indicating that most students perceive both demonstration kits – Lift and drag force and Mini-scale gas turbine – as highly relevant to the core concepts in Aerohyanmics. Question 2 has obtained the second highest score, suggesting that many students have found the two demonstration kits helpul in understanding the concept of lift and drag force on an airfol. On the other hand, Question 4 and 5 have received the lowest score, indicating that students feel the impact of demonstration kits is only slightly better than learning without them. Furthermore, the effect of demonstration kits on conducting quizzes and assignments is considered marginal.

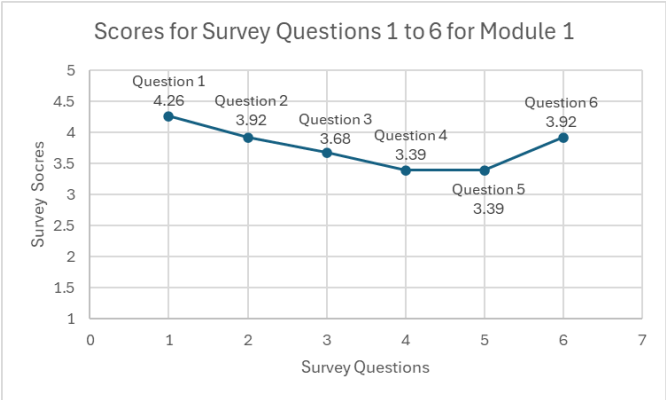


Figure 2. The Average Survey Scores for Survey Question 1 Through 6 for Module 1.

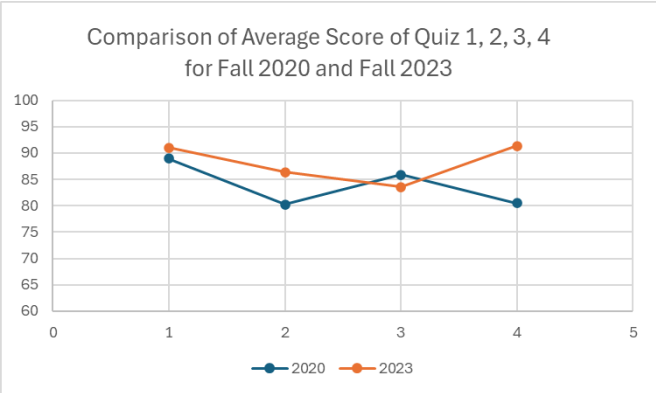


Figure 3. Comparison of Average Score of Quiz 1, 2, 3, 4 for Fall 2020 (Without Demo) and Fall 2023 (With Demo).

In this course, we incorporate an online quiz following each module as part of assessing students' learning outcomes. To further evaluate the impact of utilizing demonstration kits on the administration of online quizzes, we have compared the average scores for the same set of four online quizzes from the year 2020 (without demonstration kits) and 2023 (with demonstration kits), respectively. The results indicate a slightly improved average score of 91.01 in 2023 than 88.91 in 2020 for Module 1. For Module 3, the average score without demo in 2020 is even slightly better than that with demo in 2023. We will re-evaluate the choice of demo for Module 3 in future semesters. On the other had, there is a significant increase in the average score in Module 2 and 4. Unfortunately, due to time onstraints, we are not able to conduct surveys for other Modules. We plan to conduct surveys in Module 2 and 4 in future semesters.

2.3. Additional Comments From Students

In addition to survey questions with scores, we also include an open – ended question in the survey, so that students can express their views with wider aspects of evaluation. Some comments are cited in Table 3 below.

Table 3. Open-Ended Comments From Students

Do you have any other comments about Module 1?
Some comments for question 7: • Overall, I thought it was great. Good introduction to the world of aeronautics and astronautics. There are good pauses where we are encouraged to calculate the answers using the formula we have just learned. This is very helpful in reinforcing not only how to use the formula, but what it means. Thank you • The lectures, powerpoints and demo kits are very detailed, clear and useful for my understanding of concepts of topics in Module 1. • If the lift and drag demo kit can come with smoke to show the air streamline and the gas turbine is driven by the energy from combustion that seems will be better. • the propeller airfoil, downwash, vortices, induced drag concepts are quite difficult to understand. • I would've preferred if the demo kits were projected onto the big screens and explained more clearly, maybe with annotations.

Source: Internal Survey Data

Students have provided generally positive feedbacks and constructive advice to us. The suggestion in the last comment has been taken and implemented in the demonstration in Module 2, 3, and 4.

3. Conclusions

A total of seven demonstration kits have been carefully selected across the four learning modules, such that each of them visually support a fundamental concept for a specific topic. Survey questions for Module 1 are constructed to investigate students' learning experiences from various perspectives. The internal survey results indicate that students' general perception about the demonstration kits in Module 1 is positive, therefore, we will keep them as key components in this course.. Some average scores are lower than the other, which serves as a guideline for adjustment of demo kits selections in future semesters. The suggestions in the open-ended questions will further help us fine tune the selection of demonstration kits and further better structure them as an effective learning aid. The average scores in online quizzes with and without demonstration kits further confirms that demonstration kits are generally helpful in improving students' performance.

References

Basheer A., Hugerat, M., Kortam, N., Hofstein, A. (2017). The Effectiveness of Teachers' Use of Demonstrations for Enhancing Students' Understanding of and Attitudes to Learning the Oxidation-Reduction Concept. EURASIA Journal of Mathematics Science and Technology Education. 13(3):555-570 DOI:10.12973/eurasia.2017.00632a

Julius Fusic, S., Ramesh, H., and Sharanya, G. (2023). Effect of Q-Net demonstration-based educational approach on improving students problem-solving skills in the electrical machines course. *Journal of Engineering Education Transformations, Volume No 36, January 2023, Special issue, eISSN 2394-1707*, DOI:10.16920/jeet/2023/v36is2/23074

Kazama T. (2017) Hands-on teaching materials for use in mechanica engineering classrooms. The 4th International Conference on Design Engineering and Science, ICDES 2017, Aachen, Germany, September 17-19, 2017. https://www.jsde.or.jp/icdes/proceedings/4th-2017/PDF/141.pdf

Kim, H. (2022). Impact of In-Class Demonstration on Student Performance in an Introductory Thermodynamics Course. *ASEE 2022 Annual Conference, Minneapolis, Minnesota,* June 26th – 29th, 2022. https://peer.asee.org/impact-of-in-class-demonstration-on-student-performance-in-an-introductory-thermodynamics-course.pdf

Kim Y. (2015). Learning statics through in-class demonstration, assignment and evaluation. *International Journal of Mechanical Engineering Education*. 43(1): 23-37. DOI:10.1177/0306419015574643

Kumkratug, T. (2018). Demonstration of three-phase armature winding in classroom using a proposed portable hardware tool. IEEE Frontiers in Education Conference (FIE), San Jose, CA, USA, pp. 1-6. DOI: 10.1109/FIE.2018.8658372

Rossiter, J.A., Pope, S.A., Jones, B.LI., and Hedengren, J.D. (2019). Evaluation and demonstration of take home laboratory kit. IFAC-PapersOnLine, Volume 52, Issue 9, Pages 56-61, ISSN 2405-8963, DOI: https://doi.org/10.1016/j.ifacol.2019.08.124

Factors Influencing the Implementation of Formative Assessment as Perceived by Music Teachers: A Mixed Method Research in Macao

Qi Zixiang, University of Saint Joseph, Macao SAR
Serra Sofia, University of Alvaro, Portugal
Tchiang Van Man, University of Saint Joseph, Macao SAR

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study explores the implementation and conception of formative assessment (FA) by middle school teachers in Macao (N = 57) and examines the factors influencing its implementation. A convergent mixed-method approach was applied to collect two types of data. Quantitative data were gathered through two questionnaires: 1) One questionnaire was adapted from Ramsey and Duffy (2016) to assess teachers' frequency of FA implementation, with content validity examined by three experts. 2) The other, Conceptions and Practices of FA Questionnaire (Yan and Cheng, 2015; Yan et al., 2022), assessed both personal and contextual variables of FA implementation. Qualitative data were collected through semi-structured interviews, and traditional inductive thematic analysis was applied for data analysis. The mixed-method results indicated that the following: a) Teachers had significantly positive instrumental attitudes, moderately positive affective attitudes and high self-efficacy towards implementing FA; b) Teachers had a limited understanding of FA, which might be attributed to inadequate professional training and overly theoretical content in such training; c) Variables such as affective attitude, instrumental attitude, self-efficacy and school environment showed a significantly positively correlation with the implementation of FA strategies. Variables such as environment environment, instructional environment, student characteristics and high-stakes assessments showed a highly positive correlation with some FA strategies. Only subjective norms were had a significant positive effect on FA implementation.

Keywords: Formative Assessment, Music, Factors, Macao

iafor
The International Academic Forum
www.iafor.org

Introduction

The effectiveness of formative assessment (FA) on students' learning achievement has been confirmed in the literature (Black & Wiliam, 1998a; Hattie & Timperly, 2007; Shute, 2008). A theoretical framework of FA was proposed by William and Thompson (2008). This framework included five strategies: a) Clarifying and sharing learning intentions and success criteria, b) Eliciting evidence of students' learning, c) Providing feedback to advance the learners, d) Activating learners as owners of their own learning and e) Activating learners as learning resources for each other. In music education, some effective strategies of FA have been investigated (Green & Hale, 2009; Scott, 2012; Denis, 2018; Gallo, 2019; Martin, 2020; McPherson, 2022). In the educational context of Macao, FA has been introduced through documents released by DSEDJ, such as the *Music Guideline* (2017) and *Student Assessment System for Formal Education of Local Education System* (2020). Consequently, FA has played a significant role in the local music curriculum, known as 'the primary type of assessment'. Additionally, the factors influencing the implementation of FA by teachers have been explored in previous studies and can be divided into two types: personal and contextual. Thus, whether and how these factors affect FA implementation in the context of Macao is yet to be explored.

Literature Review

Personal Factors That Influence FA

According to Heritage (2007), even if teachers possess all the knowledge and skills required for FA, the implementation of FA may be hindered without the appropriate attitudes towards its role in teaching and learning. Conversely, teachers have a positive affective attitude towards FA are more likely to implement the method (Moss et al., 2013). Thus, an affective attitude towards FA is a factor that influences teachers' implementation of FA. Instrumental attitude has been defined as teachers' views on the value of FA in teaching and learning (Yan et al., 2021). Several studies have shown that the frequency of conducting FAs increases when teachers recognise the benefits of these assessments in tracking students' learning progress, informing instructional adjustments and promoting effective classroom activities (Brink & Bartz, 2017; Dixon and Haigh, 2009; Sezen-Barrie & Kelly, 2017). In contrast, a negative attitude towards the usefulness of FA may constrain teachers' practices to a superficial level, such as using rubrics only for a basic understanding of check-in classrooms but not analyzing the results further (Brown & Gao, 2015; Tebeje & Abiyu, 2015). Nevertheless, the relationship between instrumental attitude and practical implementation is not straightforward since other factors mediate the prediction of instrumental attitude on actual implementation. For instance, although many teachers conceptualize FA as an effective tool, its implementation remains random due to a lack of guidance (Crichton & McDaid, 2016). Professional learning programs can benefit teachers' FA practice by equipping them with the necessary skills and enhancing their positive instrumental attitude, thereby facilitating the implementation of FA (Crichton & McDaid, 2016; DeLuca et al., 2019; Ahmedi, 2019).

Self-efficacy is usually defined as teachers' confidence in their ability to implement and take control of FA (Yan & Cheng, 2015). Dixon and Haigh (2009) showed that self-efficacy mediates teachers' implementation, as teachers with strong self-efficacy about implementing FA would persistently try it even when encountering setbacks. As teachers perceive they have sufficient ability and skills to conduct FA, they implement it more frequently over time

(Brink & Bartz, 2017). Similarly, Karaman and Sahin (2017) revealed that teachers' implementation of FA was most strongly predicted by their level of self-efficacy based on their survey data. Overall, the higher the level of confidence they had about implementing FA, the more likely they were to implement it in teaching practice.

Support and encouragement from principals, school management teams and head teachers are also influential factors in promoting teachers' implementation of FA (Moss et al., 2013; Brink & Bartz, 2017). Moss et al. (2013) reported that when administrators had a deep understanding and appropriate attitude towards FA, their teachers were more inclined to take action. Additionally, administrators in schools can formulate policies that positively facilitate the implementation of FA (Crichton & McDaid, 2016). Prioritising FA in school-based policies allows teachers to better implement FA, as they can focus more on students' learning progress and support them in truly mastering the learning content rather than merely covering the curriculum (Brink & Bartz, 2017). Besides school leaders, policymakers and parents also have an impact on the implementation of FA.

Contextual Factors That Influence FA

Professional training promotes teachers' actual implementation of FA in classrooms (Wong, 2007). Numerous studies have shown that education and professional training can increase the frequency of FA practice by improving teachers' knowledge (e.g. assessment methods, subject content and teaching strategies) and understanding of FA (Crichton & McDaid, 2016; Hondrich et al., 2016; Koloi-Keaikitse, 2016; Saito & Inoi, 2017) or by guiding the integration of FA into curriculum design and classroom instruction (Wong, 2007). Although the effect of education and training is generally positive, the programme design is crucial (Yan, 2021). Deficient teaching and learning facilities in schools, such as computers, projectors, internet access, books, offices and printers, can also hinder the implementation of FA (Tebeje & Abiyu, 2015).

The instructional environment is related to working conditions, and these variables can impact teachers' FA implementation (Moss et al., 2013; Ahmedi, 2019). First, teachers have limited class time to elicit learning evidence and provide timely and specific feedback in their classes. Hence, some teachers may consider implementing FA to be consuming valuable class time that could be used for teaching curriculum content (Crichton and McDaid, 2016). Second, teachers working in larger classes are less inclined to practise FA due to the difficulties of class management and time (Brown & Gao, 2015). Third, external policies. As reported by Dixon and Haigh (2009), current international educational reforms promote FA, thereby increasing its implementation in schools.

Learner characteristics involve academic abilities, engagement in classroom activities, learning motivation, attitudes towards FA and student-teacher relationships that affect teachers' implementation of the method (Grob et al., 2017; Ahmedi, 2019). Student characteristics can determine the difficulty of implementing FA. Consequently, Yan et al. (2021) pointed out that students with higher levels of academic abilities, engagement, motivation and positive attitudes can simplify FA implementation for teachers.

The Chinese education system has long been dominated by the examination culture that considers assessment a tool of accountability and a standard of achievement (Brown & Gao, 2015). The underlying reason is that high-stakes examinations have been used to determine students' access to further education or employment opportunities. Consequently, the

widespread use of summative assessment (SA) impedes teachers' implementation of FA when various stakeholders (e.g. school leaders and parents) are more likely to agree with the goals of SA (Hamodi et al., 2017). Therefore, it is challenging for teachers to persist in implementing FA in classrooms if society does not endorse its goals and value (Deneen et al., 2019).

FA in Educational Contexts of Macao

The concept of FA was first introduced in music education in Macao in 2017 following the release of the *Music Guideline* (2017) by DSEDJ. This document regulated FA as a prominent assessment type as opposed to SA. Although it defined FA, outlined its benefits and suggested several methods for its application, it left the implementation of FA to the discretion of teachers in different school contexts. In the latest regulation titled '*Student Assessment System for Formal Education of the Local Education System'* (2020), FA was defined as 'a type of continuous assessment that is carried out constantly in the course of learning and teaching and focuses on the learning process'. Importantly, this regulation stipulated that assessment should be a combination of FA and SA in Macao, with the former being the primary type of assessment (DSEDJ, 2020). Based on the evidence in Macao, the educational bureau has recognised the importance of FA in education and has, thus, published relevant documents and regulations.

Research Questions

RQ 1: What is the implementation and conception of FA by music teachers in Macao?
RQ 2: Which personal factors can influence the implementation of FA in music teaching as perceived by teachers?
RQ 3: Which contextual factors can influence the implementation of FA in music teaching as perceived by teachers?

Methods

Mixed methods research promotes the strengths of both qualitative and quantitative methodologies (Creswell, 2003; Tashakkori & Teddlie, 2017). Using the combination method, the researchers can mitigate the weaknesses of each approach and view the problem from multiple perspectives. This mixed study applied a convergent parallel design. The researcher applied concurrent timing to implement the quantitative and qualitative strands during the same phase of the research process, prioritised the methods equally and kept the strands independent during analysis before mixing the results during the overall interpretation (Creswell & Clark, 2007).

Quantitative data were collected through a survey using a questionnaire. Part A of the questionnaire (Appendix 1) was adapted from Ramsey and Duffy (2016), while Part B was adapted from Yan and Cheng (2015) and Yan et al. (2022) (Appendix 2). The content validity was checked by three music education experts. Then, a pilot study (N = 20) was conducted to investigate the reliability of the questionnaire. After revision, the questionnaire was published via an online survey software. Subsequently, a total of 57 questionnaires were completed and returned. During quantitative data analysis, a descriptive analysis examined the frequency of teachers' use of FA strategies in Part A of the questionnaire. The Pearson's correlation coefficient (r) analysis was applied to measure the correlation between the frequency of implementation of FA (in Part A) and the variables in Part B of the questionnaire.

Subsequently, a regression analysis was conducted to estimate the impact of the variables in Part B on the frequency of FA implementation (in Part A).

Qualitative data were collected through semi-structured interviews. For this interview, a stratified, purposive sampling was applied to represent the experiences of certain sub-groups: years of teaching, undergraduate major, highest degree obtained and whether teaching a choir. Nine participants were selected for the interview (Table 1). The first author collected and transcribed the interview data before conducting a traditional deductive thematic analysis using Nvivo 14.

No.	Name	Gender	Years of teaching	Undergraduate Major	Highest degree obtained	Whether teaching choir
1	Ms. A	Female	7	Music Education	Bachelor's degree	Y
2	Mr. B	Male	5	Music Performance (Vocal)	Master's degree	Y
3	Ms. C	Female	7	Music Education	Bachelor's degree	Y
4	Mr. D	Male	7	Music Education	Master's degree	Y
5	Mr. E	Male	8	Music Education	Master's degree	Y
6	Ms. F	Female	6	Music Education	Bachelor's degree	Y
7	Ms. G	Female	13	Music Performance (Piano)	Master's degree	Y
8	Ms. H	Female	9	Music Administration	Master's degree	Y
9	Mr. I	Male	10	Music Education	Master's degree	Y

Table 1: Interview Participants' Demographic Information

Results

RQ 1: What Is the Implementation and Conception of FA by Music Teachers in Macao?

The quantitative results showed the frequency of implementation of different strategies for FA within the framework of Thompson and Wiliam (2007). Specifically, strategy two was most frequently applied by teachers, followed by strategies three and one. In contrast, teachers were less likely to use student-centred strategies such as four and five.

According to the qualitative data, teachers may have a limited understanding of FA. When discussing the definition of FA, most teachers lacked confidence and had difficulty providing a complete definition. Additionally, the teachers had some misconceptions about FA. The first was that they tended to mix the function of FA with other types of assessment, such as diagnostic or SA. For example, Mr. E believed that FA should be conducted before the lesson begins for lesson planning:

> Teachers need to understand the characteristics of the group they are facing, their sound conditions, and their learning foundation before a teacher starts teaching. At this point, a teacher must develop your teaching plan based on their FA, right?

Ms. F misunderstood FA as SA:

> FA is to give certain goals for students at each learning phase. As for singing, students need to undergo some singing tests so that they can be assessed whether they can meet certain requirements of learning tasks.

Similarly, Ms. A echoed:

> I believe that the purpose of FA is to enable students to review the content taught by the teacher within a certain stage, and meanwhile, the teacher can also understand whether the students have mastered it.

Additionally, teachers misunderstood the purpose of FA. For instance, Ms. A noted that implementing FA was to increase competition among the students. Such misunderstanding could make FA norm-referenced rather than criteria-referenced. Ms. G also believed that the purpose of FA was comprehensive:

> FA can be self-referenced, norm-referenced or criteria-referenced. Through FA, students can be competitive with peers. Without peer comparison, students may misjudge whether their performance is good or poor. In addition, under equal learning conditions in the same class, can students surpass themselves?

Furthermore, some teachers mentioned the features of FA without completeness and specificity. For instance, Ms. G mentioned that FA should be implemented during the learning process. Ms. C described that the forms of FA were more diverse than traditional SA, allowing for a more comprehensive assessment of students' achievement and growth. However, this diversity was not specified further. Mr. D was one of the only two teachers who mentioned giving feedback to students in FA. Thus, we observed that most teachers ignored the provision of feedback as a crucial component in the complete loop of FA. Therefore, the so-called FA could only be conducted as several small SAs spread over time, according to Mr. I. The result is that such assessment still functions as an assessment of learning rather than an assessment for learning.

RQ 2: Which Personal Factors Can Influence the Implementation of FA in Music Teaching As Perceived by Teachers?

The convergence of the quantitative and qualitative results showed that teachers had a positive affective attitude towards the implementation of FA. The descriptive data revealed that teachers had moderately high affective attitudes towards FA (M ± SD: 4.79 ± .978). Specifically, teachers believed that FA is an enjoyable process that can create a better learning atmosphere. Furthermore, quantitative data revealed that affective attitudes have a significant positive correlation with all five strategies, with the highest positive correlation with the implementation of FA strategy two (r = .550, p = .000). The qualitative data confirmed the quantitative findings, with most teachers indicating that they were more willing to conduct FA than SA.

The convergence of quantitative and qualitative results confirmed that teachers had a positive instrumental attitude towards the implementation of FA. Regarding the quantitative data, the descriptive statistics indicated that teachers had a significantly high instrumental attitude towards FA (4.93 ± .866). Thus, these assessments help teachers understand the students' strengths and weaknesses through feedback. Moreover, FA can promote the integration of learning and teaching with assessment, thereby enhancing teaching effectiveness. Notably, quantitative data showed that teachers' instrumental attitude showed a significantly positive correlation with all five strategies of FA, with the strongest correlation with strategy two (r = .578, p = .000).

The qualitative results corroborated the quantitative data, indicating that teachers believed that FA implementation had numerous benefits in music classrooms. For example, Ms. H mentioned that conducting FA could help teachers better monitor student learning progress:

> FA allows me to better capture the details of a student's practice so that I can monitor student learning. In day-to-day teaching, FA has a greater impact on student learning.

Mr. D further noted that implementing FA could help teachers utilise more effective teaching interventions:

> The most powerful thing about FA is that students know in which areas they are good (or not good) and how they can improve their current work. Accordingly, teachers can analyse and adjust their learning strategy based on this assessment information. Otherwise, they might not capture students' current learning needs. If teachers only teach or rehearse repetitively, teaching efficiency will not increase.

Additionally, Ms. C mentioned that FA aligns well with the nature of the music subject:

> I believe that FA is more suitable for the subject of music, especially for teaching singing. Such assessments can provide students with a better experience and are therefore welcome from a student's perspective.

In terms of self-efficacy, the quantitative descriptive data showed that teachers had moderately high self-efficacy regarding FA (4.75 ± .903). Nevertheless, teachers believed they could integrate FA into teaching (4.95 ± .833) and design appropriate assessment tasks (4.82 ± .928), while they lacked training in FA (4.49 ± .947). The correlation analysis revealed a significantly positive correlation between self-efficacy and all five FA strategies and the most positive correlation with the implementation of FA strategy five (r = .610, p = .000). The qualitative data confirmed the quantitative findings, indicating that many teachers lack professional training in FA. Most teachers indicated that they had never participated in professional development on FA. Only a few teachers mentioned that FA had been briefly covered in some training courses they had attended previously. However, these courses only introduced the concepts or principles of FA. Although some of these concepts could be applied to other subjects, they may not be entirely suitable for music lessons. Therefore, the actual implementation of FA was still at the teachers' discretion:

> In the earlier lectures I attended, FA was mentioned. Although it was explained, there were no specific instructions on how to implement it or practical guidance for teachers. Instruction in such lectures was given on concepts, frameworks or principles of implementing FA with limited explanations. Therefore, such lectures were always generalised with limited demonstrations related to music subjects. (Ms. C)

> In the last training course I attended on FA, the lecturer introduced online assessment tools such as 'Kahoot', which usually use multiple-choice tasks that were more suitable for subjects such as Chinese, history or English, whereas skill-based activities such as singing in music lessons have very little place for such tasks. As a result, teachers are left to consider how to implement FA in singing classes. On the other hand, the workload of teachers in Macao is relatively heavy. So the problem is how much time teachers could invest in exploring the application of FA after the professional training is finished? (Mr. D).

According to quantitative data, subjective norms were the only variables that could positively affect teachers' frequency of implementing FA. Regarding qualitative data, teachers believed that parents strongly supported them in implementing FA in their teaching.

RQ 3: Which Contextual Factors Can Influence the Implementation of FA in Music Teaching As Perceived by Teachers?

The quantitative data showed that the school environment has a significantly positive correlation with all five FA strategies and most positively with the implementation of FA strategy five (r = .545, p = .000). The school environment included several variables such as professional training, materials, tools and technology that support FA. The pooled quantitative and qualitative results indicated that teachers lacked professional training in FA. The quantitative data indicated that teachers felt that the school did not provide adequate professional training on FA (3.88 ± 1.211). The qualitative data confirmed the quantitative findings while further indicating that almost all teachers showed a strong passion for participating in training courses on FA. Nevertheless, they had different needs when participating in such training courses. Mr. D hoped that the training courses on FA would include concrete examples from music or singing lessons. Some other teachers mentioned their confusion in implementing FA and hoped it could be addressed in further training courses. For example, Ms. F listed some of her questions, such as 'How can FA meet students' learning needs?', 'How can FA be better integrated into existing courses?' and 'How can the effectiveness of FA be improved within the current time frame of teaching?' Similarly, Mr. E mentioned that:

> I am curious about the environment and conditions under which FA is implemented. Is it aimed at general music education in schools or extracurricular music education? Secondly, the effectiveness of its implementation.

Unlike other teachers, Ms. G reported that her interest was more about the cutting-edge academic development of FA:

> I am more interested in the cutting-edge dynamics of FA because for the basic theories of FA, we can just buy a book to read. But for me, the direction for future academic development attracted me a lot.

The only contradictory convergence in this study was found to be related to materials, tools and technology. According to the quantitative data, teachers felt the school did not provide them adequate materials, tools and technology for FA (4.14 ± 1.255). In contrast, the qualitative data revealed that the teachers felt the inadequacies of the current technological support and resources for FA.

The quantitative data revealed that the instructional environment showed a significant positive correlated with the implementation of FA strategies two (r = .261, p = .050), four (r = .533, p = .000), and five (r = .545, p = .000). The classroom environment included several variables, such as instructional time, class size and curriculum. The convergence of the quantitative and qualitative data suggested that teachers lack the time to implement FA. The quantitative data revealed that teachers reported insufficient time in each class to incorporate formative activities into lessons (3.88 ± 1.255), further confirmed by qualitative data. Mr. E commented:

> A routine rehearsal lasts one and a half hours and should include a 15-minute break according to school regulations. Usually, the first half of the rehearsal may extend to an hour, so I have the problem of not having enough class time during rehearsals.

As a result, teachers had to spend extra time implementing FA due to the limitation of in-class instruction time, as mentioned by Ms. F Such a phenomenon would inevitably increase teachers' workload. Ms. C echoed a similar idea:

> I am used to using learning checklists in my FA. Therefore, in addition to preparing daily lessons, I also need to invest more time and energy in designing the learning checklists and even adapting them to the situation of different classes.

The quantitative data showed that teachers believe that students actively participate in FA (4.53 ± .889). The correlation analysis also showed a significantly positive correlation between students' character and the implementation of FA strategies one, two, four and five, with the most positive correlation with the implementation of FA strategy five (r = .633, p = .000). Nevertheless, teachers also reported that students did not receive adequate training on FA (4.26 ± 1.126), which might explain why they cannot engage in FA activities (4.49 ± .928).

The qualitative data confirmed the quantitative findings that several student character traits (e.g. lack of autonomy, limited cognitive ability, obedience, attendance and student engagement) could hinder the implementation of FA. As commented by Ms. A:

> Junior high school students have very little opportunity to practise on their own, so I usually apply a spoon-fed-only method to teach that focuses mainly on classroom practice.

Mr. D believed that the students' cognition was limited to effectively engage in the FA process:

> I once guided students to reflect on their performance throughout a semester. When I reviewed the students' words, I found that students were very confused, for example, about how to practice effectively. The only option they suggested for further improvement was 'more'. Thus, it cannot be guaranteed that all students know what aspects of their own shortcomings they are aware of and that they use this feedback well and apply it to improve their future learning.

Mr. E mentioned students' obedience and attendance:

> The state of the students is fluctuating and unstable. If students show a high level of cooperation, the effectiveness of FA will naturally increase. If, on the other hand, student attendance and regular practice cannot be guaranteed, this will also reduce effectiveness.

Additionally, Mr. B referred to students' engagement:

> For students who are highly engaged in class and willing to collaborate with teachers, FA can be successfully implemented, and accordingly, their progress may be greater.

> In contrast, for some students with low engagement in class, even if you give them feedback or suggestions, they may not be very pleased to hear or receive.

Additionally, the convergence of quantitative and qualitative results confirmed that teachers believed that preparing for public appearances and competitions could discourage teachers from implementing some FA strategies. Moreover, as teachers reported, students focused more on their grades than on the learning process.

Discussion and Implications

In terms of personal factors, the combination of the quantitative and qualitative data revealed that teachers had strong positive affective attitudes, instrumental attitudes and self-efficacy towards the implementation of FA. First, teachers believed that FA is an enjoyable process that can create a better learning atmosphere. They also believed that FA improves the effectiveness of teaching and learning. While implementing FA, teachers believed they could effectively integrate the method into teaching and design appropriate assessment tasks. Nevertheless, they acknowledged their lack of professional training in FA. The quantitative data also showed that these variables showed a significant correlation with all FA strategies, as described previously (Moss et al., 2013; Brown & Gao, 2015; Brink & Bartz, 2019). The strongest correlation was found between instrumental attitude and FA implementation, followed by the correlation between affective attitude and self-efficacy and implementation. Subjective norms were the only variable that could positively affect teachers' frequency of implementing FA. The convergence of qualitative and quantitative data on contextual factors indicated that schools did not provide teachers with adequate training on FA. Teachers' willingness to participate in future training was high, but they had different learning needs (e.g. learning from concrete examples specifically in the context of music teaching, addressing current ambiguities or gaining information about the current academic development of FA). The convergence of qualitative and quantitative data also showed that teachers lacked instructional time to implement FA. Oversized class sizes significantly increased teachers' workloads and hindered the systematic implementation of FA. Such findings were consistent with Brown and Gao (2015) and Crichton and McDaid (2016). Regarding learning characteristics, although teachers reported that students can actively participate in FA, they mentioned that many students lack learning autonomy and cognitive skills; even obedience and attendance cannot be guaranteed for some students. Additionally, the combined qualitative and quantitative data revealed that the pressure of high-stakes performance or competition made it difficult for teachers to implement FA in the classroom.

As professional training can influence teachers' capability of applying FA and influence their frequency and quality of implementing FA, delivering effective professional training to teachers seems significant. Thus, this study suggested several ways to maximize the effectiveness of teacher training. First, professional training should clearly inform the concept of FA. As explored in this study, teachers may confuse the concept of FA with other types of assessment (such as SA and diagnostic assessment). Professional training tutors could instruct teachers to identify FA from several examples and explain the reasons for their choice (Wiliam, 2018). Additionally, teachers should be aware of the purpose and characteristics of FA (e.g. criterion-referenced rather than norm-referenced or self-referenced, continuous use during the teaching process and diverse assessors, including teachers, learners and peers). Importantly, tutors should provide teachers with effective practices for FA, specifically in music. These effective practices could include strategies for aligning assessment with objectives and incorporating FA into instruction, designing assessment tools (such as rating

scales, checklists, rubrics, guided listening worksheets and observation sheets), criteria-referenced performance assessment and self and peer assessment. As mentioned by teachers in this study, they needed more practical examples of how to apply these strategies in the context of teaching music. Also, Wong (2007) suggested that professional training should be changed from a teacher-centred to a student-centred, interactive mode. By applying such methods, teachers may have the opportunity to learn according to their experience levels and receive constructive feedback, which could motivate them to make changes in actual practice.

Conclusion

The present study demonstrated that music teachers had significantly positive instrumental attitudes, moderately positive affective attitudes and high self-efficacy towards the implementation of FA in Macau. Nevertheless, the teachers had a limited understanding of FA, which might be related to insufficient professional training and overly theoretical content in this training. This study also investigated the factors influencing teachers' implementation of FA. Personal variables, such as affective attitude, instrumental attitude, and self-efficacy showed a significantly positive correlation with the implementation of FA. Only subjective norms had a significant positive effect on the implementation of FA. Moreover, a highly positive correlation was established between the contextual variables such as school environment, instructional environment, students' characteristics, and high-stakes assessments and the implementation of FA strategies.

Appendix 1

	N	Minimum	Maximum	Mean	SD
I share the learning goal before students start working in singing class.	57	2	5	3.89	.880
The learning goal for the singing lesson is connected to local academic standards.	57	2	5	3.77	.945
I refer to the learning goal multiple times in the singing lesson.	57	1	5	3.46	.965
I share with students the criteria that will be used to determine their success in the singing lesson.	57	1	5	3.72	.978
I have students participate in developing the criteria for success in the singing lesson.	57	1	5	3.18	1.182
I provide demonstrations, models or examples of singing when I articulate the criteria for success.	57	3	5	4.44	.732
I ask questions within the singing lesson to assess the singing knowledge of the whole group.	57	2	5	4.07	.863
I ask questions within the singing lesson to assess the singing knowledge of an individual student.	57	2	5	4.00	.926
I make adjustments to instruction within the singing lesson based on student responses.	57	1	5	3.93	.997
I ensure the pace of the singing lesson to provide adequate wait time for students to respond to questions.	57	2	5	4.00	.802
I use follow-up questions when engaging students in discourse.	57	2	5	4.26	.791
I assess the singing of the learners by utilising live and in-class singing exams.	57	2	5	3.82	.966
I assess the singing of the learners by observing and judging their in-class singing performance.	57	2	5	4.14	.833
I assess the technical accuracy (e.g. pitch accuracy, rhythm accuracy, pronunciation, and vocal technique) when I assess the singing of the learners.	57	2	5	4.32	.985
I assess the musical expression (e.g. dynamics, timbre, phrasing, articulation, composer/stylistic intent, etc.) when I assess the singing of the learners.	57	2	5	4.09	.931
I provide a grade to the learners in my feedback as a number or percentage.	57	1	5	3.26	1.094
I tell students what they have not achieved with specific reference to their learning.	57	1	5	3.72	1.114
I tell students what they have achieved with specific reference to their learning.	57	2	5	3.74	.936
I specify a better or different strategy of singing for improvement.	57	1	5	4.14	1.008
I point out the objects that need improvement, such as a person, a vocal part or a whole team.	57	2	5	4.25	.851
I provide praise related to singing performance or instead of the learners at the self-level (i.e. ability or effort).	57	1	5	3.30	1.401
I give immediate feedback that is provided directly during the process of a repertoire.	57	1	5	3.88	1.135
I give delayed feedback that is shared several minutes after the completion of a repertoire.	57	1	5	3.98	1.061
I provide corrective information (such as verifying 'right' or 'wrong', providing the correct response, error flagging, or 'try again') in the singing class through explanation or demonstration.	57	1	5	4.18	.869

I offer commentary (such as hints, cues or prompts) that guides students to make independent observations and choices.	57	1	5	4.19	.811
I provide my feedback to the learners verbally.	57	1	5	4.39	.840
I provide my feedback to the learners in writing.	57	1	5	2.68	1.242
I show students what they need to do in order to improve their learning based on assessment results.	57	1	5	3.91	1.005
I guide students in acting on assessment feedback information to improve their learning.	57	1	5	3.93	.961
I use student self-assessment in singing lessons.	57	1	5	3.25	1.138
I guide students to identify strengths and weaknesses in their own singing performance.	57	1	5	3.79	.940
I guide the learners in indicating the location and dimensions of their weaknesses in their singing performance.	57	1	5	3.70	.906
I ask the learners to record themselves and then listen to these recordings to identify, articulate and correct mistakes.	57	1	5	3.42	1.253
I guide students to identify strategies that will improve their work.	57	1	5	3.37	1.096
I use evidence generated through student self-assessments to inform future teaching and learning.	57	1	5	3.42	1.133
I help students to develop self-assessment skills.	57	1	5	3.49	.984
I use student peer assessment in singing lessons.	57	1	5	3.35	1.142
I guide students to provide feedback to help peers improve.	57	1	5	3.54	1.103
I use evidence generated through student peer-assessments to inform future teaching and learning.	57	1	5	3.25	1.184
I provide the learners with sentence starters (e.g. 'I like the way you...', 'You did an excellent job of ...', 'I was surprised that...', and 'I do not understand') to prompt them.	57	1	5	3.68	1.198
I monitor the peer assessment process by circulating among the pairs, giving feedback, coaching and sequencing activities as necessary.	57	1	5	3.58	.999
I teach students to engage in peer feedback processes.	57	1	5	3.46	.946
Valid N (listwise)	57				

Appendix 2

	N	Minimum	Maximum	Mean	SD
I like to apply FA.	57	2	6	4.82	1.002
FA is an enjoyable process.	57	2	6	4.68	.985
FA facilitates a better learning atmosphere.	57	3	6	4.88	.946
FA can offer an accurate appraisal of students' performance.	57	3	6	4.79	.840
FA can integrate learning and teaching with assessment.	57	3	6	5.00	.824
FA assessment helps students to understand their strengths and weaknesses through teachers' feedback.	57	2	6	4.95	.934
FA can improve the quality of teaching and learning.	57	3	6	5.05	.875
As far as I know, the following stakeholders believe that FA should be implemented: Officials of the Education Bureau.	57	3	6	4.93	.842
As far as I know, the following stakeholders believe that FA should be implemented: The principal of my school.	57	3	6	4.89	.838
As far as I know, the following stakeholders believe that FA should be implemented: Parents of my students.	57	3	6	4.70	.865
As far as I know, the following stakeholders believe that FA should be implemented: My colleagues.	57	3	6	4.81	.766
I can integrate FA into the teaching and learning process.	57	3	6	4.95	.833
I have received sufficient training to implement FA	57	2	6	4.49	.947
I can design appropriate assessment tasks for FA.	57	2	6	4.82	.928
My administrator supports and encourages the use of FA.	57	2	6	4.72	.940
My school provides me with materials/tools to support FA.	57	1	6	4.14	1.125
My school provides me with technology to support FA.	57	1	6	4.07	1.208
My school provides me with adequate training in FA practices.	57	1	6	3.88	1.211
The curriculum allows me to implement FA.	57	1	6	4.63	1.159
My class sizes allow me to customise instruction for all students.	57	1	6	4.02	1.369
The instruction time of each class is sufficient for integrating FA activities.	57	1	6	3.88	1.255
My students' attitudes towards FA support my implementation of FA.	57	1	6	4.42	.999
My students are engaged during my implementation of FA.	57	2	6	4.53	.889
My students have sufficient ability to participate in FA.	57	2	6	4.49	.928
My students have appropriate training to participate in FA.	57	1	6	4.26	1.126
High-stakes music competitions or performance preparation makes doing FA challenging.	57	1	6	4.40	1.116
How my teaching is judged makes implementing FA difficult.	57	1	6	3.82	1.338

Students care more about examination scores than learning through FA.	57	1	6	4.67	1.107</
To me, helping students get high scores on examinations is more important than FA.	57	1	6	3.56	1.376
Parents' expectations regarding examination scores make FA implementation difficult.	57	1	6	4.14	1.217
Valid N (listwise)	57				

References

Ahmedi, V. (2019). Teachers' attitudes and practices towards formative assessment in primary schools. *Journal of Social Studies Education Research, 10*(3), 161-175.

Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice*, *5*(1), 7-74.

Brink, M., & Bartz, D. E. (2019). Effective use of formative assessment by high school teachers. *Practical Assessment, Research, and Evaluation, 22*(1), 8.

Brown, G. T., Kennedy, K. J., Fok, P. K., Chan, J. K. S., & Yu, W. M. (2009). Assessment for student improvement: Understanding Hong Kong teachers' conceptions and practices of assessment. *Assessment in Education: Principles, Policy & Practice, 16*(3), 347-363.

Crichton, H., & McDaid, A. (2016). Learning intentions and success criteria: Learners' and teachers' views. *The Curriculum Journal, 27*(2), 190-203.

DeLuca, C., Chapman-Chin, A., & Klinger, D. A. (2019). Toward a teacher professional learning continuum in assessment for learning. *Educational Assessment, 24*(4), 267-285.

Deneen, C. C., Fulmer, G. W., Brown, G. T., Tan, K., Leong, W. S., & Tay, H. Y. (2019). Value, practice and proficiency: Teachers' complex relationship with assessment for learning. *Teaching and Teacher Education, 80*, 39-47.

Denis, J. M. (2018). Assessment in music: A practitioner introduction to assessing students. *Update: Applications of Research in Music Education*, *36*(3), 20-28.

Dixon, H., & Haigh, M. (2009). Changing mathematics teachers' conceptions of assessment and feedback. *Teacher Development, 13*(2), 173-186.

Direcção dos Serviços de Educação e Juventude. [DSEJ] (2017a). *Junior Secondary School music curriculum guide*. http://www.dsej.gov.mo/crdc/guide/data/junior/Music_guide_c.pdf

Direcção dos Serviços de Educação e Juventude. [DSEJ] (2020). *Student assessment system for formal education of local education system*. https://www.dsedj.gov.mo/~webdsej/www/edulaw/202007/download/Regulation_28_2020e.pdf

Gallo, D. J. (2019). Formative assessment practices and children's singing accuracy: A mixed methods inquiry. *International Journal of Music Education*, *37*(4), 593-607.

Green, S. K., & Hale, C. L. (2011). Fostering a lifelong love of music: Instruction and assessment practices that make a difference. *Music Educators Journal*, *98*(1), 45-50.

Grob, R., Holmeier, M., & Labudde, P. (2017). Formative assessment to support students' competencies in inquiry-based science education. *Interdisciplinary Journal of Problem-Based Learning, 11*(2), 1-9.

Heritage, M. (2007). Formative assessment: What do teachers need to know and do? *Phi Delta Kappan*, *89*(2), 140-145.

Hondrich, A. L., Hertel, S., Adl-Amini, K., & Klieme, E. (2016). Implementing curriculum-embedded formative assessment in primary school science classrooms. *Assessment in Education: Principles, Policy & Practice, 23*(3), 353-376

Karaman, P., & Şahin, Ç. (2017). Adaptation of teachers' conceptions and practices of formative assessment scale into Turkish culture and a structural equation modeling. *International Electronic Journal of Elementary Education, 10*(2), 185-194.

Koloi-Keaikitse, S. (2016). Assessment training: A precondition for teachers' competencies and use of classroom assessment practices. *International Journal of Training and Development, 20*(2), 107-123.

Martin, L. (2020). Using synchronous formative feedback to facilitate student growth. *Music Educators Journal*, *107*(2), 51-57.

McPherson, G. E., Blackwell, J., & Hattie, J. (2022). Feedback in music performance teaching. *Frontiers in Psychology*, *13*, 891025.

Moss, C. M., Brookhart, S. M., & Long, B. A. (2013). Administrators' roles in helping teachers use formative assessment information. *Applied Measurement in Education, 26*(3), 205-218.

Ramsey, B., & Duffy, A. (2016). *Formative assessment in the classroom: Findings from three districts. Michael and Susan Dell Foundation and Education, 1*. https://education-first.com/wpcontent/uploads/2016/05/MSDF-Formative-Assessment-Study-Final-Report.pdf

Saito, H., & Inoi, S. I. (2017). Junior and senior high school EFL teachers' use of formative assessment: A mixed-methods study. *Language Assessment Quarterly, 14*(3), 213-233.

Scott, S. J. (2012). Rethinking the roles of assessment in music education. *Music Educators Journal*, *98*(3), 31-35.

Sezen-Barrie, A., & Kelly, G. J. (2017). From the teacher's eyes: Facilitating teachers' noticings on informal formative assessments (IFAs) and exploring the challenges to effective implementation. *International Journal of Science Education, 39*(2), 181-212.

Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research*, *78*(1), 153-189.

Tebeje, M., & Abiyu, A. (2015). Improving implementation of formative continuous assessment at College of Agriculture, Wolaita Sodo University, Ethiopia. *Journal of Education and Practice, 6*(19), 110-116.

Wiliam, D. (2018). *Embedded formative assessment*. Solution Tree Press.

Wong, M. W. (2007). Assessment for learning and teacher development: The experience of three Hong Kong teachers. *Teacher Development, 11*(3), 295-312.

Yan, Z., & Cheng, E. C. K. (2015). Primary teachers' attitudes, intentions and practices regarding formative assessment. *Teaching and Teacher Education, 45*, 128-136.

Yan, Z., Li, Z., Panadero, E., Yang, M., Yang, L., & Lao, H. (2021). A systematic review on factors influencing teachers' intentions and implementations regarding formative assessment. *Assessment in Education: Principles, Policy & Practice, 28*(3), 228-260.

Yan, Z., Chiu, M. M., & Cheng, E. C. K. (2022). Predicting teachers' formative assessment practices: Teacher personal and contextual factors. *Teaching and Teacher Education, 114*, 1-13.

Developing an AI-Powered Robotic Assistant for Interactive Video-Based Learning: Engineering Innovations and System Design

Chen Giladi, Sami Shamoon College of Engineering, Israel

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study presents an AI-powered robotic assistant's concept and high-level design to revolutionize classroom video-based learning. The proposed system utilizes advanced natural language processing (NLP) and computer vision techniques to potentially generate interactive multiple-choice questions from educational YouTube videos automatically. The envisioned robotic assistant would transcribe video content, segment it, and use language models to create questions projected onto students' desks, potentially creating an immersive and interactive learning experience. The system concept includes a 3D-printed face with a human-like appearance and lip-sync capabilities to enhance communication. Student interaction is proposed through innovative 'flip-flop' devices with ArUco markers, potentially enabling real-time collection and analysis of responses. This paper introduces the system architecture and discusses its potential applications in enhancing video-based learning experiences and reducing teacher workload.

Keywords: AI in Education, Robotic Teaching Assistant, Video-Based Learning, Educational Technology Integration

iafor
The International Academic Forum
www.iafor.org

1. Introduction

Video-based learning has become increasingly prevalent in modern education, offering flexibility and access to a wide range of content (Lin et al., 2018). However, it often lacks the interactivity and personalization of traditional classroom settings. This challenge presents an opportunity for innovative solutions to bridge the gap between passive video consumption and active learning experiences (Teresa et al., 2023). Artificial Intelligence (AI) has shown tremendous potential in various educational applications, from personalized learning paths to automated grading systems (Chen et al., 2020). Integrating AI in education promises to enhance learning outcomes, increase engagement, and provide valuable insights into student performance (Sajja et al., 2023).

This paper introduces the concept of an AI-powered robotic assistant designed to transform video-based learning in classroom settings. By combining advanced natural language processing, computer vision, and robotics, the proposed system aims to create an interactive and immersive learning environment that adapts to students' needs and enhances their engagement with educational video content.

Figure 1: AI-powered robotic teaching assistant engaging with students in a classroom setting.

2. Methods

2.1 System Design and Overview

The proposed AI-powered robotic assistant integrates various technologies to enhance video-based learning (Al-Shaikh et al., 2024). The system architecture includes an AI engine for processing educational video content, transcribing speech, and generating relevant questions (Forkan et al., 2023). A robotic interface with human-like features serves as a visual focal

point, potentially increasing student engagement (Wrede et al., 2006). The design incorporates a projection system to display questions and information directly onto students' desks, creating an immersive learning environment (Yu, 2023). Student interaction is facilitated through a novel response mechanism using 'flip-flop' devices with ArUco markers, enabling real-time collection and analysis of responses (Mahalingam et al., 2024). This system adapts content dynamically based on individual student needs, aiming to improve learning outcomes compared to traditional teaching methods (Sajja et al., 2023).

2.2 Key Components

The AI engine functions as the system's core, using natural language processing and machine learning algorithms to analyze video content, generate questions, and process student responses (Sunitha et al., 2023). This component learns and improves based on student interactions and educator feedback (Sajja et al., 2023). The robotic interface, featuring a 3D-printed face, enhances the learning experience by visually representing the AI assistant (Kalyan Raj et al., 2023). This interface could incorporate lip-sync capabilities to match educational video audio, creating engaging student interactions. The projection system creates an immersive learning environment by displaying questions and information directly onto students' desks, blending digital content with the physical classroom space (Yu, 2023). Using 'flip-flop' devices with ArUco markers, the student response mechanism collects real-time feedback from students (Mahalingam et al., 2024). This component enables quick student responses, promotes active participation, and provides data for the AI engine to adapt its content delivery.

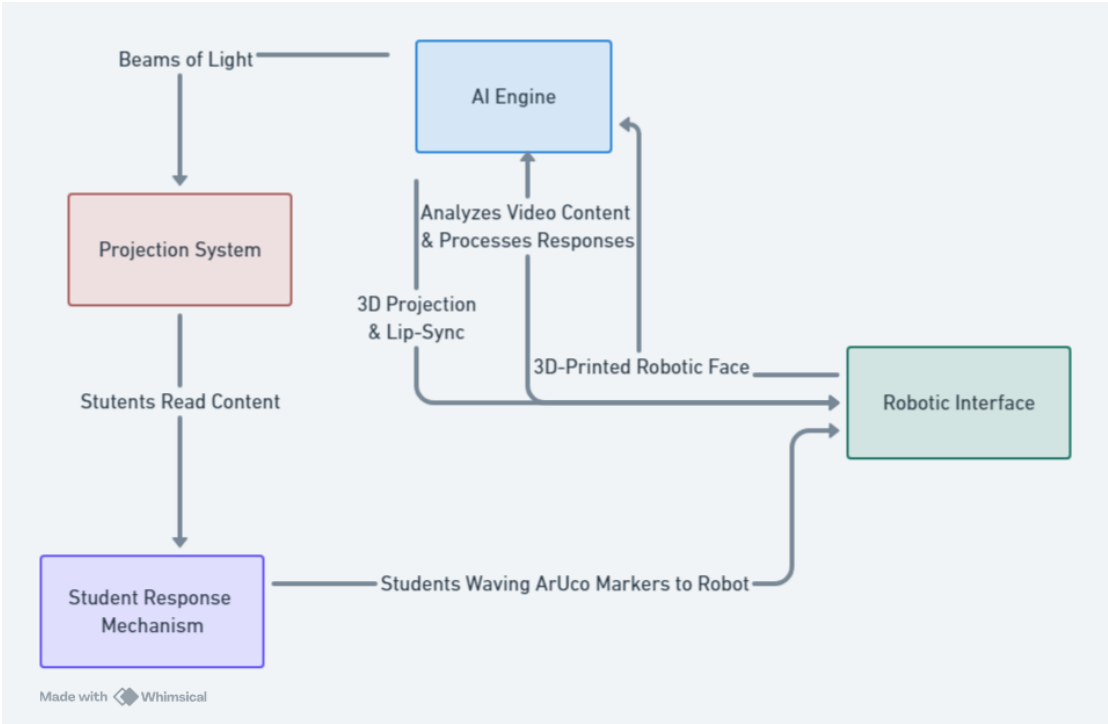


Figure 2: System Architecture. This diagram illustrates an advanced educational system where an AI Engine analyzes content and student responses, integrating with a 3D-printed robotic interface and a projection system that displays interactive content for student engagement through ArUco marker-equipped response devices.

3. Results and Discussion

3.1 Automated Question Generation

The proposed system's ability to automatically generate questions from educational videos represents a significant innovation in video-based learning. By leveraging natural language processing techniques, the AI engine analyzes video transcripts, identifies key concepts, and creates relevant multiple-choice, true/false, and short-answer questions (Kang et al., 2021; Bachiri & Mouncif, 2022). This feature saves educators significant time in preparing interactive elements for video lessons, with studies showing that AI-generated questions perform comparably to human-generated ones in assessing learner competency (Gala et al., 2021; Elshiny & Hamdy, 2023). The system enables the creation of a diverse range of questions, catering to different cognitive levels and learning objectives, with some approaches even incorporating pre-questions with images to improve learners' performance on comprehension tests (Skalban et al., 2012).

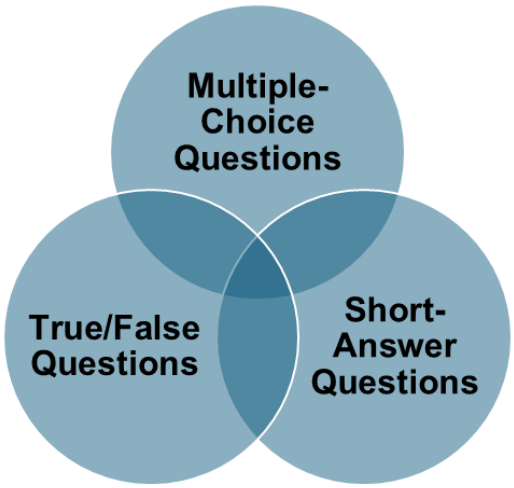


Figure 3: Types of Questions Generated: Multiple-choice (tests comprehension and recall, allows quick assessment), True/False (validates understanding, efficient for basic concepts), Short-Answer (encourages critical thinking, provides deeper insight into learner comprehension).

3.2 Immersive Learning Environment

Projecting questions and information directly onto students' desks creates an immersive learning environment, seamlessly integrating digital content into their physical space (Koike et al., 2000). This approach increases student engagement by enhancing interaction with learning materials and improving focus (Lin et al., 2014; Garrick et al., 2013). Presenting information in this novel way captures and maintains students' attention more effectively than traditional video playback methods, with studies showing improved task performance and user comfort (Wagner et al., 2018). The immersive nature of the projected content reduces distractions and fosters a more focused learning experience, particularly when information is displayed in the upper and nearby areas of the desk (Tokiwa & Fujinami, 2017).

Figure 4: Robotic assistant projecting content on the desk.

3.3 Real-Time Student Interaction

The proposed 'flip-flop' devices with ArUco markers represent an innovative approach to collecting student responses in real-time, similar to other student response systems that have shown promise in enhancing active learning and engagement (Mikic-Fonte et al., 2019; McLoone et al., 2015). This feature facilitates active participation from all students, including those hesitant to speak up in traditional settings, improving students' willingness to communicate and overall satisfaction with the learning experience (Hung, 2017). The real-time nature of this interaction enables the system to adapt its content delivery based on student responses, akin to real-time formative assessment tools like InkSurvey and Quiz It (Kowalski et al., 2013; Adam et al., 2014). Suppose many students struggle with a particular concept. In that case, the system can provide additional explanations or adjust the difficulty of subsequent questions, allowing instructors to gauge student understanding instantly and adapt their teaching accordingly (Mattei & Ennis, 2014).

Figure 5: Enhancing Classroom Engagement with Real-Time Response Devices. The image depicts students using 'flip-flop' devices with ArUco markers. This innovative approach improves engagement and learning by allowing real-time, active participation and immediate adaptation of teaching strategies based on student responses.

3.4 Potential Impact and Future Directions

The proposed AI-powered robotic assistant can significantly impact classroom-based learning by increasing interactivity and engagement, potentially enhancing student learning outcomes and making video lessons more effective (Suntharalingam, 2024; Kalyan Raj et al., 2023). The system could reduce the workload for educators by automating question generation and response analysis, freeing up time for more personalized instruction and support (Forkan et al., 2023; Kang et al., 2021). However, implementing such a system faces challenges, including ensuring the accuracy and relevance of generated questions, addressing privacy concerns related to data collection, and integrating the technology seamlessly into existing classroom environments (Kokku et al., 2018). Future research directions could explore the system's effectiveness in different subject areas and age groups and investigate its long-term impact on student learning outcomes and motivation (Seo et al., 2020; Lin et al., 2018).

4. Conclusion

The concept of an AI-powered robotic assistant for video-based learning represents an innovative approach to addressing the challenges of engagement and interactivity in digital education. By combining advanced AI technologies with a physical robotic presence and immersive projection systems, the proposed system has the potential to transform how students interact with educational video content.

While the implementation and effectiveness of such a system remain to be fully explored, the concept opens exciting possibilities for the future of classroom technology. Further research and development in this area could lead to significant advancements in educational technology, potentially revolutionizing how we approach video-based learning in classroom settings.

Acknowledgments

The author sincerely thanks the participating school, teachers, and students for their cooperation and invaluable feedback during this feasibility study—special thanks to the engineering team at Sami Shamoon College of Engineering for their technical support and expertise. The author acknowledges the Ministry of Education for facilitating and funding this research, which was instrumental in realizing this project.

References

Adam, D., Kioutsiouki, D., Karakostas, A., & Demetriadis, S. (2014). Do Your Students Get It? Quiz It! The Android Classroom Response System. In 2014 IEEE 14th International Conference on Advanced Learning Technologies (pp. 168-170). IEEE.

Al-Shaikh, R., Al-Malki, N., & Almasre, M. (2024). Implementing the cognitive theory of multimedia learning in designing and evaluating an AI educational video assistant utilizing large language models. Heliyon, 10(1), e25361.

Bachiri, Y., & Mouncif, H. (2022). Increasing Student Engagement in Lessons and Assessing MOOC Participants Through Artificial Intelligence. In Business Information Systems (pp. 128-142). Springer, Cham.

Chen, L., Chen, P., & Lin, Z. (2020). Artificial Intelligence in Education: A Review. IEEE Access, 8, 75264-75278.

Elshiny, R. M., & Hamdy, A. (2023). Automatic Question Generation Using Natural Language Processing and Transformers. In 2023 International Conference on Computing Advancements (ICCA) (pp. 1–6). IEEE.

Forkan, A., Kang, Y., Jayaraman, P., Du, H., Thomson, S., Kollias, E., & Wieland, N. (2023). VideoDL: Video-Based Digital Learning Framework Using AI Question Generation and Answer Assessment. International Journal of Advanced Corporate Learning, 16(1), 35–47.

Gala, R., Vijayaraghavan, R., Nikam, V., & Kiwelekar, A. (2021). Real-Time Cognitive Evaluation of Online Learners through Automatically Generated Questions. In 2021 IEEE 20th International Conference on Cognitive Informatics & Cognitive Computing (ICCI*CC) (pp. 166-173). IEEE.

Garrick, R., Villasmil, L., Dell, E., & Hart, R. (2013). Creating Technology-Rich Learning Environments for the Classroom. In Technological Advancement in Developed and Developing Countries: Discoveries in Global Information Management (pp. 302–316). IGI Global.

Hung, H. T. (2017). Language Teaching and Technology Forum: Integrating a Student Response System in Flipped Classrooms. TESOL Quarterly, 51(4), 988–998.

Kalyan Raj, L., Bijapur, C. S., & Gururaja, H. S. (2023). Digital Assistant Robot for Academic Fraternity Using Deep Learning. In 2023 7th International Conference on Computation System and Information Technology for Sustainable Solutions (CSITSS) (pp. 1-6). IEEE.

Kang, Y. B., Forkan, A., Jayaraman, P., Wieland, N., Kollias, E., Du, H., Thomson, S., & Li, Y. F. (2021). An AI-based Solution for Enhancing Delivery of Digital Learning for Future Teachers. arXiv preprint arXiv:2106.04719.

Koike, H., Sato, Y., Kobayashi, Y., Tobita, H., & Kobayashi, M. (2000). Interactive textbook and interactive Venn diagram: natural and intuitive interfaces on augmented desk system. In Proceedings of the SIGCHI conference on Human Factors in Computing Systems (pp. 121–128). ACM.

Kokku, R., Sundararajan, S., Dey, P., Sindhgatta, R., Nitta, S. V., & Sengupta, B. (2018). Augmenting Classrooms with AI for Personalized Education. In 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP) (pp. 6976-6980). IEEE.

Kowalski, F. V., Kowalski, S. E., & Gardner, T. Q. (2013). Using Mixed Mobile Computing Devices for Real-Time Formative Assessment. In 2013 ASEE Annual Conference & Exposition (pp. 23–1186). ASEE.

Lin, P. H., Wooders, A., Wang, J. T. Y., & Yuan, W. M. (2018). Artificial Intelligence, the Missing Piece of Online Education? IEEE Engineering Management Review, 46(3), 25–28.

Lin, T. Y., Chen, C. F., Huang, D., Huang, C. W., & Chen, G. D. (2014). Using Resource of Classroom and Content of Textbook to Build Immersive Interactive Learning Playground. In 2014 IEEE 14th International Conference on Advanced Learning Technologies (pp. 669–670). IEEE.

Mahalingam, T., Nishanth, S., Sanjay, T., & Sathya, K. (2024). AI-Assisted Studying Partner for Students. International Journal of Advanced Research, 12(1), 670–675.

Mattei, M. D., & Ennis, E. (2014). Continuous, Real-Time Assessment of Every Student's Progress in the Flipped Higher Education Classroom Using Nearpod. Journal of Learning in Higher Education, 10(1), 1-7.

McLoone, S. C., Villing, R., & O'Keeffe, S. (2015). A Novel Smart Device Student Response System for Supporting High-Quality Active Learning in the Engineering and Science Disciplines. AISHE-J: The All Ireland Journal of Teaching and Learning in Higher Education, 7(2), 2391–23919.

Mikic-Fonte, F. A., Liz-Domínguez, M., Caeiro-Rodríguez, M., & Llamas-Nistal, M. (2019). Work-in-Progress: QMSFC: A System for Encouraging the Active Participation of Students in Flipped Classroom. In 2019 IEEE Global Engineering Education Conference (EDUCON) (pp. 913-917). IEEE.

Sajja, R., Sermet, Y., Cikmaz, M., Cwiertny, D., & Demir, I. (2023). Artificial Intelligence-Enabled Intelligent Assistant for Personalized and Adaptive Learning in Higher Education. arXiv preprint arXiv:2309.10892.

Seo, K., Fels, S., Yoon, D., Roll, I., Dodson, S., & Fong, M. (2020). Artificial Intelligence for Video-based Learning at Scale. In Proceedings of the Seventh ACM Conference on Learning @ Scale (pp. 215–218). ACM.

Skalban, Y., Ha, L., Specia, L., & Mitkov, R. (2012). Automatic Question Generation in Multimedia-Based Learning. In Proceedings of COLING 2012: Posters (pp. 1151-1160).

Sunitha, M., Vijitha, B., & Gunavardhan, E. (2023). Artificial Intelligence-based Smart Education System. In 2023 International Conference on Electronic Systems, Signal Processing and Computing Technologies (ICESC) (pp. 1–6). IEEE.

Suntharalingam, H. (2024). Enhancing Digital Learning Outcomes Through the Application of Artificial Intelligence: A Comprehensive Review. International Journal of Innovative Science and Research Technology, 9(4), 530-539.

Teresa, L. A., Sunil, N. M., Andrews, S. R., Thengumpallil, T. T., Thomas, S., & Binson, V. A. (2023). Enhancing Children's Learning Experience: Interactive and Personalized Video Learning with AI Technology. In 2023 IEEE International Conference on Recent Advances in Systems Science and Engineering (RASSE) (pp. 1–6). IEEE.

Tokiwa, M., & Fujinami, K. (2017). Understanding Where to Project Information on the Desk for Supporting Work with Paper and Pen. In Proceedings of the XVIII International Conference on Human-Computer Interaction (pp. 1-4).

Wagner, J., Freitas, C., & Nedel, L. (2018). VirtualDesk: A Comfortable and Efficient Immersive Information Visualization Approach. Computer Graphics Forum, 37(3), 415-426.

Wrede, B., Kleinehagenbrock, M., & Fritsch, J. (2006). Towards an Integrated Robotic System for Interactive Learning in a Social Context. In 2006 IEEE/RSJ International Conference on Intelligent Robots and Systems (pp. 5295-5300). IEEE.

Yu, D. (2023). AI-Empowered Metaverse Learning Simulation Technology Application. In 2023 International Conference on Metaverse, Extended Reality and Artificial Intelligence (iMeta) (pp. 178–181). IEEE.

Contact email: chengi1@sce.ac.il

Exploring Imaginary Worlds: Leveraging Immersive Virtual Reality for Designing & Constructing 3D Environments

Albert Lehrman, Charles University, Czechia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In an era defined by technological advancements, the integration of new media, Immersive Virtual Reality (IVR), has revolutionized art and design education, empowering students to explore innovative avenues of creative expression. This presentation outlines the key facets of a university-level art and design course integrating 3D design theory with the concept of imaginary world building. Through a series of creative design challenges, students will develop 3D versions of their own imaginary worlds, infusing personal meaning and elements of storytelling into their compositions. Emphasizing imagination and creative expression, this course employs creative-thinking and problem-solving techniques such as association-making, brainstorming, and media exploration, complemented by concept sketches, group evaluation, and personal reflection. Here, students will either construct 3D scale models or use the IVR-based drawing program, TiltBrush. Separated into 3 groups, students will work: 1) exclusively in VR; 2) solely with scale models; or 3) both on VR-based and model-based versions. Employing the narrative inquiry approach, comparisons will be drawn utilizing surveys, interviews, reflections, sketchbooks, group discourse, and process timelines. With this, the primary aim is to compare the teaching, learning, and working processes across groups, with a secondary aim of examining the use of symbols derived from the exploration of personally relevant themes. This research aims to contribute to the growing body of knowledge by exploring the convergence of IVR technology with established art practices, unveiling novel pedagogical strategies in art education, and outlining the impact of IVR on artistic expression.

Keywords: Art Education, Visual Arts, Design Thinking, Art-Based Research, Creative Thinking, Creative Problem-Solving, Imagination, World-Building, Immersive Virtual Reality

iafor
The International Academic Forum
www.iafor.org

Introduction

The integration of Immersive Virtual Reality (IVR) into art and design education represents a groundbreaking shift with profound implications for enhancing creativity and student engagement. As a revolutionary tool, IVR offers an innovative platform that enables students to engage in imaginative world-building and visualize abstract ideas with unprecedented depth and clarity (Du, 2021; Jiawei & Mokmin, 2023). This study aims to explore the multifaceted applications of IVR technology, examining its impact on various aspects of learning and creative processes in the context of Art Education.

IVR allows students to transcend traditional educational boundaries by providing an immersive environment where they can interact with their creative work in dynamic and interactive ways. Unlike conventional methods that often rely on two-dimensional representations, IVR creates a three-dimensional space where abstract concepts can be visualized and manipulated in real-time (Araiza-Alba et al., 2021). This immersive experience facilitates a deeper understanding of complex ideas and supports an *Iterative design process*, where students can continuously refine and develop their projects based on immediate feedback (Kolb, 1984).

As IVR technology continues to gain traction across various disciplines, its potential to transform art and design education becomes increasingly apparent. By leveraging IVR, educators can introduce novel approaches to teaching and learning that enhance creativity, critical thinking, and technological literacy (Freina & Ott, 2015). This paper investigates how IVR can be utilized to achieve these educational objectives, comparing its impact on creativity and problem-solving with traditional 3D modeling techniques. Through a comprehensive analysis, the study aims to demonstrate the transformative potential of IVR in fostering a more engaging and effective learning environment.

This research explores the significant role of IVR in revolutionizing art and design education. By providing a robust framework for understanding the cognitive and creative benefits of IVR, the study seeks to highlight how immersive technologies can enhance students' ability to visualize, iterate, and express complex concepts (Suh & Cho, 2020; Molina-Carmona et al., 2018). The findings will contribute to a deeper understanding of IVR's potential to reshape educational practices and prepare students for success in a digitally-driven world.

1. Background Literature

1.1 The Growing Role of IVR in Art Education and Creative Fields

Immersive Virtual Reality (IVR) is increasingly recognized for its transformative impact on art education and other creative fields. IVR technology aims to replicate real-world scenarios, providing immersive learning environments that foster a strong sense of presence. This technology allows for interactive control, communication, and creation of objects, significantly enhancing the learning experience (Asad et al., 2021). IVR promotes cognitive learning experiences that require high levels of visualization and awareness, serving as an effective pedagogical tool to advance students' problem-solving, critical thinking, and rational thinking skills (Asad et al., 2021). The immersive and interactive nature of IVR can substantially improve cognitive skills by providing students with environments that encourage creative exploration (Asad et al., 2021).

One of the remarkable capabilities of IVR is its ability to transform abstract or imaginary thoughts into tangible experiences, promoting active engagement rather than passive observation. This feature is particularly useful in art education, where it supplements practices that are impractical in real life and extends the boundaries of reality for discovery (Dede et al., Asad et al., 2021). In the context of art and design education, IVR stimulates students' artistic creation potential by helping them understand and analyze three-dimensional spaces, thereby overcoming traditional constraints and enhancing creative thinking skills (Jiawei & Mokmin, 2023; Du, 2021).

1.2. Uses of IVR in Art Education and Research

IVR offers a broad spectrum of applications within art education, significantly enriching the learning experience. One primary advantage is its ability to enhance students' comprehension of three-dimensional space, which is crucial for understanding spatial relationships and perspective in art education. Jiawei and Mokmin (2023) argue that IVR enables students to interact with and manipulate virtual environments in ways that traditional methods cannot, leading to a deeper understanding of spatial dynamics and depth perception.

IVR also facilitates the visualization of abstract art concepts by translating them into tangible representations, making complex and abstract ideas more accessible to students. Du (2021) emphasizes that IVR provides a more concrete means of understanding and manipulating artistic concepts, thereby making the learning process more engaging.

Additionally, IVR has significant applications in creating immersive art installations. Traditional art forms are often limited by physical space and material constraints, but IVR allows for the development of interactive artistic experiences that transcend these limitations. Asad et al. (2021) note that students can create and experience art in ways that go beyond the physical world's boundaries, opening new possibilities for artistic expression and interaction.

IVR also offers a flexible platform for experimenting with various artistic techniques and styles. According to Molina-Carmona et al. (2018), this flexibility enables students to explore different mediums and approaches without the constraints imposed by physical materials. This freedom to experiment can lead to innovative artistic outcomes and a deeper understanding of different artistic techniques.

Furthermore, IVR enhances collaboration by facilitating teamwork in shared virtual spaces. This technology allows students to work together on art projects in a more interactive and integrated manner. Freina and Ott (2015) highlight that this collaborative aspect of IVR promotes collective creativity and enhances the overall learning experience.

Lastly, IVR modernizes traditional sculpting and modeling techniques. The use of digital platforms for creating and manipulating 3D models represents a significant advancement over conventional sculpting methods. Suh and Cho (2020) point out that IVR tools offer new possibilities for digital sculpting, allowing for more precise and versatile manipulation of virtual materials.

1.3. Importance of Creative Thinking and Problem-Solving in Art Education

Engaging in arts-based research helps develop creative thinking by transforming authentic artistic practices into inquiries that convey deeper meanings (Barone & Eisner, 2012;

Hernández-Hernández & Fendler, 2013). Material engagement enhances creative thinking and problem-solving through direct interaction with materials, fostering an in-depth understanding of artistic processes (Barad, 2007; Latulipe et al., 2023). Art education rooted in experiential learning helps students convert direct experiences into deeper understanding through critical reflection and exploration (Asad et al., 2021).

IVR enhances experiential learning by immersing students in authentic virtual environments, allowing for first-hand experiences and practice in controlled atmospheres without real-life risks (Asad et al., 2021). By using IVR technology, students can overcome traditional constraints, facilitating new strategies for artistic creation and enhancing their ability to analyze and understand 3D spaces (Jiawei & Mokmin, 2023; Du, 2021).

2. Research Aims and Methodologies

2.1. Research Aims and Essential Questions

This research initiative aims to explore the transformative potential of IVR in art and design education, with a particular focus on imaginative world-building and the instruction of spatial design strategies. World-building involves creating detailed and immersive environments, enabling students to visualize and interact with complex spatial concepts in a three-dimensional space. Offering a unique platform for exploration, IVR allows students to design and manipulate spatial environments with greater ease and flexibility compared to traditional methods (Freina & Ott, 2015; Kwon, 2019). By integrating IVR into the curriculum, the project seeks to investigate how this technology influences students' creative processes, design skills, and overall learning outcomes (Jiawei & Mokmin, 2023; Suh & Cho, 2020).

The study will examine the use of IVR in developing imaginative spaces compared to traditional media. By focusing on world-building, the research aims to determine how IVR can enhance students' understanding of spatial relationships and improve their design skills. Additionally, the research will investigate the impact of IVR on creative thinking and problem-solving abilities. By integrating world-building and spatial design strategies into the study, the research seeks to provide a thorough evaluation of how IVR technology influences creativity and learning. The findings are expected to offer valuable insights into the potential benefits and limitations of IVR in the context of art and design education, ultimately contributing to a deeper understanding of its role in shaping the future of creative practices.

The project is structured around a comparative analysis between groups of art and design students: one utilizing traditional 3D modeling techniques and the other engaging with IVR tools. The research aims to address the following essential questions: How can IVR enhance art and design education? What cognitive and working processes are involved in creative problem-solving in IVR, and how do they compare to traditional 3D modeling techniques? What are the implications of IVR for student engagement, creativity, and learning outcomes? By examining these questions, the study will assess the efficacy of IVR in fostering creative thinking and problem-solving skills, thereby enriching the educational experience and preparing students for future challenges in the creative industries.

2.2. Methodologies

This research investigates the transformative potential of IVR in art and design education, with a specific focus on imaginative world-building, spatial design strategies, creativity, and

problem-solving abilities. A mixed methods framework is employed to comprehensively assess IVR's impact on these educational outcomes.

2.2.1. Research Design and Participant Selection

The study follows a comparative research design over the course of one academic semester, lasting approximately three months. The study involves 12 international students with an interest in art and design. Participants are divided into two or three groups based on their preferred methods: one group exclusively using IVR tools (e.g., Tilt Brush), another using traditional 3D model-making materials (e.g., foam, plaster, paper mache), and a potential third group using both methods. This self-selection process allows for the exploration of natural preferences and their effects on research outcomes, thereby aligning with the research aim of evaluating the potential impact of IVR in enhancing art and design education.

2.2.2 Data Collection Methods

To address the research questions—particularly how IVR influences students' creative processes, spatial design skills, and learning outcomes—a variety of data collection methods are employed:

A: Student Sketchbooks and Teacher Observations: Document the iterative design processes, capturing the evolution of ideas and providing qualitative data on student engagement and creativity.

B: Pre-Test and Post-Test Assessments: The Test of Creative Thinking-Drawing Production (TCT-DP) (Jellen & Urban, 1986) and the Test of Creative Imagination (TCI) (Karwowski, 2008a, b) may be utilized to quantitatively measure changes in creative thinking and imagination. These assessments offer objective evidence of IVR's impact on creativity, directly linking to the research aim of evaluating the cognitive processes involved in creative problem-solving.

C: Questionnaires: The Creative Thinking Self-Efficacy (CTSE) and Creative Problem Solving Efficacy (CPSE) questionnaires (Finke, Ward, & Smith, 1992) assess students' confidence in their creative abilities and problem-solving skills. This data will help determine the perceived impact of IVR on students' creative confidence, aligning with the research question on student engagement and learning outcomes.

D: Art Production and Evaluation: Tools such as the Art Creativity and Achievement Rating (ACAR) and Creative Art Tools (CAT) are used to evaluate the quality and originality of students' artworks. These instruments assess the effectiveness of IVR in enhancing creative outputs compared to traditional methods, thus directly addressing the research aim of comparing design outcomes.

2.2.3 Data Analysis Methods

The data collected will be analyzed using the following methods:

A. Comparative Analysis: Compares the effectiveness of traditional 3D modeling techniques against IVR tools in enhancing spatial design strategies. The analysis will focus on design outcomes, creative processes, and student engagement, providing a detailed evaluation of the

advantages and limitations of IVR. This method supports the research aim of determining how IVR influences students' understanding of spatial relationships and design skills.

B. Narrative Inquiry: Captures detailed accounts of students' interactions with IVR, their creative processes, and reflections on their learning experiences. This qualitative method is aligned with Kolb's experiential learning theory (1984), emphasizing the importance of reflective, personal experiences in learning. The insights gained from these narratives will contribute to understanding the nuanced impacts of IVR on creativity, as per the research objectives.

C. Reflective Analysis: Students engage in reflective analysis to evaluate their creative processes, tool effectiveness, and overall learning journey. This method, informed by Schön's reflective practice (1983), provides deeper insights into students' problem-solving abilities. Reflections will be coded according to Osborne's Creative Problem Solving (CPS) model and the imaginative training program 'Eureka' (Dziedziewicz & Karwowski, 2015), offering valuable perceptions of IVR's impact on their design skills. This method is integral to understanding the cognitive processes involved in creative problem-solving within IVR environments.

2.2.4 Instruments

To thoroughly assess IVR's impact, the following instruments will be utilized:

A. Torrance Tests of Creative Thinking-Drawing Production (TCT-DP): Assesses divergent thinking through tasks that require original responses, providing quantitative data on shifts in creativity.

B. Creative Imagination Scale (TCI): Evaluates the depth of creative imagination, offering insights into how IVR influences students' ability to generate innovative ideas.

C. Creative Thinking Self-Efficacy (CTSE) and Creative Problem Solving Efficacy (CPSE) Questionnaires: Measure students' self-reported confidence in their creative and problem-solving abilities, directly addressing the research aim of evaluating how IVR affects students' cognitive and creative skills.

D. Art Creativity and Achievement Rating (ACAR) and Creative Art Tools (CAT): Evaluate the creative and technical aspects of students' artworks, providing a comprehensive view of the role IVR plays in enhancing artistic outcomes.

By integrating these methodologies and instruments, this study aims to provide a detailed understanding of IVR's impact on creativity, spatial design skills, and problem-solving abilities, contributing valuable insights to the field of art and design education.

3. Theoretical Frameworks

The investigation of IVR in art and design education is underpinned by two foundational frameworks: Experiential Learning Theory (ELT) and Embodied Cognition. These theories provide insight into how IVR can enhance creativity, spatial design skills, and overall educational outcomes.

Experiential Learning Theory (ELT): According to Kolb (1984), ELT emphasizes the importance of hands-on, interactive experiences in learning. It consists of four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. ELT posits that learning is enhanced through direct engagement with materials, reflection on experiences, development of abstract ideas, and testing these ideas through further action. In the context of IVR, this framework supports the notion that immersive experiences in a virtual environment align with Kolb's model. Students engage in concrete experiences by interacting with 3D spaces, reflect on their creations, conceptualize new strategies, and experiment with iterative design processes (Kolb, 1984).

Embodied Cognition: This theory, as articulated by Araiza-Alba et al. (2021), argues that cognitive processes are deeply rooted in sensory experiences and physical interactions with the environment. In IVR, students interact with virtual objects as if they were physical entities, which engages multiple senses and physical movements. This sensory immersion enhances cognitive processes such as spatial reasoning and problem-solving. For instance, the ability to "walk around" and manipulate virtual designs helps students intuitively grasp spatial relationships and design principles, supporting deeper cognitive insights and creative breakthroughs (Jiawei & Mokmin, 2023).

Together, ELT and Embodied Cognition offer a comprehensive understanding of IVR's role in education. ELT demonstrates how IVR facilitates a complete cycle of experience, reflection, and experimentation. Embodied Cognition highlights how sensory and physical interactions in IVR can enhance spatial understanding and creativity. These frameworks collectively illustrate how IVR can transform educational practices, creating a more interactive and effective learning environment for art and design students.

4. Course Aims and Objectives

The course aims to cultivate creativity and imagination among students, essential skills in art and design that drive innovation and artistic expression. By prioritizing creativity, the course empowers students to explore their artistic potential and push beyond conventional design thinking, fostering an environment where novel ideas and unique solutions can flourish (Dziedziewicz & Karwowski, 2015). An integral component of this creative exploration is the concept of world-building, which involves constructing detailed and immersive environments. This approach allows students to engage deeply with spatial design and visualization, enhancing their ability to conceptualize and realize complex ideas in three-dimensional space.

Another key aim is to develop students' design and visualization skills. The ability to visualize and translate concepts into tangible forms is crucial in art and design education. This objective addresses the need for students to refine their skills in creating detailed visual representations and to effectively communicate their ideas. Through engagement with both traditional and IVR-based design tools, including world-building techniques, students learn to navigate complex design processes and bridge the gap between abstract ideas and practical implementation. This prepares them for real-world design challenges by allowing them to experiment with creating and manipulating virtual environments, thus refining their spatial awareness and technical skills (Du, 2021).

The course also focuses on fostering critical thinking and problem-solving abilities. Critical thinking involves analyzing and evaluating artistic choices, while problem-solving addresses

design challenges and innovative solutions. Activities and assignments encourage students to critique their own and peers' work, developing their ability to assess design elements critically and make informed decisions. Iterative design processes, including world-building projects, emphasize problem-solving by presenting students with complex scenarios to tackle and adapt to, equipping them with skills necessary to handle evolving industry standards and challenges (Kolb, 1984).

Specific objectives guide students through various stages of their creative development. Firstly, generating conceptual designs and visualizations: students create initial design concepts and develop them into detailed visual representations, enhancing their creative thinking and ability to present and communicate their designs effectively (Freina & Ott, 2015). Secondly, constructing 3D models and virtual prototypes: this objective, particularly relevant in the context of IVR and world-building, allows students to build and manipulate virtual objects and environments, developing technical skills in digital modeling and a deeper understanding of spatial relationships (Suh & Cho, 2020). Lastly, integrating narrative and story elements: by incorporating narrative elements into artistic projects, students learn to infuse their designs with meaning and context, emphasizing storytelling in art and design, and helping students connect their work with broader themes and concepts (Asad et al., 2021).

These aims and objectives address fundamental aspects of art and design education—creativity, visualization, critical thinking, and problem-solving—providing a comprehensive approach to developing artistic and design skills. This alignment with industry needs ensures that students are well-prepared to meet future career challenges and opportunities.

4.1 Teaching Content and Methodology

The teaching content and methodology of the course are structured to ensure a rich and immersive learning experience for students. The course is designed to encompass a broad range of concepts and techniques in both traditional 3D modeling and IVR, providing students with the flexibility to explore and apply various approaches to art and design.

Active learning is central to the instructional approach, with students engaging directly with the material through hands-on projects, interactive workshops, and collaborative activities. This method reinforces theoretical knowledge and allows experimentation in practical settings (Freina & Ott, 2015). Reflective practice is another critical component. By regularly reflecting on their work and learning experiences, students critically analyze their progress, identify areas for improvement, and develop a deeper understanding of their creative processes. These reflective exercises help students gain insight into their strengths and challenges, promoting continuous growth and development (Kolb, 1984). Additionally, the course employs differentiated instruction to cater to diverse learning styles and skill levels. By offering various forms of instruction and assessment, such as visual aids, hands-on activities, and personalized feedback, all students can engage effectively with the course content and achieve their learning objectives (Dziedziewicz & Karwowski, 2015).

4.2 Course Content

The course provides a thorough exploration of both traditional 3D modeling techniques and IVR tools, offering students a broad range of learning opportunities.

Introduction and Foundations: The course begins with an overview of essential design principles and materials, including techniques for 3D modeling and IVR tools. Students will learn fundamental design concepts such as closure, proximity, continuity, similarity, balance, and connectedness, which are critical for advanced design tasks.

Creative Design and Visualization: Students engage in activities to develop their conceptual designs and virtual prototypes. They will participate in brainstorming sessions, drawing exercises, and design challenges, incorporating creative thinking strategies such as word-association, doodle drawing, and mark-making. These exercises help refine their skills in translating abstract ideas into tangible forms.

IVR and Traditional Techniques: The course includes hands-on practice with IVR technology and traditional 3D modeling materials. Students will create and manipulate virtual environments, using IVR to explore spatial relationships and enhance their design capabilities. This phase covers navigation of virtual spaces, interaction with 3D content, and integration of narrative elements into their projects.

Project Development and Evaluation: Students work on projects that involve planning, drafting, creating mock-ups, and refining their designs. They will present their final projects, engage in group evaluations, and provide reactions and reflections. Post-tests and surveys will assess changes in creative thinking and problem-solving skills.

Reflective Practice and Feedback: The course incorporates reflective activities, including peer reviews and individual reflections, to help students evaluate their creative processes and project outcomes. Collaborative activities foster community and provide diverse perspectives on design challenges.

By integrating these components, the course ensures a comprehensive approach to developing artistic and technical skills, preparing students to tackle complex design challenges and harness their creativity effectively.

5. Preliminary Results & Comparative Analysis

The preliminary results from an earlier iteration of the course provide valuable insights into the impact of integrating IVR into art and design education. These findings align with the course’s aims and objectives, highlighting how IVR technology influences creativity, design skills, and problem-solving abilities compared to traditional methods.

The initial analysis indicates several benefits of using IVR, such as enhanced spatial visualization and innovative design solutions. However, it also identifies areas needing improvement, which will inform modifications in subsequent iterations of the course. This evolving approach ensures that the course continuously adapts to better meet learning objectives and address any challenges encountered.

The preliminary data thus offers a foundational understanding of IVR’s role in student learning outcomes, while also guiding future refinements to optimize the course's effectiveness.

5.1 Ease of Modification and Flexibility

A notable finding is the increased ease of modification and flexibility experienced by students using IVR tools. Unlike traditional 3D modeling techniques, which often involve a more rigid and time-consuming process for design adjustments, IVR offers a dynamic and interactive environment. Students reported greater ease in modifying their designs, adjusting spatial elements, and experimenting with visual aesthetics. This flexibility supports an iterative design process, allowing students to refine their work more efficiently. The real-time modifications and immediate visual feedback in IVR encourage exploration and experimentation, enhancing creativity and aligning with the course's objective of developing design and visualization skills (Jiawei & Mokmin, 2023).

5.2 Immersive Experience and Cognitive Engagement

The immersive experience provided by IVR significantly enhances students' cognitive engagement and spatial comprehension. Participants in the IVR group reported a heightened level of engagement and a deeper understanding of spatial relationships through direct interaction with their virtual designs. This immersive interaction aligns with the course's aim to cultivate creativity and imagination. Engaging with designs in a more intuitive and meaningful way helps students grasp complex spatial concepts and develop advanced visualization skills, thereby enhancing creative thinking and practical design abilities (Araiza-Alba et al., 2021).

5.3 Excitement and User Experience

Students using IVR tools exhibited higher levels of excitement and motivation compared to those using traditional 3D modeling techniques. The engaging nature of IVR, combined with user-friendly programs such as Tilt Brush, contributed to increased enthusiasm and investment in the design process. This positive user experience is directly related to the course's objective of fostering critical thinking and problem-solving abilities. The enhanced engagement and motivation from IVR not only made the learning process more enjoyable but also encouraged students to approach their projects with greater dedication and creativity. This correlation between increased motivation and improved learning outcomes underscores the importance of creating stimulating and immersive learning environments (Dziedziewicz & Karwowski, 2015).

5.4 Challenges and Limitations

Despite the advantages, challenges and limitations were observed, particularly among students using traditional 3D modeling techniques. These students faced difficulties due to limited prior exposure to arts-based tools and the abstract nature of the design activities. The lack of familiarity with advanced tools and techniques posed barriers to fully engaging with the course content. Addressing these challenges is essential to ensure that all students can benefit from the course's objectives and achieve their learning goals. Additional support and resources may be needed to bridge the gap between traditional methods and new technologies (Freina & Ott, 2015).

6. Conclusions

This research underscores the significant impact of integrating IVR into art and design education, reflecting the course's aims and objectives. The findings from the earlier iteration of the course reveal that IVR enhances flexibility, engagement, and motivation among students. IVR tools have demonstrated advantages in modifying and refining designs more efficiently compared to traditional 3D modeling techniques (Jiawei & Mokmin, 2023). The immersive and interactive nature of IVR offers a more engaging platform for exploring artistic potential, which aligns with the course's goals of fostering creativity and problem-solving (Araiza-Alba et al., 2021).

Despite these positive outcomes, the preliminary results also highlight that many participating students lacked formal art and design backgrounds. This diversity in experience levels underscores the importance of providing adequate support and resources to facilitate the transition to new technologies. Addressing these needs is essential to ensure all students, regardless of their prior experience, can fully benefit from the course's innovative methods (Freina & Ott, 2015). The increased enthusiasm and commitment observed among students using IVR further supports its role in developing critical thinking and problem-solving skills (Dziedziewicz & Karwowski, 2015).

As the course evolves, it is clear that while IVR holds considerable promise, ongoing adjustments are necessary to better address the diverse needs of students. The initial journey of integrating IVR has provided valuable insights into its potential and limitations, setting the stage for future improvements. The next phase of this research will focus on refining the course design to enhance its effectiveness and inclusivity. This will involve addressing identified challenges, incorporating feedback, and exploring additional strategies to support diverse learning styles.

Acknowledgements

The author extends heartfelt gratitude to those who supported the research, including the organizers of the The European Conference on Education for providing the platform to present this ongoing research, and the Faculty of Education at Charles University for providing the means to conduct this course. Their contributions have been invaluable in bringing this study to fruition.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

This paper acknowledges the use of generative AI and AI-assisted technologies in the writing process. These tools have been utilized to enhance the clarity, coherence, and efficiency of the manuscript. While AI technologies have supported the drafting and editing stages, all final content and interpretations remain the responsibility of the authors. The use of such technologies has been guided by ethical considerations, ensuring that their application complements and supports, rather than replaces, the intellectual input and scholarly rigor of the research process.

References

Araiza-Alba, M., López-López, E., & Ruiz-Rico, M. (2021). Embodied cognition and its role in immersive virtual environments: An overview of research and applications. *Journal of Educational Technology & Society, 24(2), 50-64.

Asad, S., Khan, M. M., & Ali, M. (2021). Enhancing art education through immersive virtual reality: A pedagogical perspective. Journal of Educational Technology & Society, 24(3), 102-115.

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approaches (4th ed.). Sage Publications.

De Bono, E. (2000). Six thinking hats. Penguin Books.

Du, L. (2021). Exploring abstract concepts in art through virtual reality: A comparative study of traditional and digital methods. *Art & Design Journal, 45(3), 305-319.

Dziedziewicz, M., & Karwowski, M. (2015). The role of creativity in the workplace: The need for innovative problem-solving. Creativity Research Journal, 27 (1), 1-5.

Finke, R. A., Ward, T. B., & Smith, S. M. (1992). Creative cognition: Theory, research, and applications. MIT Press.

Freina, L., & Ott, M. (2015). A literature review on immersive virtual reality in education: State of the art and perspectives. European Journal of Open, Distance and E-Learning, 18 (2), 1-10.

Jiawei, X., & Mokmin, N. (2023). Enhancing spatial understanding in art education through immersive virtual reality. Journal of Art Education Technology, 38 (1), 22-37.

Karwowski, M. (2011). It's in the Eye of the Beholder: The Role of Implicit Theories in the Creative Self-Efficacy. Psychology of Aesthetics, Creativity, and the Arts, 5(4), 270-278. doi:10.1037/a0022961

Kolb, D. A. (1984). Experiential learning: Experience as the source of learning and development. Prentice Hall.

Molina-Carmona, R., García-Casas, M., & Campos-Pardo, E. (2018). Digital sculpting in art education: Exploring new techniques through virtual reality. International Journal of Art & Design Education, 37 (4), 580-595.

Reiter-Palmon, R., & Robinson, D. H. (2009). The Creative Imagination Scale (TCI): A new measure for assessing creative thinking. Creativity Research Journal, 21 (3), 234-243.

Schön, D. A. (1983). The reflective practitioner: How professionals think in action. Basic Books.

Suh, J., & Cho, K. (2020). Modernizing traditional sculpting techniques through digital platforms: A case study of virtual reality applications. Journal of Digital Arts and Design, 26 (2), 45-60.

Torrance, E. P. (1974). Torrance Tests of Creative Thinking. Personnel Press.

Yin, R. K. (2018). Case study research and applications: Design and methods (6th ed.). Sage Publications.

Simulation of Situational Tasks as a Method of Developing Safe Behavior Skills

Diana Amirova, Nazarbayev Intellectual School of Chemistry and Biology in Almaty, Kazakhstan
Nazigul Muratbekova, Nazarbayev Intellectual School of Chemistry and Biology in Almaty, Kazakhstan
Assem Zhomartova, Nazarbayev Intellectual School of Chemistry and Biology in Almaty, Kazakhstan
Zhanna Khadessova, Nazarbayev Intellectual School of Chemistry and Biology in Almaty, Kazakhstan
Zhaxybek Suleimenkulov, Nazarbayev Intellectual School of Chemistry and Biology in Almaty, Kazakhstan

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study is one of the important issues of modern society and reflects the general problem of Kazakhstan, the way out of which we see through a local solution, using a series of lessons within the framework of the Lesson study. In this regard, the study's purpose was to develop skills for responding to situations that threaten students' lives through the modelling of situational tasks in and out of the classroom. During the study, the following methods were used: lesson observation, input and output surveys, and modelling situational tasks to develop and improve skills in responding to situations threatening human life. The study also included broadcasting video materials and discussing news events in the country and the world. At the final stage of the study, we discovered outstanding results from the exit survey, which we reflected in the paper. Situational tasks were created and tested to develop students' safe behaviour skills in life-threatening situations, as well as increase students' responsibility for their lives and the people around them. The results of the input and output survey are confirmation of the relevance of the study. During the course of the research, we concluded that students' awareness of situations that violate the safety of human life has increased, which is confirmed by the results of the study. Furthermore, the results of the study showed the necessity to modify the perspectives and algorithms of actions of preventive and training activities in school, as well as to automate the school community's safe behaviour abilities.

Keywords: Safe Behaviour, Situational Tasks, Situational Approach, Life-Threatening Situations, Earthquake, Stress

iafor
The International Academic Forum
www.iafor.org

Introduction

The study on the topic “Modelling situational tasks as a method of developing students’ safe behaviour skills” is one of the important issues of modern society as discussed by Peden et al. (2008), The World Health Organization emphasizes the need for robust child injury prevention measures.

Our research aims to solve an essential problem: improving students' response skills in life-threatening situations. The decision to conduct this study was driven by an awareness of the growing number of emergencies in society and the necessity to develop abilities to quickly respond to life-threatening situations. Situations that jeopardise the lives of students include stressful situations, and scenarios, such as those during fires, earthquakes, floods, and mudflows.

Ensuring safety in various aspects of life is a fundamental concern in modern society (Belov, 2010), that is why this research is important, since in our society there is an insufficiently serious attitude to all types of dangers and preventive measures, ignoring and negligent attitude towards training activities at school and in society as a whole.

In society, the statement "Kudai saktaydy" or "everything is the will of the Almighty" is frequently heard. However, statistics in the country demonstrate a high number of scenarios resulting in a huge number of victims and casualties (floods, earthquakes, fires, danger in mines and open pits, tours to the Charyn Canyon, etc.).

In this regard, the purpose of the study was determined to be the development of skills to respond to situations that threaten the lives of students through the modelling of situational tasks in class and outside of class.

Materials and Methods

The research work consisted of a series of lessons in the 8th grade "A" class over a period of five months (November-December-January-February-March). The lessons were conducted in accordance with the approved thematic plan, which included topics and objectives related to natural phenomena, dangers, and life-threatening situations.

Educational programs in life safety play a crucial role in developing the necessary skills for safe living (Abramova & Stankevich, 2017). The study employed a lesson-based approach that included modelling situational tasks to develop and improve response skills, conducting surveys and entry and exit questionnaires. Relying on data from real scenarios, expert opinions, and scientific-methodological literature, the research progressively refined teaching strategies to better prepare students for responding to life-threatening situations. As a result of the study, impressive survey results were found. At the very beginning of the research, an entry survey was conducted with the students, and an exit survey was conducted at the final stage. The survey consisted of three questions, which were the same for both the entry and exit stages.

The methodology of using situational tasks in teaching life safety, as outlined by Hanislamova et al. (2011), was integral to our research approach. The research was based on creating simulated situations, broadcasting video materials, and discussing news events in the country that involved life-threatening situations. However, during the course of the study, our

team encountered a real-life danger — earthquakes in the city of Almaty. The situation caught the school community off guard and inspired adjustments to future research.

We believe that modelling situational tasks is an effective method for developing students' skills in responding to critical situations and has several positive aspects in education. The situational approach creates realistic learning conditions by simulating scenarios that are as close as possible to real-life situations. This helps students better understand and retain the material as they see the direct application of theoretical knowledge in practice (Belov, 2010).

Moreover, the situational approach promotes the development of students' critical thinking and decision-making skills by requiring active participation in solving problem tasks. This stimulates their ability to analyse situations, assess risks, and make informed decisions.

Lazarus and Folkman (1984) present a framework for understanding the psychological processes involved in stress and coping. Their transactional model highlights the dynamic relationship between individuals and their environment, where stress is perceived as a result of an imbalance between demands and resources. This model is particularly relevant in educational settings, where students frequently encounter stressors such as academic pressure, peer relationships, and time management challenges. Lazarus and Folkman (1984) argue that the appraisal process—how individuals evaluate and interpret these stressors—is critical in shaping their emotional and behavioural responses. Primary appraisal involves assessing whether an event is a threat, harm, or challenge, while secondary appraisal considers the available coping resources and options. Effective coping strategies, as highlighted by Lazarus and Folkman, include problem-focused coping, which addresses the source of stress, and emotion-focused coping, which aims to manage the emotional response. In the context of our study, understanding these stress appraisal processes is essential. By simulating real-life stressful situations in a controlled environment, we can help students develop their appraisal skills and implement effective coping mechanisms, eventually improving their readiness to handle actual emergencies.

The situational approach boosts students' motivation and engagement in the learning process. By seeing the results of applying their knowledge and skills in practical situations, their interest in learning increases, leading to a deeper understanding of the material. The situational approach develops students' social interaction skills in the classroom. Joint task completion and role-playing games promote the development of communication skills and cooperation, which are crucial for the development of safe behaviour skills.

Thus, the use of a situational approach in studying the development of student safety skills is due to its ability to provide realistic, practice-oriented, motivating and socially interactive learning. This approach not only promotes better learning but also develops important life skills in students that are necessary for their safety and successful socialization.

Literature Review

The literature review on the research problem revealed a steady increase in natural, technological, and social emergencies, highlighting the need to address safety behaviour at all levels and identify numerous factors that lead to life-threatening situations. It was noted by Belov (2010) that a low culture of life safety in society, neglect of safety knowledge, occupational safety, and safe behaviour rules, along with irresponsible attitudes towards one's own life and health and the safety of others, are the main causes of critical situations. The

lack of a safety culture among the younger generation poses a threat to society, potentially leading to an increase in accidents and disasters in the future.

Moreover, Peek (2023) provides a detailed examination of how to develop capacities and resilience among children in disaster-prone areas. Her research emphasizes the importance of tailored educational programs that focus on building adaptive skills and emotional strength in young learners. By integrating disaster preparedness into the school curriculum, educators can help children understand the risks associated with natural disasters and equip them with practical strategies to cope effectively. Peek's findings highlight that adopting resilience in children not only prepares them for emergencies but also contributes to their overall mental well-being and confidence. Such initiatives are crucial in regions frequently affected by disasters, as they empower the younger generation to respond proactively and minimize the impact of catastrophic events on their lives.

Johnson et al. (2014) conducted evaluations of disaster education programs and found significant benefits in preparing children for emergencies. Their research indicates that structured and well-implemented educational initiatives can greatly enhance children's understanding of potential hazards and appropriate response actions. These programs not only increase children's knowledge about disasters but also improve their practical skills in emergency situations, such as evacuation procedures and first aid. Furthermore, the study shows that children who participate in disaster education programs exhibit higher levels of confidence and calmness during actual emergencies, reducing panic and improving overall safety outcomes. The findings underscore the importance of incorporating comprehensive disaster education into school curricula to build a more resilient and prepared youth population.

Researcher Abramova (2017) believes that life safety education, which adopts the development of specific knowledge, skills, and abilities in students, is essential for safe existence within the system of the "human-society-nature-technosphere." During the development of situational tasks, some materials such as role-playing scenarios and environmental safety projects from Khanislamova et al. (2011) methodological guide "Situational Tasks for the Course 'Life Safety'" were used. The authors of this guide consider situational and calculation tasks as tools for developing skills for safe interaction with natural, anthropogenic, and social environments, as well as the competencies necessary for future practical activities.

It is worth noting that the "situational approach" initially originated as a methodological foundation in the field of business education at Harvard University, USA. and has now spread to many areas of general and professional education. The situational approach is based on taking into account the specific conditions of the situation during the decision-making process. The category of "situation" is central to the methodology of the situational approach and is defined as a "combination of conditions and circumstances that create a specific environment or state" (Hersey, 1988).

Overall, the literature review on the research problem revealed that the modelling of situational tasks as a method for developing students' safe behaviour skills is widely studied by educators and scholars in the field of education. Academic works emphasize the importance of this method in developing skills in children and adolescents that are essential for their safety in various life situations.

Discussions

Before the study, the geography and English teachers of the particular 8th grade class collaborated to analyse the curriculum of these subjects and selected topics related to life-threatening situations through task modelling. For example, the topics include "The Impact of Climate on Human Life and Activities," "Life in the Ocean," "Being Stressed Nowadays," and "Environmental Problems of Kazakhstan," with objectives such as "assessing the impact on human life and activities (including additional local components)." Based on these objectives, sample joint lesson plans were developed. The planned lesson samples align with the learning objectives in the curriculum. The lesson plans included questions and situational tasks aimed at revealing the life-threatening situations' significance to students' lives. The tasks were designed to encourage students to analyse the provided information, make decisions, and offer their own suggestions.

Additionally, guidelines were provided to lead students towards independent research, action, and achieving results. These activities were organised in the form of individual work, pair work, and small group work. Methods such as document analysis in qualitative research, lesson observations, surveys, and interviews were used to collect data. Additionally, as a research tool, students' work based on a specially designed set of tasks was evaluated, and the results were analysed.

Lesson 1.

The first lesson was related to the topic of Stress. Understanding how students appraise and cope with stress is essential for effective simulation-based training (Lazarus & Folkman, 1984). This lesson study involved a carefully orchestrated scenario to observe students' reactions to a stressful situation created by the teacher of English.

Scenario description of the lead-in task of the first lesson: While the students were distracted by a dance activity, the teacher created a stressful situation by hiding the phone of one of the students on the windowsill. After the dance, the students were asked to open their phones and scan a QR code to play a game. When the student couldn't find her phone and started looking for it, another student who had seen the teacher take the phone informed her, which helped calm her down. The situation was then discussed, and the teacher apologised and introduced the topic of the lesson. This led to an open discussion where students shared their feelings and emotions.

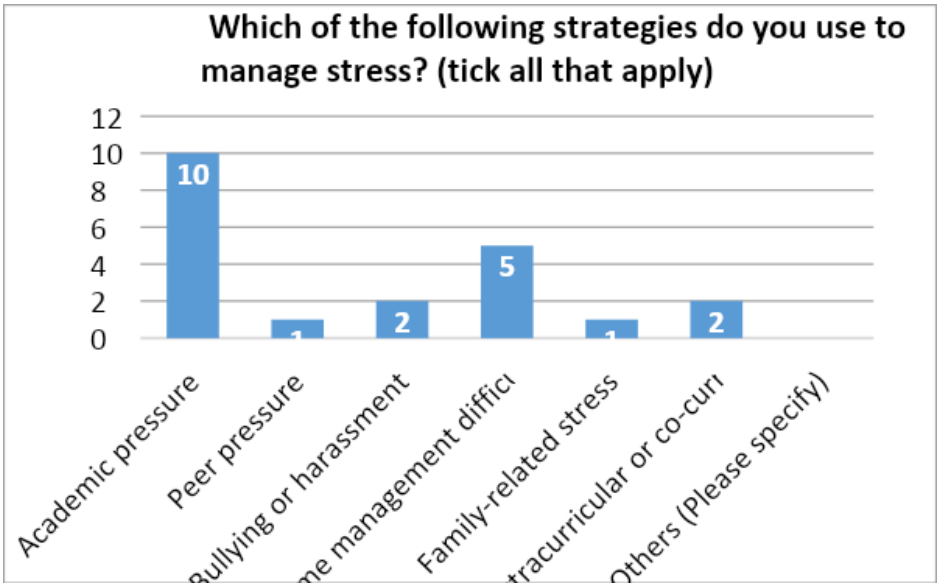


Figure 1. *Students' Answers to the Survey Regarding Stress Factors*

At the end of the lesson survey was taken where students identified various stress factors they face, including academic pressure (10 students), peer pressure (4 students), bullying or harassment (1 student), time management difficulties (5 students), family-related stress (1 student), and extracurricular or co-curricular pressure (2 students). Most of the students were confident or moderately confident when rating their confidence in managing stress. Students reported using various strategies to manage stress, including talking to a trusted adult such as parents or teachers (10 students), talking to friends (5 students), engaging in hobbies or activities they enjoy (4 students), taking breaks and practising relaxation techniques (4 students), and ignoring the stress and hoping it goes away (1 student). When asked if the school provides enough support and resources to manage stress, 6 students responded with "No," and another 6 students were "Not sure." Students reported how often they feel overwhelmed by stress related to schoolwork or activities: 3 students felt overwhelmed occasionally, 3 students frequently, and 5 students almost always. When asked if they had ever sought help or advice for stress-related issues at school, 6 students responded with "Yes" and 6 students responded with "No." This split response highlights a potential gap in the effectiveness or awareness of the school's support systems for managing student stress. On a scale of 1 to 10, students rated the importance of schools addressing and supporting students' mental health and stress management. Four students rated it between 1 (Not Important) to 5, while eight students rated it between 6 to 10 (Extremely Important). This inequality suggests that while there is a substantial acknowledgement of the need for mental health support, a portion of the students may either not fully understand its significance or feel that other issues take precedence. This variation in perception underscores the necessity for schools to not only provide mental health resources but also to educate all students on the importance and benefits of mental health and stress management programs.

The simulation revealed essential insights into the students' stress management capabilities and their perception of support provided by the school. The variety of stress factors highlights the multifaceted nature of the stress experienced by students, with academic pressure being the most common.

The understandings gained by students from the lesson were significant. Increased awareness of stress factors allowed students to better understand various contributors to their stress,

such as academic pressure, peer pressure, time management issues, and family-related stress, helping them to identify and address these sources more effectively. The simulation provided practical experience in handling stressful situations, teaching students to manage their emotions and reactions in real-life scenarios. Through the situational task, students enhanced their problem-solving skills by quickly assessing situations, communicating effectively with peers, and taking appropriate actions to resolve issues. The scenario encouraged the development of critical thinking by prompting students to analyse their responses and the effectiveness of different stress management strategies, promoting a more analytical approach to dealing with stress. The lesson also emphasised the importance of having reliable support systems, such as trusted adults, friends, and school resources, making students realise the value of seeking help and discussing their stressors.

Understanding the need for preparedness was another key idea, as students learned the significance of having plans and strategies in place for unexpected stressful situations. The discussion of various stress management strategies raised awareness of diverse coping mechanisms, enabling students to choose and apply the most suitable strategies for themselves. Furthermore, the lesson improved communication and collaboration among students, as working together to solve problems and sharing experiences and emotions helped build a sense of community and mutual support. Overall, the students benefited from the lesson by gaining a valuable understanding of stress management, improving their practical skills, and recognizing the importance of support systems and preparedness in handling stress effectively.

Lesson 2.

In the geography lesson conducted with the same class on the topic "The Impact of Climate on Human Life and Agriculture," the objective was set to "determine the harm to human health and agriculture." This objective included local climatic phenomena such as icy conditions, frost, dust storms, and hail. To understand students' actions in these situations, a situational task was developed, linked to events that occurred in their local area. For example, a video was shown of a severe dust storm that occurred in Almaty on July 23, 2023. This storm caused several accidents and damages. The video was designed to immerse students in a situational context and develop their practical skills.

To understand the students' reactions to this disaster, they were asked, "What was your reaction to this incident?" The students responded differently. Since the disaster occurred during the summer, many were not in the city, leading to a variety of perspectives.

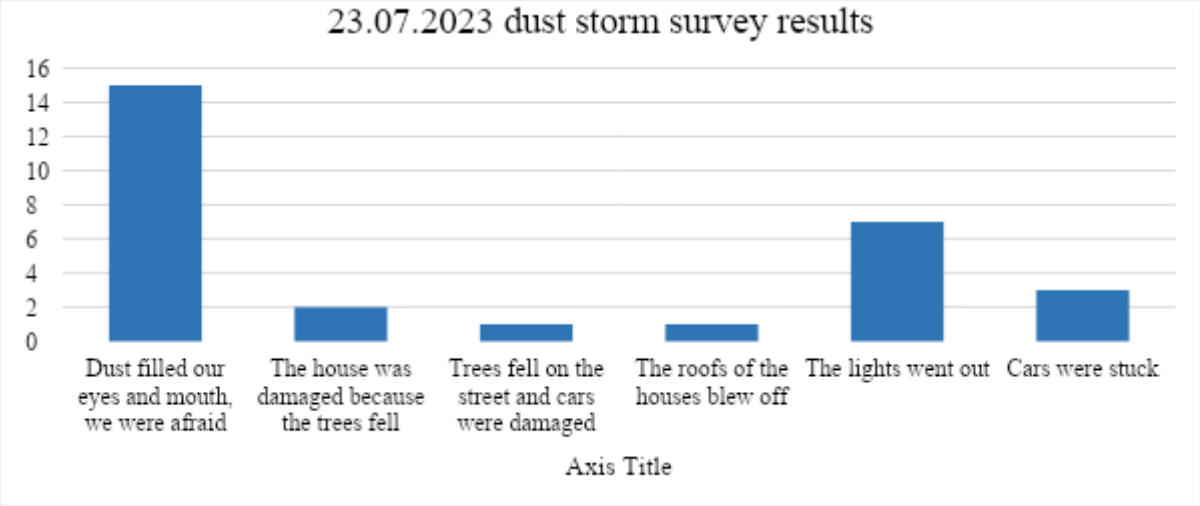


Figure 2. *Students' Reactions During the Dust Storm in Almaty on July 23, 2023*

Some students reported feeling fear when the house roof was lifted and the lights went out, while others understood the adverse health effects of falling trees and the entry of dust and small stones into their eyes and mouths. When we compared their reactions to this incident with their actions during a similar event on March 28, 2024, when another dust storm occurred in Almaty, we saw some differences. In the second situation, they experienced the disaster firsthand. We asked them to recall the dust storm shown in the previous lesson and conduct a comparative analysis. The question posed was: "What were your actions during this disaster?"

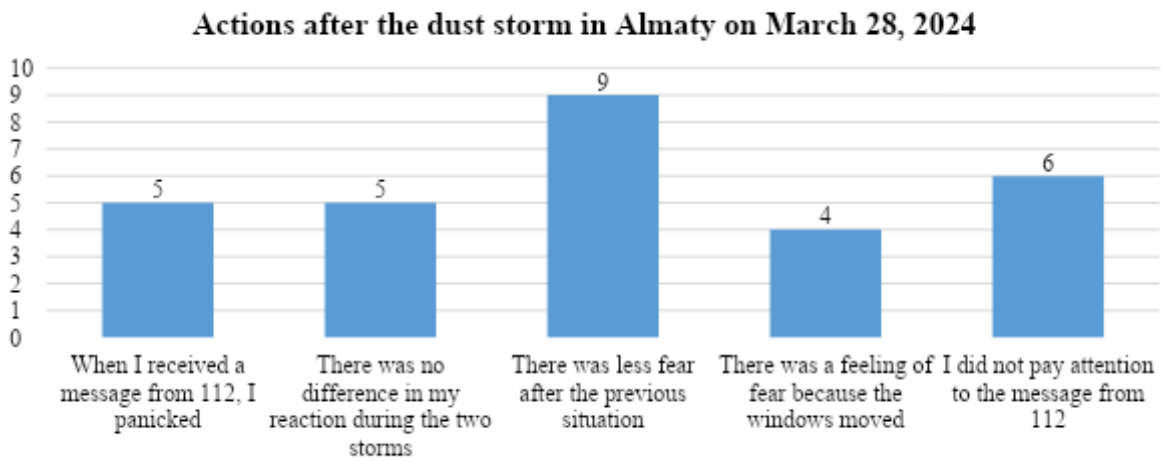


Figure 3. *Students' Actions During the Dust Storm in Almaty on March 28, 2023*

During this disaster, 5 students reported that they panicked and became anxious when they received an alert from 112 (the phone number of the Unified Duty Dispatch Service of the Department of Emergency Situations). 9 students felt less fear compared to the previous incident, while four could not hide their fear when the house windows started shaking. However, 6 students ignored the alerts from 112 and were indifferent to the impending disaster. This behaviour indicated that the students still did not fully grasp the severity of the disaster and were not yet ready to take responsibility for their safety.

To conduct a comparative analysis of these two incidents, we asked the students to discuss in groups what actions should be taken during such an event and to propose measures to prevent disaster-related harm.

The students' suggestions and decisions were to always check the 112 alerts to be informed about an approaching dust storm in advance. They also added to close windows and doors when a dust storm is approaching. If a person is inside a building, ensure that the electricity is turned off. If a person is outside, stay away from dangerous areas such as trees, power lines, and buildings. If the electricity on, the dust storm may damage the power lines, causing people to be injured or even killed. Additionally, students suggested that even if the windows are closed, not leave them unattended because dust can still enter through the edges.

Despite the varied reactions to the disaster, it is evident that the students are prepared to take protective measures and make decisions during an emergency. In class, they examined the causes and impacts of natural disasters and conducted analysis work. Their efforts are demonstrated in the poster they created, which explains how a dust storm occurs: "A dust storm is the transportation of soil or sand by wind in desert, semi-desert, and ploughed areas that occurs during strong winds in dry weather." This is particularly relevant as our region encompasses desert and semi-desert zones.

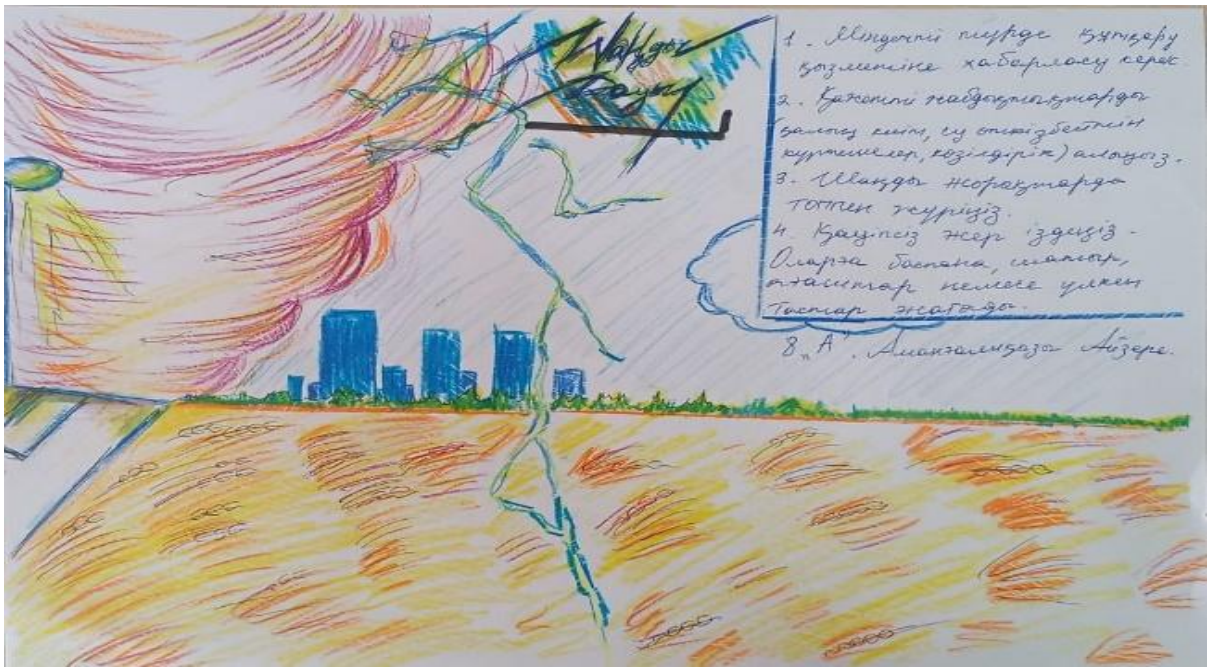


Figure 4. *Students' Actions During the Dust Storm*

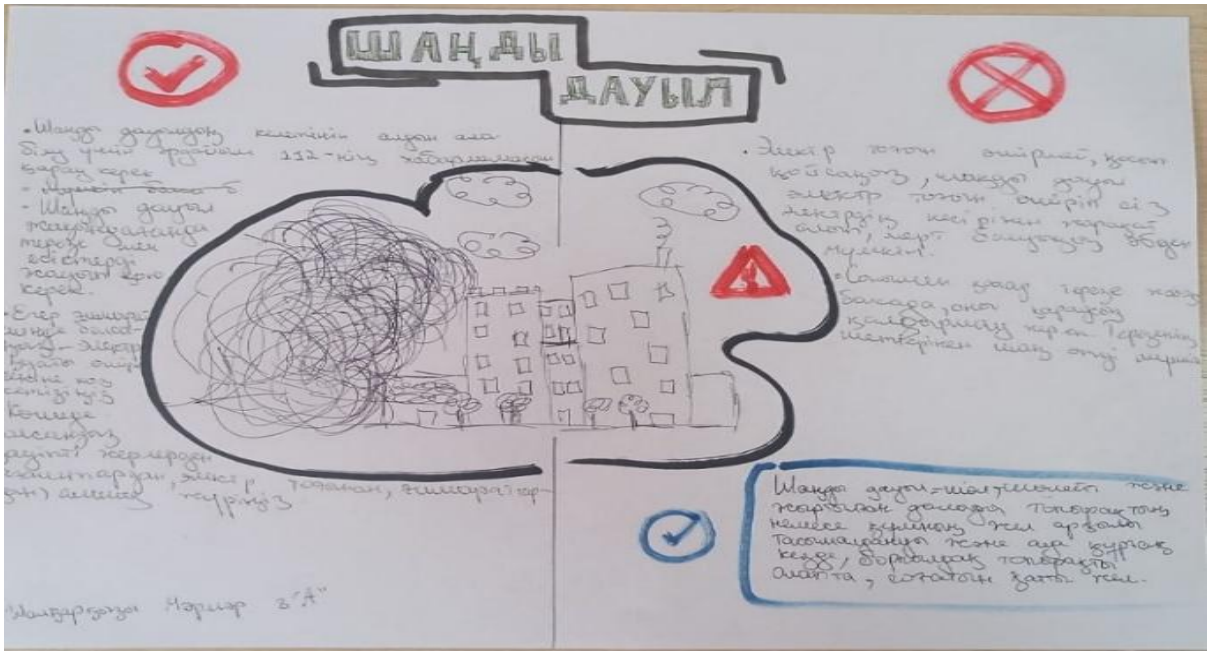


Figure 5. *Students' Decisions and Suggestions During the Dust Storm*

Lesson 3.

For those who enjoy spending their holidays at the sea or ocean, it is important to be aware of the dangers that may not be present in our local area. Therefore, the 8th-grade curriculum includes the topic "Life in the Ocean," which aims to educate students about "dangerous phenomena and situations in the ocean," including tsunamis and attacks by dangerous marine animals. As part of this topic, an assignment introduces information about a shark attack on a person at a beach in Egypt.

Figure 6. *Shark Attack on a Man at a Beach in Egypt*

Although students have not encountered such dangers directly, they understand the severe risk involved. While some students rated the danger as very high, the majority did not consider it extremely hazardous but were still able to identify appropriate protective measures.

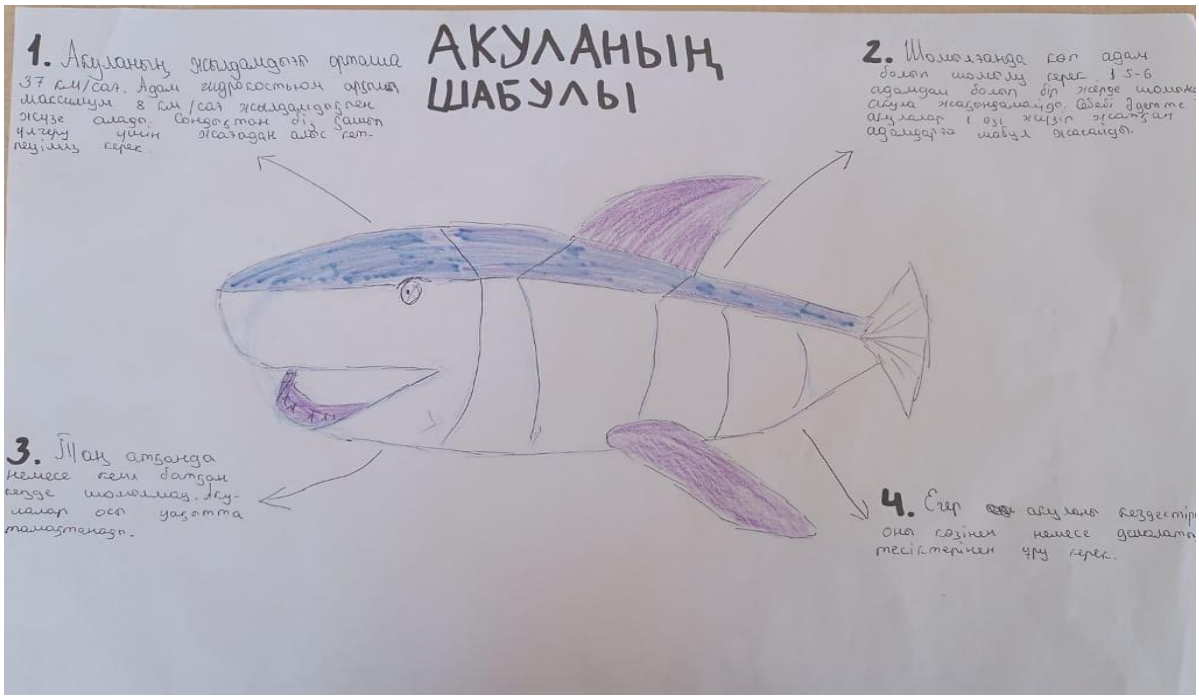


Figure 7. *Students' Decisions and Suggestions During Sea or Ocean Hazards*

Information from the picture:

1. The average speed of a shark is 37 km/h, while a person can swim at a maximum speed of 8 km/h with a wetsuit. Therefore, to escape in time, we should not venture far from the shore.
2. Swim in groups. Sharks are less likely to approach large groups of people and are more likely to attack a solitary swimmer.
3. Avoid swimming at dawn and dusk, as this is when sharks are feeding.
4. If a shark attacks, aim for its eyes or gills.

While completing these tasks, it became evident that students developed their analytical, evaluative, and critical thinking skills in addressing safety issues.

Before starting this study, an entry survey was conducted with the students. The survey included the question, "What dangers have you encountered in your life?" and the following responses were obtained.

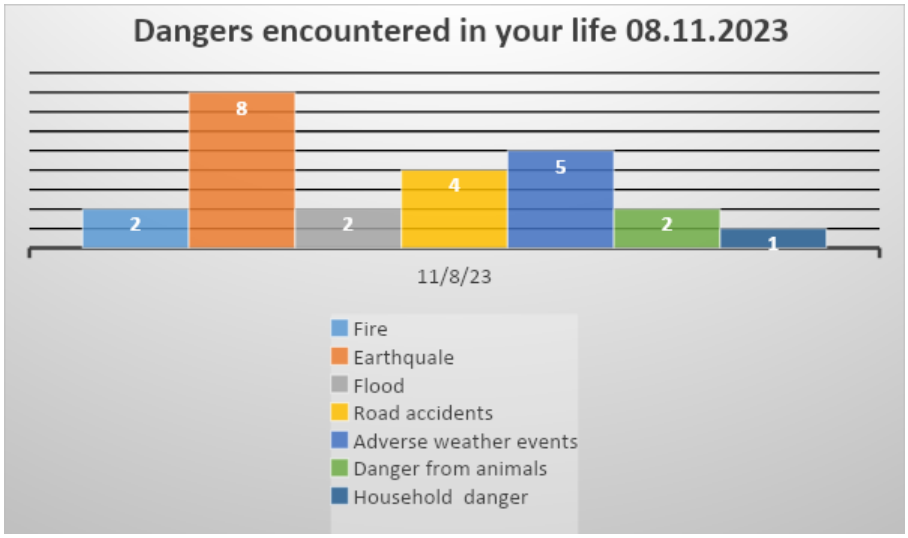


Figure 8. *Entry Survey: Dangers Encountered by Students in Their Lives*

Most students are aware that their local area is situated in a seismic zone, as each parallel class covered the topic of the "Lithosphere." However, they also mentioned medium-level risks such as floods, fires, adverse weather conditions, animal hazards (e.g., dog bites), and household dangers. Despite this, it remains unclear to what extent they understand the significance of these hazards.

Currently, there are many sources of information in society, including forecasters, bloggers, clairvoyants, and numerologists. In early January 2024, entrepreneur and blogger Alexander Savelyev disseminated information about an impending earthquake in Almaty. To determine the students' reactions to this information, we conducted a survey.

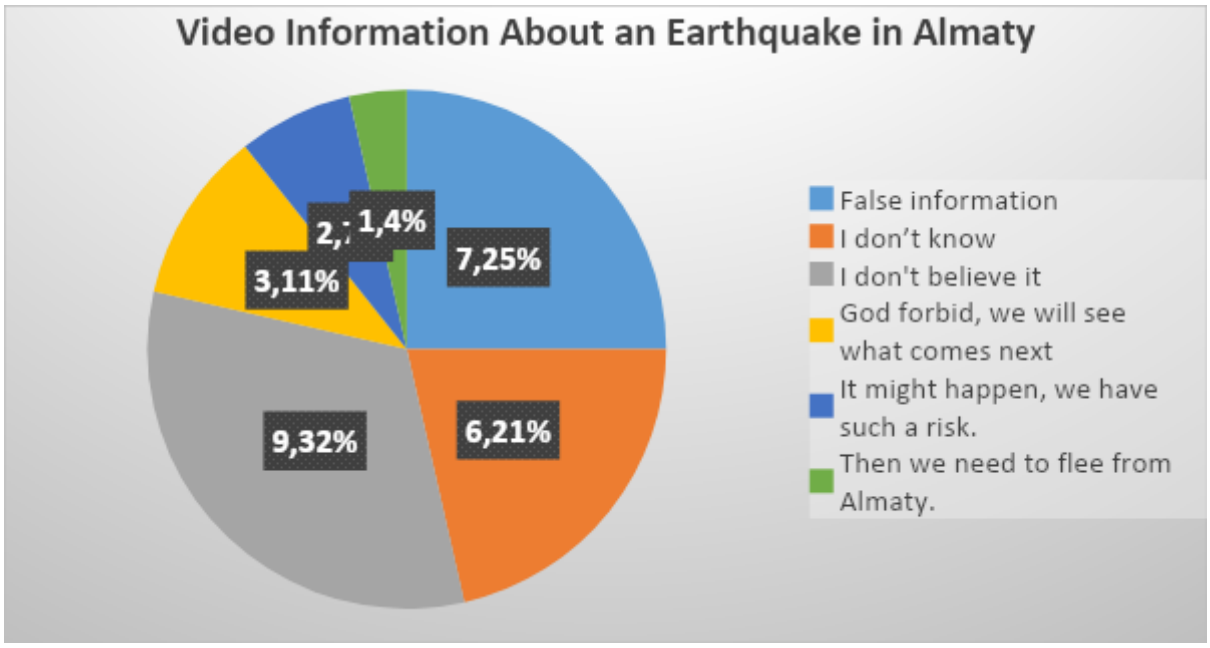


Figure 9. *Students' responses to the information about an earthquake in Almaty*

As it is evident, in the previous survey, despite knowing that their local area is located in a seismic zone and prone to earthquakes, the responses indicating disbelief and false

information increased, while responses such as "I don't know" and "God forbid" beliefs were still present.

However, on January 23, 2024, at 00:09 Astana time, seismic stations across Kazakhstan recorded the most severe earthquake. All stations of the National Nuclear Centre of the Republic of Kazakhstan's monitoring network documented this event.

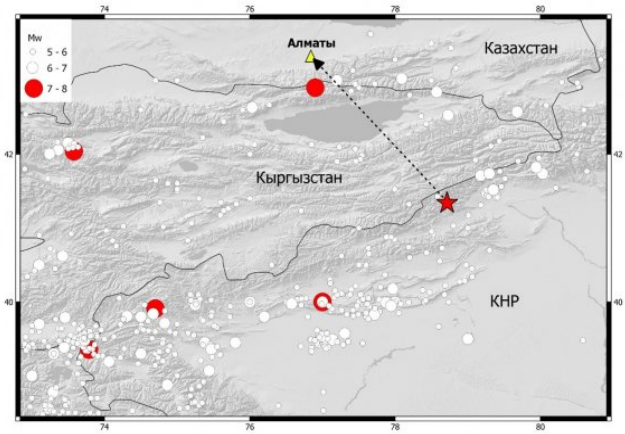


Figure 10. *Earthquake in Almaty on January 23, 2024, at 00:09 Am, Lasting 2 Minutes With a Magnitude of 5.*

This disaster was also felt in Almaty city, Almaty region, Zhambyl region, and Turkestan region. The epicentre was located at the border between Kyrgyzstan and China, where the earthquake had a magnitude of 6, while in Kazakhstan, it registered as a magnitude of 5. Historically, one of the most devastating earthquakes in Kazakhstan occurred at the end of the 19th century and the beginning of the 20th century, on January 4, 1911, at 4:25 AM, with a magnitude of 10-11 (8.2 magnitude). This earthquake is considered the strongest in Central Asia, destroying 736 brick buildings in Verny (now Almaty), killing around 50 people, and injuring over a hundred.

Approximately two weeks after the blogger's prediction, the earthquake struck. During the earthquake, many people panicked and became very frightened. People rushed out of their homes and tried to flee to the outskirts of the city. Although they received alerts from 112, these messages were often ignored. Those who couldn't escape were taken to safe points (schools and kindergarten buildings). The seismic drills conducted in the city and educational institutions did not prove effective. No alarms took place. This event highlighted the low level of preparedness and response to natural disasters in our country. Following this disaster, the survey conducted among the students showed real results.

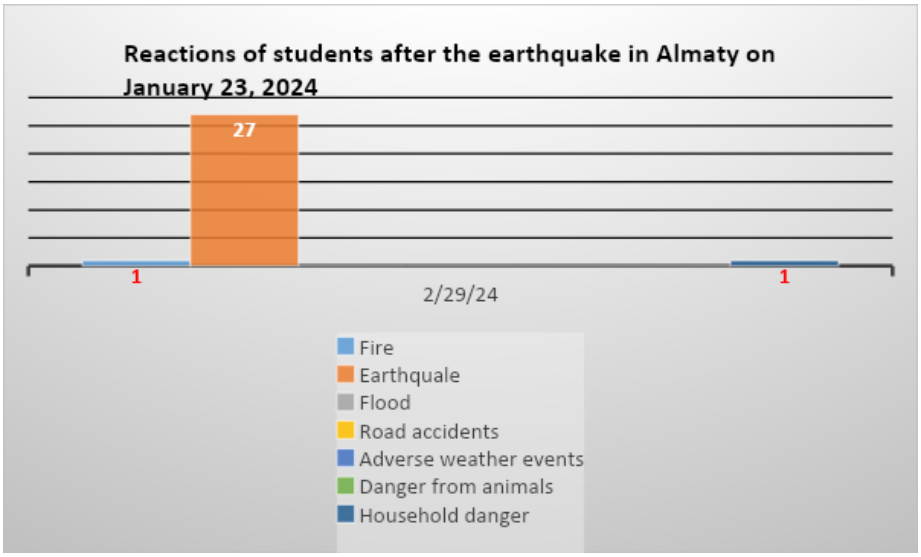


Figure 11. *Students' Reactions After the Earthquake in Almaty on January 23, 2024*

Compared to the November survey, an overwhelming majority of the 29 students (27) indicated experiencing the earthquake. The influence of the January 23, 2024, earthquake is evident. The number of respondents taking action increased significantly compared to the first survey. Only one student was asleep and unaware, and one was surprised, while the rest took various actions independently or with their families: they went outside or acted based on the warnings. Notably, three families had prepared emergency kits in advance. The number of students who remained calm also increased. The impact of the drills and the information provided during lessons at school is evident among the students.

During this time, everyone at the school reacted differently to the disaster, with some panicking and running outside. After the incident, to understand the actions of the students and school staff, we asked the following question: "What was your reaction during the earthquake on March 4?"

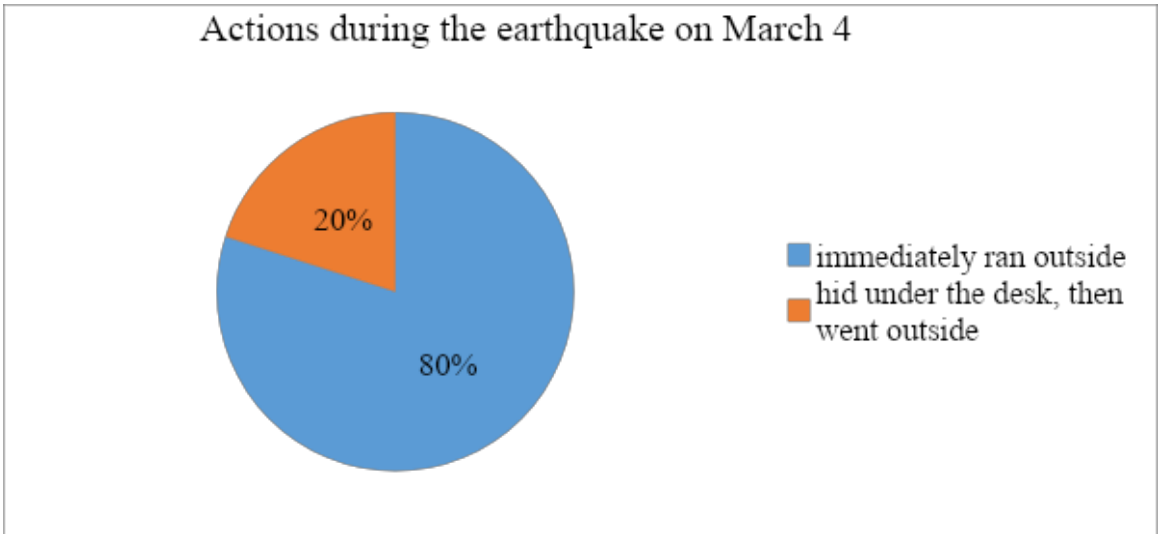


Figure 12. *Actions of People at the School During the Earthquake in Almaty on March 4, 2024*

80% of the people at the school immediately ran outside, while 20% hid under desks and then went outside. This data suggests that, because the disaster occurred unexpectedly, people were unable to remain calm when making decisions. Unlike in Japan, such phenomena do not occur frequently in Kazakhstan. The next question posed to the 8th grade students was: "Which actions are correct during an earthquake?"

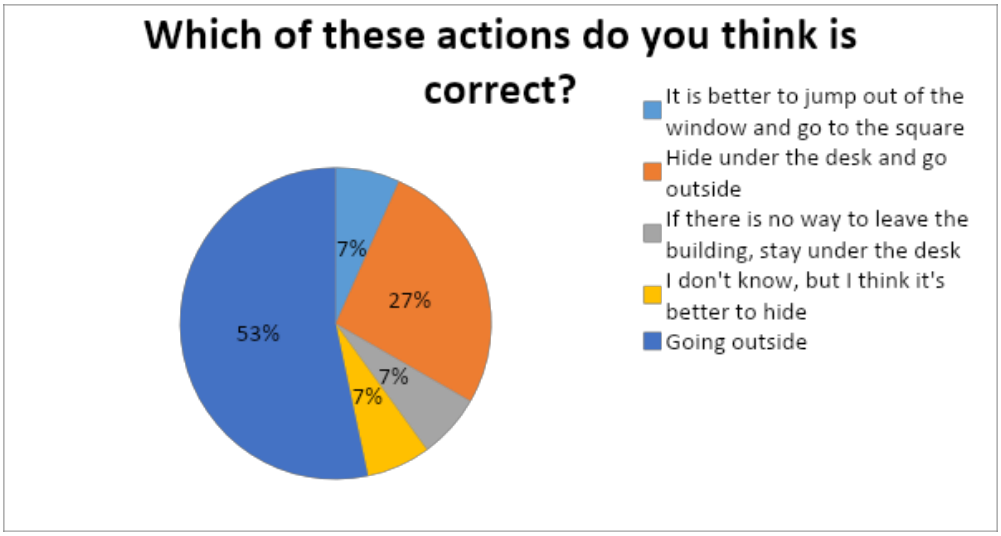


Figure 13. *Indicators of Actions During the Earthquake*

The majority of students determined that going outside was the correct action among the various responses. However, it was noted that they did not pay much attention to the instructions and guidelines posted in each classroom.

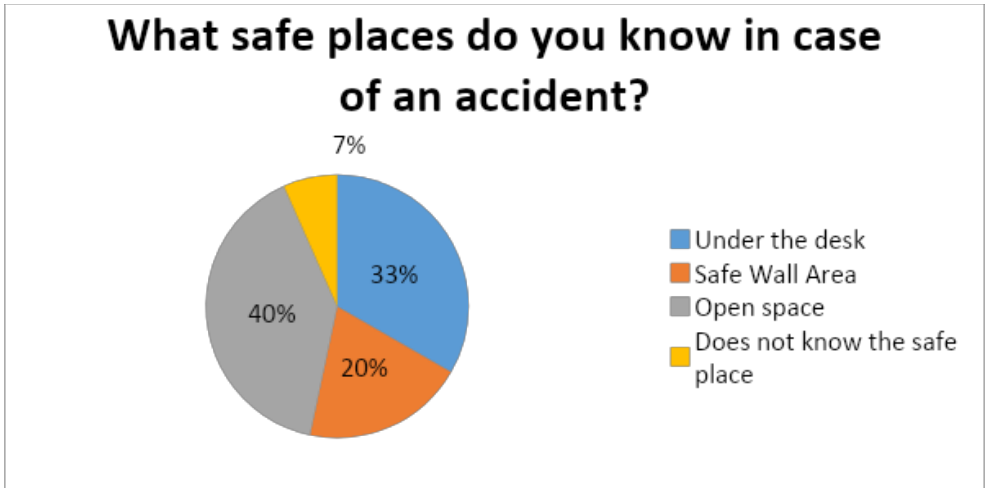


Figure 14. *Information on Safe Areas During an Earthquake*

In response to the question "What safe areas do you know of during a disaster?" most students indicated that they paid attention to the warnings given during lessons and drills.

Results

Based on the research, we reached the conclusion that students' awareness of situations that threaten human life safety has significantly increased, as evidenced by the exit survey data and the outcomes of the situational tasks. The results of the study indicate the need for the school community to rethink its approach to preventive and training activities. Additionally,

students demonstrated critical thinking skills while performing situational tasks and produced outputs from their mini-research projects in the form of posters, guidelines, and presentations.

Conclusions

Our research is important for several reasons. At a mental level, it helps students develop a conscious understanding of situations that threaten human safety. On a practical level, modelling situational tasks aids in developing students' response skills to life-threatening situations. This approach also promotes a sense of responsibility among students for their own lives and the lives of those around them. The results of the entry and exit surveys confirm the relevance of our study.

Thus, based on the conducted research, we concluded that the application of situational task modelling in educational practice shows significant positive results in developing students' safe behaviour skills. This method allows for the integration of theoretical knowledge with practical skills, leading to better material retention and increased readiness of students for real-life situations.

References

Abramova, S. V. (2017). Образование в области безопасности жизденедятельности [Education in the Field of Life Safety]. *VII Interregional Scientific and Practical Conference with International Participation*, 288.

Belov, S. V. (2010). *Безопасность жизнедеятельности и защита окружающей среды (техносферная безопасность) [Life Safety and Environmental Protection (Technosphere Safety)].* Moscow: Yurayt Publishing.

Hersey, P. &. (1988). *Management of Organizational Behavior: Utilizing Human Resources* (Vol. 5). New Jersey, Englewood Cliffs: Prentice Hall.

Johnson, V. A., Ronan, K. R., Johnston, D. M., & Peace, R. (2014). Evaluations of Disaster Education Programs for Children: A Methodological Review. *International Journal of Disaster Risk Reduction, 9*, 107-123.

Khanislamova, G. M., Kabirov, T. R., & Shaidullina, Z. V. (2011). *Ситуационные задания к курсу «Безопасность жизнедеятельности» [Situational Tasks for the Course "Life Safety"].* Ufa: Bashkir State Pedagogical University Publishing.

Peden, M., Oyegbite, K., Ozanne-Smith, J., Hyder, A. A., Branche, C., Rahman, A. F., . . . Bartolomeos, K. (2008). *World report on child injury prevention.* World Health Organization.

Peek, L. (2023). *Children and Disasters: Understanding Vulnerability, Developing Capacities, and Promoting Resilience — An IntroductionChildren, Youth and Environments* (Vol. 18).

Contact email: Damirovas202@gmail.com

Emotional Colours: Relationship Between Light Wavelengths and Emotional Activation for Enhancing Memory Processes

Elèna Cipollone, Niccolò Cusano University, Italy

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The research project seeks to reassess and redefine the educational tools and environment to establish optimal learning conditions by harnessing the potential of luminous stimuli inherent in didactics. Literature has underscored how the wavelength of various colours correlates with differing levels of engagement in children, as it is associated with varied emotions experienced upon encountering the coloured stimulus. Consequently, owing to the strong link between emotion and memory, research has revealed how colours can positively influence the memorisation of concepts. The objective is to delineate the impact of coloured stimuli on the memory processes of elementary school children, through deliberate employment of specific wavelengths, such as 255-0-0 (700.47nm), 0-255-0 (546.09nm), 0-0-255 (435.79nm), 121-0-255 (428 nm), 69-255-0 (534 nm) and 255-248-128 (572 nm), chosen based on the heightened sensitivity of human eye photoreceptors. The study entailed an initial phase of individual-level colour-emotion association utilising software capable of discerning the subject's emotion through facial muscle contractions. Subsequently, following the customisation of the educational tools and environment, a mnemonic test was conducted to ascertain the memorisation of academic content. This pilot study, conducted on a sample of 134 primary school children, has yielded highly intriguing results, revealing that a conscious utilisation of colour within the educational context can enhance mnemonic processes in 30% of cases. The project's potential lies in its considerable practicality and customisation, enabling the adaptation of the proposal to suit the specific needs and requirements of each student, thus respecting the diversities within the class group.

Keywords: Engagement, Primary School, Children, Learning, Color

iafor
The International Academic Forum
www.iafor.org

Introduction

Learning environments play a crucial role in the complex task of knowledge acquisition. To create a space that facilitates memory processes, their structuring should consider the multitude of stimuli with which students interact daily. Achieving such an organisation can benefit from the conscious use of tools, materials, and educational aids, whose functional application can substantially contribute to sustaining a positive emotional experience in the learning process (Gaines et al., 2023).

The latter draws upon various activations that enable the analysis, understanding, and subsequent assimilation of available information. Among these, the visual acquisition of stimuli allows for the processing of a significant portion of their characteristics, and the physiology of vision, which studies its functioning, helps us understand how these stimuli play a fundamental role in the information-processing process (Sinha et al., 2024). Specifically, it emerges that the role played by colour, and its various wavelengths, enriches the visual experience, providing a higher level of engagement based on the response of biological, cultural, and experiential components (Farley et al., 2019; Dalke et al., 2018). In the literature, it is reported that high levels of emotions are associated with better memory retention (Kensinger et al., 2020); thus, the conscious choice of colour in the educational context and its materials can optimise the process, making the understanding and assimilation of information more efficient. Moreover, studies report that different wavelengths convey emotional content that activates emotional memory processes. This plays a fundamental role in the learning phases, as the qualitative aspect of such types of information carries significant weight in the stages of acquisition, maintenance, and retrieval.

Based on these findings, the research project "Emotional Colours" was developed, with the primary aim of investigating the impact of colours on the mnemonic processes of primary school children, to guide a more conscious use of coloured stimuli within educational tools. Following the pilot study (Cipollone, 2022) and an initial analysis regarding the coloured stimuli present in the learning environment (Cipollone et al., 2024; Cipollone et al., 2024), this new research specifically explored the extent to which wavelengths impact emotional levels in primary school students.

The "Emotional Colours" project adopts a multidisciplinary approach, integrating studies from Educational Neuroscience, the physiology of vision, and psychology. This educational methodology leverages natural learning processes to enhance the educational experience.

Educational Neuroscience provides a scientific foundation for understanding how cognitive and neural processes intertwine while acquiring new information, using neuroimaging techniques to observe brain responses to coloured visual stimuli and how such responses influence memory and attention (Bowers & House, 2019). The physiology of vision clarifies how the brain processes visual information through different wavelengths, enabling us to understand which wavelengths are most effective in promoting engagement and memory retention (Elliot & Maier, 2014). Psychology explores how emotions and perceptions influence the ability to memorise and recall information, studying emotional reactions to colours to develop strategies that evoke positive emotions and enhance learning (Pekrun, 2017).

The objective is to create learning environments that positively stimulate students, fostering memory retention and content comprehension through the strategic use of colours and

emotions. The project aims to develop visually appealing educational tools that enhance learning effectiveness. The conscious use of colours can transform the educational environment, making it more engaging and motivating, thereby facilitating the acquisition of new knowledge in a more efficient and lasting manner (Barrett et al., 2015).

Scientific Literature

Colour vision is a complex phenomenon that begins when light enters the eye through the cornea, passes through the pupil, and then through the lens, allowing a clear image to form on the retina, located at the back of the eye. The retina is a complex, light-sensitive structure composed of millions of photoreceptors. These photoreceptors are divided into two main categories: rods and cones. Rods are responsible for vision in low-light conditions and do not detect colour. Cones, on the other hand, are crucial for colour vision and function best in bright light conditions. There are three types of cones, each sensitive to different wavelengths of light (Shapley, 2019; Torisawa et al., 2015).

When light strikes the cones, it triggers chemical reactions that convert light energy into electrical signals. These electrical signals are transmitted via the optic nerve to the brain, specifically to the visual cortex, where they are processed and interpreted. The different wavelengths of light correspond to different colours perceived by the human eye, each of which can influence mood and emotions in distinct ways. These effects are due to the interaction of light with the photoreceptors in the retina, which then send signals to the brain, influencing the production of neurotransmitters and hormones that regulate mood (Persson et al., 2024).

Wavelengths of colour represent a fundamental determinant in the educational landscape for the attentional, emotional, and mnemonic dimensions of students (Cipollone & Peluso, 2021). The various mechanisms of neurophysiological activation, related to changes and movements of the eyes (Van der Wel et al., 2018), allow for the perception of the broad range of characteristics that define the completeness of elements. Supporting this evidence, it has been demonstrated that chromatic stimuli, compared to achromatic ones, result in longer fixation durations and larger pupil diameters (Liu et al., 2021). The relevant literature strongly suggests that the perception of colour activates networks of brain connectivity during learning tasks, capturing visual attention and stimulating emotional activation (Chai et al., 2023). This reveals a significant overlap of brain areas involved in emotion and motivation processes, suggesting that these functions are closely interconnected (Cromwell et al., 2020).

Consequently, the chromatic component of stimuli can be identified as a variable influencing brain activation processes, supporting information processing in the surrounding environment. Colour enriches the characteristics of the stimulus, making it not only more visually appealing but also more distinctive and memorable. This visual quality facilitates cognitive processing and the creation of mnemonic associations, enhancing the emotional impact and the subsequent recall of information, laying the foundation for meaningful learning. As a result, stimuli with a chromatic variable are more likely to activate attentional and mnemonic processes than achromatic stimuli, facilitating their subsequent retrieval by the student.

Emotions associated with colours play a significant role in memory optimisation, as they influence the encoding, storage, and retrieval of information (Immordino-Yang & Damasio, 2018). When a colour evokes a specific emotion, it activates the amygdala, a key brain

structure for emotion regulation, closely linked to the hippocampus, essential for memory formation. The amygdala activation during an emotional experience strengthens memory encoding, increasing the likelihood that the information will be stored in the long term. This process is known as "memory consolidation," and it is particularly effective when information is associated with a strong emotional response (Titz et al., 2021; Park et al., 2018). Moreover, emotions also influence memory retrieval. During information recall, emotions can act as a powerful retrieval cue, facilitating access to memories that have been previously stored (Linnenbrink-Garcia et al., 2019). Colourful experiences that evoke positive emotions not only enhance memory retention but also make memories more vivid and enduring (Schott & Dörfel, 2019). This is particularly relevant in an educational context, where the strategic use of colour can transform educational materials into powerful learning tools, capable of stimulating engagement and facilitating the assimilation of information.

Therefore, emotions associated with colours enhance memory by activating specific neural circuits that favour the encoding and retrieval of information, making learning not only more effective but also more enduring. Consequently, the conscious choice of colour in educational contexts and materials can optimise the memory experience, significantly improving understanding and assimilating information.

Research Project

Emotional Colours is a project that, for the past two years, has aimed to explore the relationship between colours and mnemonic processes in primary school children. The objective is to identify the impact of wavelengths on cognitive functioning to facilitate the creation of stimulating learning environments.

The pilot study (Cipollone, 2022) conducted on 72 subjects highlighted how the memorisation of words could depend on the type of colour and the emotional valence associated with it, revealing that coloured words enhanced memorisation by 20%. Given the positive results of the pilot study, Emotional Colours continued its investigation by evaluating the variables involved. An initial analysis focused on the impact of colour on the student's attention level (Cipollone, Lembo, et al., 2024). This study revealed that the high level of engagement provided by colour was associated with a high level of attention, regardless of the type of wavelength.

Following this study, the relationship between the level of engagement provided by colour and the mnemonic process was analysed (Cipollone, Chierichetti, et al., 2024). This third analysis revealed that a high level of engagement provided by colour does not always guarantee a high level of memorisation, indicating that other variables come into play in this process.

The research project is therefore continuing this analysis, and the current focus is on evaluating the impact of emotion associated with colour on mnemonic processes. In this phase, the research hypothesis establishes that wavelength influences memorisation through emotional activation.

The sample was composed of 134 students, aged between 6 and 11 years, with an average age of 9.35. The sample (m=70; f=64) was drawn from 2 public and 2 private schools in Rome and was randomly divided into an experimental group (N=75) and a control group (N=59). A consent form and information sheet were provided to all the parents of the

children. Informed consent was negotiated with them and pseudonyms have replaced the names of participants. Participants (including child participants) were given the opportunity to withdraw from the study at any time.

The selection of the wavelengths on which to focus the study was based on a thorough analysis of the literature and human physiology. This analysis revealed that the three cones, the photoreceptors present in the retina responsible for photopic vision, are specialised in the perception of three colours: 0-0-255, 0-255-0, and 255-0-0, with peaks of sensitivity at 121-0-255, 69-255-0, and 255-248-128, respectively. The nomenclature used for the naming of colours follows the RGB format.

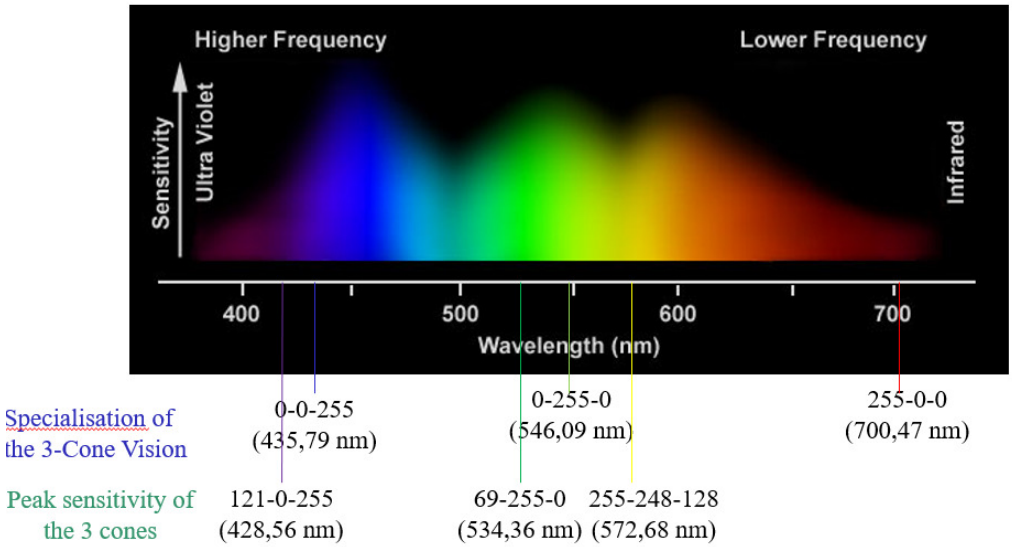


Figure 1: wavelength selection

In light of this evidence, it was decided to focus on the wavelengths associated with these colours, specifically: 700.47 nm, 546.09 nm, 435.79 nm, 428.56 nm, 534.36 nm, and 572.68 nm.

As the relevant literature has highlighted a lack of studies on these topics in children and significant interindividual variability in colour perception, this project was structured into two fundamental phases:

- Assessment of the individual association between wavelength and emotion in children: in this phase, participants viewed coloured stimuli while being exposed to the AI software "EMOJI," which is capable of detecting their level of engagement and the emotions experienced, through the detection of facial muscles, in line with Paul Ekman's neuromuscular theory of emotions (Ekman, 1992).
- Verification of the link between wavelength and mnemonic processes: in this phase, a memory test based on the structure of the NEPSY-II M6 subtest was administered. The children read a text and were subsequently evaluated on three memory tasks: free recall, cued recall, and recognition. The control group viewed the text in black and white, while the experimental group received a text with 18 coloured words (3 for each wavelength), randomly selected through software. This phase allowed for the verification of the level of memorisation of the coloured stimuli.

In both phases, the selected colours were viewed according to the RGB classification.

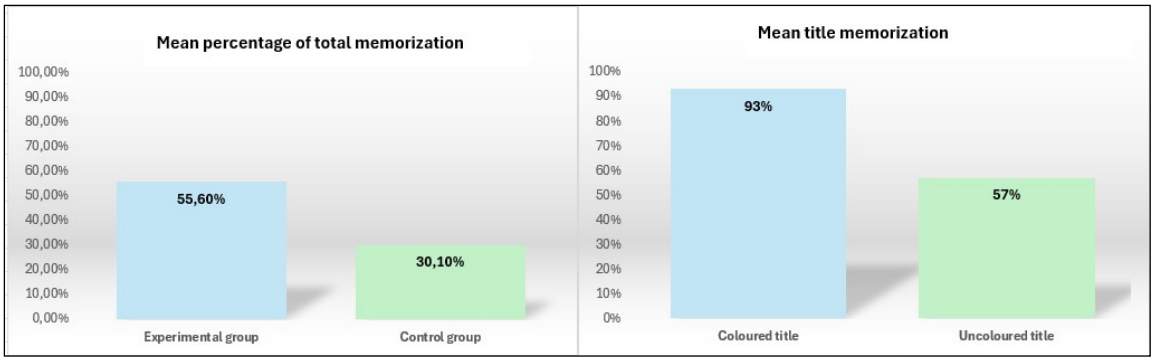


Figure 2: mean percentage of memorization

Figure 2 shows the scores obtained in the memory test. In the graph on the right, the total scores of the test are displayed, while the graph on the left shows the scores related to the memorisation of the title. As seen in both graphs, the experimental group achieved significantly higher scores than the control group, with a mean difference in memorisation level of 30%.

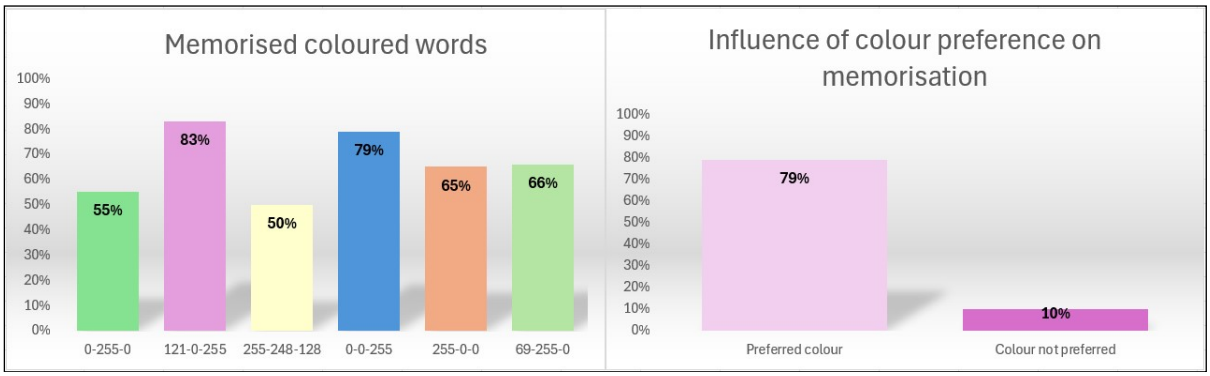


Figure 3: colour – emotion relationship

Figure 2 reveals the results divided by colour. In the right graph, it is shown how the colour that most favoured memorisation was 121-0-255, followed by 0-0-255 and 69-255-0. The data reveals that these three colours were perceived as associated with positive emotions, such as happiness and relaxation.

In the left graph, the influence of the favourite colour on the memorisation process is shown. It emerges that the child's favourite colour influences memorisation in 79% of cases, as it is associated with positive emotions.

For the statistical analysis, the JAMOVI software (version 2.3.28) was used.

At first, it was necessary to verify whether the differences in the memorization of the two groups were statistically significant. For this reason, an independent sample t-test was used.

Displayed below are the verification results for the assumptions: as can be seen from Table 1 and Table 2, both assumptions are satisfied.

Homogeneity of Variance Test (Leven's)		
	F	p - value
Memorisation	0.110	0.742

Table 1: Homogeneity of Variance Test

Normality Test (Shapiro-Wilk)		
	W	p - value
Memorisation	0.955	0.163

Table 2: Normality Test

A student t-test was performed (Table 3), revealing a p-value lower than 0.001. This data suggests that the differences in memorisation scores between the two groups are statistically significant.

Independent Sample t-test			
		Statistic	p - value
Memorisation	t student	5.500	< .001
Note: H_a μ Control ≠ μ Experimental			

Table 3: student t-test

Subsequently there was a need to examine the effect of two independent variables: colour and colour preference, on our dependent variable, namely the memorisation scores. For this type of analysis, a two-way ANOVA was selected.

Homogeneity of Variance Test (Leven's)		
	F	p - value
Memorisation	0.110	< .001
Note: a low p-value suggests a violation of the assumption of homogeneity		

Table 4: Homogeneity of Variance Test

Normality Test (Shapiro-Wilk)		
	F	p - value
Memorisation	0.995	< .001
Note: a low p-value suggests a violation of the assumption of homogeneity		

Table 5: Normality Test

ANOVA	Sum of squares	F	p-value
Colour	2.408e-30	0.213	0.927
Preferences	3.939	1.736e+30	< .001
Colour * Preferences	4.924e-31	0.043	0.999
Residual	3.621e-29	NaN	NaN

Table 6: two-way ANOVA

After an assumption analysis (Table 4 and Table 5), we performed the ANOVA (Table 6). The relevant data that emerges is that the effect of colour preference is highly significant.

Conclusion

The Emotional Colours project seeks to deepen the understanding of the relationship between wavelengths, emotions, and colours to optimise memory processes. The findings of this study suggest that the use of specific colours can significantly enhance the recall of stimuli. However, it is essential to delve into the mechanisms behind this enhancement to comprehend its implications fully.

The data revealed that the colours most effective in enhancing memorisation correspond to the peaks of cone sensitivity in the human eye, particularly when these colours were associated with positive emotions, such as happiness. This finding aligns with existing research, which suggests that emotional arousal plays a crucial role in the encoding and retrieval of memories. According to Kensinger and Schacter (2018), emotionally charged stimuli are more likely to be encoded deeply and retrieved more easily than neutral stimuli. Thus, the combination of chromatic characteristics and the emotional response they elicit appears to be a potent factor in memory enhancement.

Specifically, the colours of peak sensitivity - such as 121-0-255 and 69-255-0 - were found to interact positively with emotional memory. This interaction highlights the significant role of the biological component in memory processes, as these colours correspond to the wavelengths that the human visual system is most attuned to (Elliot & Maier, 2014). This suggests that our physiological predisposition to certain colours can be leveraged to enhance cognitive functions like memory, particularly when these colours are linked to positive emotional experiences.

Another key finding of the study is the enhanced memorisation associated with the presence of the participant's favourite colour. This observation underscores the importance of personal experiences and individual preferences in cognitive processes. The role of personal relevance in memory has been well documented in the literature. For example, research by Conway and Pleydell-Pearce (2020) suggests that autobiographical memories, which are often tied to personal preferences, are particularly resilient and vivid. This indicates that when educational materials incorporate colours that are personally meaningful to the learner, the likelihood of memory retention increases.

Therefore, the study concludes that colour positively influences memorisation, and the strength of this influence is significantly determined by the emotional response the colour elicits. This is consistent with the broader literature on the intersection of emotion, cognition, and visual perception (Kuhbandner & Pekrun, 2019). By integrating these findings into educational practices, educators can create learning environments that not only enhance memory retention but also engage students on a deeper, more personal level.

While this study offers valuable insights into the relationship between colour, emotion, and memory, it is important to acknowledge several limitations. Firstly, the sample size, although indicative, may not be large or diverse enough to generalise the findings across different populations. The study's participants were limited to a specific age range and geographic location, which may not fully represent the variability in colour-emotion responses seen in broader, more heterogeneous groups. Additionally, the experimental conditions may not perfectly replicate real-world educational environments, potentially limiting the ecological validity of the findings. Another limitation is the focus on a specific set of colours and wavelengths; a broader exploration of a wider range of colours and their interactions with

different emotions might yield more comprehensive insights. Finally, the study does not account for the potential long-term effects of colour-based interventions on memory and learning outcomes, as the impact was measured in a relatively short timeframe. Future research should address these limitations by expanding the sample, incorporating more objective measures of emotional engagement, and exploring the long-term implications of personalised colour use in education.

At this point, it becomes crucial to understand how to utilise this relationship effectively within the educational context. To achieve this, the project must undergo further essential developments, each aimed at enhancing the applicability of the findings in real-world settings.

Firstly, expanding the sample size is a vital step in establishing a more robust and generalisable relationship between the variables examined. A larger, more diverse sample would allow for a better understanding of how colour-emotion preferences and their impact on memory processes vary across different age groups, cultural backgrounds, and cognitive profiles. This will help identify whether the observed effects are consistent across various populations or if they require adaptation to suit specific groups. Such data could provide a stronger foundation for developing universally effective educational strategies that leverage the power of colour in learning.

Secondly, there is significant potential in developing a software tool that can assess individual colour-emotion preferences. This tool, designed for easy use by teachers, could be implemented in schools to gather personalised information on each student. By integrating such a tool into the educational system, teachers could gain insights into the specific colours that resonate emotionally with each student, thereby tailoring their teaching materials to optimise engagement and memory retention. The availability of such software would not only streamline the personalisation process but also empower educators to make data-driven decisions in their teaching practices. This approach aligns with the growing emphasis on personalised learning, which has been shown to improve educational outcomes by catering to the unique needs and preferences of each student (Pane et al., 2018).

Finally, the insights gained from this research could pave the way for a more personalised approach to the educational environment. This could involve incorporating calibrated coloured elements into various aspects of the classroom, from designing learning materials such as rulers and pencils to the tools teachers use for marking and correction. By customising these elements based on the colour preferences and emotional responses of students, the educational space could become a more engaging and supportive environment for learning.

The potential of colour as a tool for influencing cognitive processes is particularly promising not only for typically developing students but also for those with atypical developmental trajectories. Research has shown that sensory experiences, including colour, play a critical role in cognitive development and learning in children with special educational needs (Baranek et al., 2019). Therefore, it would be particularly intriguing to explore how a personalised, colour-based approach could enhance learning outcomes for these students. By structuring a student's daily educational experience around their unique emotional and cognitive responses to colour, educators could create a learning environment that is not only more effective but also more inclusive and supportive of individual differences.

In summary, the next steps of this project should focus on expanding the sample size, developing user-friendly tools for assessing colour-emotion preferences and exploring the potential for personalised educational spaces. Such efforts could significantly enhance the impact of colour on learning and contribute to the development of more tailored, effective educational practices.

References

Baranek, G. T., Little, L. M., Parham, L. D., Bodfish, J. W., & Sensory Experiences Project. (2019). Sensory features and repetitive behaviours in autism: Connecting the dots. *Journal of Autism and Developmental Disorders, 49*(11), 4231-4250. DOI:10.1007/s10803-019-04182-3

Barrett, L. F., Lewis, M., & Haviland-Jones, J. M. (2015). *Handbook of emotions*. Guilford publications.

Bowers, J. S., & House, A. (2019). The role of visual experience in the perception of color. *Psychological Science, 30(9),* 1311-1319. DOI:10.1177/0956797619863400

Chai, M., & Tang, T. (2023). Microstates of Dynamic Directed Connectivity Networks Revealing Visual Color Influences on the Brain Information Processing During Learning. *IEEE Access, 11*, 14256-14273. https://doi.org/10.1109/ACCESS.2023.3244066

Cipollone, E., (2022). The influence of colors on emotional memory: how colors can improve learning in primary school children*, Italian Journal of Health Education, Sports and Inclusive Didactics, anno 6*, n.1 https://doi.org/10.32043/gsd.v6i1.601

Cipollone, E., Lembo L. & Peluso FC. (2024). Emotional Colors: relationship between light wavelengths and educational settings for enhancing learning processes, Conference on Embodied Education Proceedings (printing).

Cipollone, E., Chierichetti, C., Morsanuto, S., Peluso, FC. (2024). Emotional Colours: which wavelength promotes memorization through colour engagement in primary school children, *Studi e ricerche sui processi di apprendimento-insegnamento e valutazione* (printing).

Cipollone E., Peluso FC. (2021). *Apprendere con il cuore: come le emozioni influenzano l'apprendimento.* Edizioni Romane Universitarie: Roma.

Conway, M. A., & Pleydell-Pearce, C. W. (2020). The Construction of Autobiographical Memories in the Self-Memory System. *Psychological Review, 107*(2), 261-288. 10.1037/0033-295X.107.2.261.

Cromwell, H., Abe, N., Barrett, K., Caldwell-Harris, C., Gendolla, G., Koncz, R., & Sachdev, P. (2020). Mapping the interconnected neural systems underlying motivation and emotion: A key step toward understanding the human affectome. *Neuroscience & Biobehavioral Reviews, 113*, 204-226. https://doi.org/10.1016/j.neubiorev.2020.02.032

Dalke, H., Little, J., Niemann, E., Camgoz, N., Steadman, G., Hill, S., & Stott, L. (2018). Simultaneous evaluation of the role of color preferences and the effect of color memory with the approach of improving students' quality of learning: A case study—Learning environments for 6-to-7-year-old children. *Learning Environments Research, 21*(2), 123-145. https://doi.org/10.1007/s10984-018-9262-5

Ekman, P. (1992). Facial expressions of emotion: An old controversy and new findings. Philosophical Transactions of the Royal Society of London. *Series B: Biological Sciences*, 335(1273), 63-69. https://doi.org/10.1098/rstb.1992.0008

Elliot, A. J., & Maier, M. A. (2014). Color psychology: Effects of perceiving color on psychological functioning in humans. *Annual Review of Psychology, 65*, 95-120. 10.1146/annurev-psych-010213-115035.

Farley, F., & Grant, A. (2019). The impact of colors on human memory in learning English collocations: Evidence from South Asian tertiary ESL students. *Asian-Pacific Journal of Second and Foreign Language Education, 4(1),* 1-17. https://doi.org/10.1186/s40862-019-0079-9

Gaines, K. S., & Curry, Z. D. (2023). The inclusive classroom: The effects of color on learning and behavior. *Journal of Family and Consumer Sciences Education, 29(1).*

Güneş E., Olguntürk N. (2020). Color-emotion associations in interiors. *Color Research & Application*, *45*, 129-141. DOI: 10.1002/col.22443.

Guthrie, J. T., Wigfield, A., & You, W. (2014). Instructional Contexts for Engagement and *Achievement in Reading. Educational Psychologist*, *49*(2), 99-107. DOI:10.1080/00461520.2014.887721

Ikeda, S. (2020). Influence of color on emotion recognition is not bedirectional: an investigation of the associations between color and emotion using a Stroop-Light task, *Psychological reports, 123*(4), 1226-39. DOI:10.1177/0033294119853280

Immordino-Yang, M. H., & Damasio, A. (2007). We feel, therefore we learn: The relevance of affective and social neuroscience to education. *Mind, Brain, and Education, 1*(1), 3-10. DOI:10.1111/j.1751-228X.2007.00004.x.

Jan L. Plass, Steffi Heidig, Elizabeth O. Hayward, Bruce D. Homer, Enjoon Um, (2014). Emotional design in multimedia learning: *Effects of shape and color on affect and learning, Learning and Instruction, 29*, pp. 128-140, https://doi.org/10.1016/j.learninstruc.2013.02.006

Kensinger, E. A., & Schacter, D. L. (2018). Cognitive and Neural Effects of Emotion on Memory in Healthy Aging and Early Alzheimer's Disease. *Current Opinion in Behavioral Sciences, 19*, 61-66. DOI:10.1016/j.cobeha.2017.09.006

Kensinger, E. A., & Ford, J. H. (2020). Retrieval of emotional events from memory. *Annual review of psychology*, *71*(1), 251-272.

Kramer R., Prior J. (2019). Colour association in children and adults. *The Quarterly Journal of Experimental Psychology, 72*, 1977-83. https://doi.org/10.1177/1747021818822948

Linnenbrink-Garcia, L., Patall, E. A., & Pekrun, R. (2016). Adaptive Motivation and Emotion in Education: Research and Principles for Instructional Design. *Policy Insights from the Behavioral and Brain Sciences, 3*(2), 228-236. DOI:10.1177/2372732216644450

Liu, J., & Van Iersel, M. W. (2021). Photosynthetic physiology of blue, green, and red light: Light intensity effects and underlying mechanisms. *Frontiers in plant science, 12*, 328. DOI:10.3389/fpls.2021.619987

Liu, Y., Ma, W., Guo, X., Lin, X., Wu, C., & Zhu, T. (2021). Impacts of Color Coding on Programming Learning in Multimedia Learning: Moving Toward a Multimodal Methodology. *Frontiers in Psychology, 12*. https://doi.org/10.3389/fpsyg.2021.773328.

Pane, J. F., Steiner, E. D., Baird, M. D., & Hamilton, L. S. (2018). Informing Progress: Insights on Personalized Learning Implementation and Effects. *RAND Corporation*

Park, B., Holloway, S. D., Arendtsz, A., Bempechat, J., & Li, J. (2015). What makes students engaged in learning? A time-use study of within- and between-individual predictors of emotional engagement in low-performing high schools. *Journal of Youth and Adolescence, 44(2)*, 247-265. DOI:10.1007/s10964-014-0080-1

Pekrun, R. (2017). Emotion and achievement during adolescence. *Child Development Perspectives, 11(*3), 215-221. DOI:10.1111/cdep.12237

Persson, P. B., & Bondke Persson, A. (2024). Color in physiology. *Acta Physiologica, e14182.*

Ram M., Shamanna B., Bhardwaj R., Bhagvati C., Theagarayan B. (2021). Color and emotion associations in Dravidian Culture. *Journal of Vision, 21(9),* 2406. DOI:10.1167/jov.21.9.2406

Schott, B. H., & Dörfel, D. (2019). Dopamine-dependent memory consolidation: The role of affective engagement. *Nature Reviews Neuroscience, 20*(6), 347-360. DOI:10.1038/s41583-019-0165-4

Schunk, D. H., & DiBenedetto, M. K. (2020). Motivation and Social Cognitive Theory. *Contemporary Educational Psychology, 60,* 101832. DOI:10.1016/j.cedpsych.2019.101832

Shapley, R. (2019). *Physiology of color vision in primates*. In Oxford Research Encyclopedia of Neuroscience. DOI:10.1093/acrefore/9780190264086.013.59

Sinha, P., Diamond, S., Vogelsang, M., Vogelsang, L., Gupta, P., Gandhi, T. K., Shah, P., Swami, P., Gilad-Gutnick, S., Ben-Ami, S., & Ganesh, S. (2024). Impact of early visual experience on later usage of color cues. *Science, 384(6698),* 907-912. DOI:10.1126/science.adk9587

Titz, C., & Karbach, J. (2021). Cognitive and Non-cognitive Factors in the Development of Kindergarten Children's School Readiness. *Frontiers in Psychology, 12*, 617640. DOI:10.3389/fpsyg.2021.617640

Torisawa, S., Fukuda, H., & Takagi, T. (2015). Visual physiology. In Biology and ecology of bluefin tuna (pp. 309-324). CRC Press, Boca Raton.

Van der Wel, P., & van Steenbergen, H. (2018). Pupil dilation as an index of effort in cognitive control tasks: A review. *Psychon Bull Rev, 25,* 2005–2015. DOI:10.3758/s13423-018-1432-y

Contact email: elena.cipollone@unicusano.it

Embedding Accredited Qualification and Work-Related Training Into Postgraduate Courses

Susan L. Lindsay, University of Glasgow, United Kingdom
Lesley Graham, University of Glasgow, United Kingdom
Carolyn J. Loveridge, University of Glasgow, United Kingdom
Ana Da Silva Costa, University of Glasgow, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
It is accepted that discipline-based learning fosters student engagement with the subject, enhances subject-related skill proficiency, and ultimately supports job securement within the field. However, postgraduate student numbers have increased to record levels, meaning that graduates enter a highly competitive market for employment. It follows that postgraduate students who have obtained transferable skills and/or other extra-specialised training are more likely to be valued favourably by employers, compared to those who do not have such additional graduate attributes. Skills provision within MSc programmes has historically been delivered by academic teaching staff with limited input from external partners. However, courses which foster knowledge exchange between university, partners, and industry, are more relevant. Such an approach enables active and constructive learning, which reduces the gap between knowledge, and skills development for real-life challenges. In this paper, we describe our transdisciplinary triple helix approach which involves expert university academics, professional industrial partners, and training by an accredited government body. Our model embeds accredited certification as part of the curriculum and provides work-related learning opportunities, alongside future employer engagement. Student learning is therefore enriched by real-world activities and challenges. This paper is of importance as it showcases that authentic learning and skills provision better prepare students for a life beyond their degree. Our model can be used by other academics to support a "curriculum for life".

Keywords: Work-Related Training, External Certification, Employer Engagement

iafor
The International Academic Forum
www.iafor.org

Introduction

Postgraduate student numbers have increased to record levels (Bolton, 2023), meaning students are in a competitive market after they have completed their studies. Students that have obtained sought after transferable skills or additional training will likely be more valued by employers (Nägele & Stalder, 2017). Universities need to support the employability of their students by including training from both within and outside academia. Taught courses which foster knowledge exchange between university, partners, and industry, are more relevant. This approach enables active and constructive learning, which reduces the gap between knowledge, and skills development for real-life challenges (Bada & Olusegun, 2015). Currently, there is lack of taught *in vivo* skills within the University of Glasgow curriculum. Integrating a triple helix of key stakeholders (Figure 1), we have developed a new *in vivo* research skills postgraduate course that embeds a UK government accredited external qualification in the field of animal experimentation (ScotPIL certificate), work-related learning from leading industrial professionals and training by designated university *in vivo* specialists. The course adopts real-world skills-based learning (McKinnon & Wood, 2012) and allows our students the opportunity to gain an additional transferable qualification.

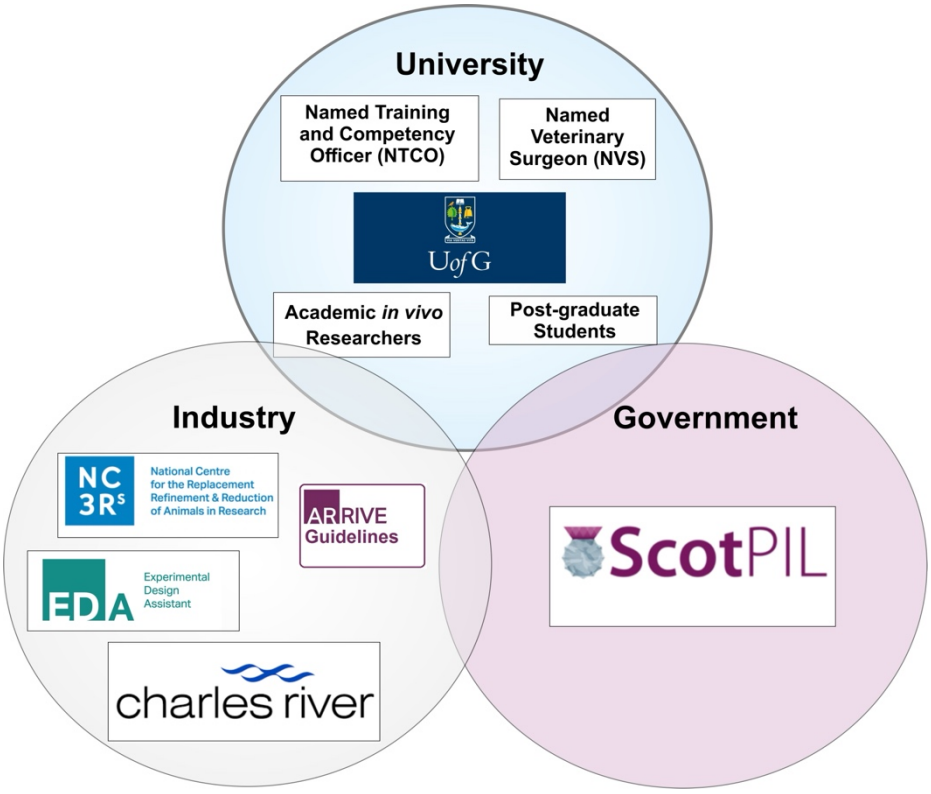


Figure 1: Highlights the Triple Helix of Key Stakeholders
Numerous stakeholders were involved in the course design and delivery. Expert university *in vivo* academics, professional industrial partners in the field of animal experimentation, and the accredited UK ScotPIL government licence.

Course Rationale

Animal research models are essential to our understanding of complex biological mechanisms and within the UK, the University of Glasgow is in the top ten organisations that uses animals for research purposes (Hobson, 2022). To allow our students greater access to this *in vivo* research-rich environment, we have created a new 20 credit optional course called

"In Vivo Research Skills" that feeds into multiple postgraduate programmes across the College of Medical, Veterinary and Life Sciences at the University of Glasgow, UK. We have embedded the UK ScotPIL personal licence exams as part of the course assessment. Successful completion of the exams allows students to obtain personal certification, meaning they can subsequently apply for their own UK Home Office Personal Licence, a recognised legal qualification. By embedding this accredited certification as part of the course assessment, students can gain a transferable qualification. In addition, the course is delivered at an optimum point during the academic year, directly before MSc dissertation projects. This means students who successfully obtain the certificate can be aligned with an *in vivo* research lab, have their licence activated and further enhance their *in vivo* research skills. This is clearly beneficial for subsequent employment or prospective PhD applications.

To support employer engagement, this course brings in two external experts in the field of animal experimentation, namely Charles River Laboratories and the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs). During a two-day visit to Charles River Laboratories in Tranent, students obtained vital and authentic work-related experience in an industry that uses animals for research purposes. This enabled students to acknowledge the wider context in which this course exists and facilitate communication with potential employers. This high-quality, work-related learning allows students to visualise taught theory in practice (McKinnon & Wood, 2012). In addition, students received two external workshops ran by the NC3Rs. The NC3Rs mission is to help the worldwide research community identify, develop and use 3Rs technologies and approaches. In line with the NC3Rs ARRIVE guidelines, a unique assessment has been incorporated that addresses the poor reproducibility of *in vivo* research (Percie du Sert, 2017). Students design an experiment using the NC3Rs experimental design assistant (EDA) (https://eda.nc3rs.org.uk), a free web-based application that uses machine-readable flow diagrams and computer-based logical reasoning to assist robust animal experiments (Percie du Sert, 2017). Students must consider best practices, such as avoidance of bias, minimum use of animals and appropriate statistical tests. This is different from traditional assessments since it is an authentic learning opportunity that researchers themselves would use. The assessment also aligns with a recent NC3Rs report which reviewed the processes of animal research (Rawle, 2023). It detailed several recommendations, one of which was the role of universities. It stated, "*The NC3Rs Experimental Design Assistant (EDA) should be more widely used… universities should explore means to support development of more experts in statistics and experimental design, both to help and train researchers*". This course therefore supports this recommendation since students must consider the real-world challenges of using animals for research.

In addition, there is a practical element to the course which gives students immersive hands-on experience, facilitating experiential learning (Dewey, 2004). They undertake training in rodent postmortem examination and drug delivery routes using cadavers. This training is delivered by the Named Training and Competency Officer (NTCO) and Named Veterinary Surgeon (NVS) from the University of Glasgow. The NTCO is the designated official responsible for the education and training of anyone who uses animals within the establishment. The NVS must advise on the impact of the experimental procedures on the health and welfare of animals. Hence, the students are "*learning by doing*" (Dewey, 2004) from leading university experts. Not only this, but these are methods routinely used by *in vivo* biologists (Memon, 2018) and provide an important educational experience, which engages students through direct and active participation.

Ultimately, this course gives students skills and knowledge that are transferrable to their dissertation project and future career. It develops numerous graduate attributes, including being "*investigative*", "*independent and critical thinkers*", "*resourceful and responsible*", but importantly for animal research, the development of being "*ethically and socially aware*" of their responsibilities (University of Glasgow, Graduate Attributes, 2021 – 2025). These are fundamental graduate attributes important for their future careers.

Conclusions

Our goal is to enhance professional employability skills and improve graduate prospects. It is therefore important that we embed authentic training and qualifications into courses to help bridge the gap between theory and practice. We have engaged with external partnerships and have designed assessments that allow certification attainment and the practical application of certified skills. Only by transforming curricula in this way, will we ensure our students go onto fulfil their academic potential.

Acknowledgements

We would like to thank Dr Lesley Gilmour (NTCO, University of Glasgow) and Dr Abigail Brown (NVS, University of Glasgow) for their help in course design and its implementation. In addition, we are grateful to the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) for providing teaching workshops. Finally, we would like to thank Charles River Laboratories, Tranent, Edinburgh for the tour of their site which provided important work-related learning opportunities.

References

Bada, S.O. & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. Journal of Research & Method in Education, 5(6): 66–70.

Bolton, P. (2024). Higher Education Student Numbers. [Online]. https://researchbriefings.files.parliament.uk/documents/CBP-7857/CBP-7857.pdf [Accessed 14.02.24].

Dewey, J. (2004). Democracy and education: An introduction to the philosophy of education. Dover Publications, Inc.

Hafez, S.A. (2021). Design for assessment of dissection in anatomy laboratory based on group identification of structures and peer evaluation. Anatomical Sciences Education. 15(6): C1, 989-1154.

Hobson, H. (2022). Ten organisations account for half of all animal research in Great Britain in 2021. [Online] https://www.understandinganimalresearch.org.uk/news/ten-organisations-account-for-half-of-all-animal-research-in-great-britain-in-2021 [Accessed 13.02.24].

McKinnon, S. and Wood, B. (2012). Learning for the real world: preparing postgraduate design students for employment through embedding work-related learning in the curriculum, Proceedings of the International Conference on Engineering and Product Design Education (EPDE 2012), Artesis University College, Antwerp, Belgium.

Memon, I. (2018). Cadaver dissection is obsolete in medical training! A mis-interpreted notion. Medical Principles and Practice. 27:201– 210.

Nägele, C. & Stalder, B.E. (2017). Competence and the Need for Transferable Skills. In: Mulder, M. (eds) Competence-based Vocational and Professional Education. Technical and Vocational Education and Training: Issues, Concerns and Prospects, vol 23. Springer, Cham.

Percie du Sert, N. Bamsey, I., Bate, S.T., Berdoy, M., Clark, R.A., Cuthill, I.C., Fry, D., Karp, N.A., Macleod, M., Mood, L., Clare Stanford, S., Lings, B. (2017). The Experimental Design Assistant. Nature Methods, 14(11): 1024-5.

Rawle, F. (2023). The role of review and regulatory approvals processes for animal research in supporting implementation of the 3Rs. [Online] https://nc3rs.org.uk/sites/default/files/2023-02/Rawle%20project%20report.pdf [Accessed 13.02.24].

University of Glasgow, Graduate Attributes [Online] (2021 – 2025). https://www.gla.ac.uk/media/Media_183776_smxx.pdf [Accessed 15/04/2024].

Contact email: susan.lindsay@glasgow.ac.uk

Development of Digital Learning Materials "The Beauty of My Country's Diversity" to Improve Nationalism Attitudes and Learning Outcomes of Elementary School Students

Elvi Mailani, Universitas Negeri Medan, Indonesia
Nurhayati, Universitas Negeri Yogyakarta, Indonesia
Fathurrohman, Universitas Negeri Yogyakarta, Indonesia
Sekar Purbarini Kawuryan, Universitas Negeri Yogyakarta, Indonesia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Nationalism is a characteristic of patriotism that must be fostered in the Indonesian nation which must start early, this is an investment for our nation in the future. This study aims to determine the steps, feasibility, and effectiveness of using the teaching material "Indanya Keragaman Negriku" as a civics teaching material on ethnic and linguistic diversity in my country at 5 SD. The type of research used is the 4D Research and Development Model. 4D (Define is done by analyzing, curriculum, learning resources, assignments and student test scores, Design is done by designing teaching materials starting from the initial appearance of teaching materials to the author's biodata, Development is done first validation of the teaching materials developed and Dissemination of the results of the validity, practicality, and effectiveness of teaching materials. Data collection techniques are observation, interviews, scales, and tests. Data analysis techniques are qualitative and quantitative. The research subjects were 5th-grade students of Ashabul Kahfi Elementary School, Medan Tuntungan, totaling 46 students. The results of the validation assessment of media experts, material experts, and practicality experts obtained 93.75%, 88, 75%, and 92.78% with very feasible qualifications and practical use with little revision. The results of the effectiveness of pre-test and post-test teaching materials through normality test, homogeneity test, and T-test (Paired Sample T-Test) with effective results. Based on the results of the research, the teaching material product "The Beautiful Diversity of My Country" is feasible, practical, and effective to use.

Keywords: Nationalism Attitude, Learning Outcomes, Development of Teaching Materials, Ashabul Kahfi Elementary School

iafor
The International Academic Forum
www.iafor.org

Introduction

The pride of the Indonesian nation for its diverse culture at the same time invites challenges for the entire community to maintain local culture through the provision of local cultural education that is applied from an early age. (Amalia et al., 2021). The introduction of culture from an early age teaches children about cultural diversity that must be respected so that the nation's cultural norms and values can be passed on to the next generation, which we can strive to change. (Utomo et al., 2020) The concept of nationalism has its definition, namely the awareness to love, protect, and fight for the Indonesian nation and have an understanding of membership that can help maintain and perpetuate the country's identity, integrity, prosperity, and strength. (Purnomo & Yono, 2020; Sunaryati, 2020). The mindset of nationalism fosters a sense of love for the country, fights for the integrity of the Indonesian nation, and seeks to increase and preserve ethnic, cultural, ethnic, and religious awareness and the state (Mahardika, 2021). However, the advent of a more modern era has led to a decline in national sentiment. Globalization is accelerating as our times are evolving. Undoubtedly, this also has a significant impact on the nation and society. (Safitri & Ramadan, 2022). Therefore, we must find a solution to this problem as soon as possible, one of which is by understanding Pancasila and Citizenship Education within the scope of Primary School (Herpratiwi et al., 2021).

This is in line with the results of the observation conducted by researchers in lecture assignments in several elementary schools in Percut Sei Tuan Subdistrict regarding the effectiveness of civics learning on the material Beautiful Diversity in My Country, which shows a variety of significant results and impacts. (Amalia et al., 2021; Widiantari et al., 2021). The implementation of learning found in the results of the observation lecture at the issue causes students to tend to be bored and sleepy due to laziness to listen to the presentation of material by the teacher in the learning process should make optimal use of the potential of the environment and the local area. (Magdalena et al., 2020). Learning to increase students' appreciation of culture emphasizes meaningful learning. Meaningful learning is learning that is packaged according to student characteristics. The characteristics of elementary school students who still think concretely and realistically require concrete and integrated learning packaging that is in line with the current independent curriculum (Riwu et al., 2019).

The independent curriculum allows learners to develop their thoughts independently in support of understanding knowledge. (Putri, n.d.; Sagala et al., 2024).. It also emphasizes deeper and more meaningful learning by engaging with essential centralized material and developing competencies gradually outside the classroom. (Herpratiwi et al., 2021; Menapace, 2018). Teachers also play an important role in teaching learners to achieve learning and developmental goals (Education, 2021). According to Permendikbud number 22 of 2020 on the Ministry of Education and Culture's Strategic Plan year 2, the "Pancasila learner profile" is the vision and mission of the Ministry of Education and Culture to carry out character development efforts through the implementation of the "Pancasila learner profile", which is following the characteristics of the Merdeka curriculum, this profile makes Indonesian students lifelong learners who have global competence (Irawati et al., 2022; Ulandari & Dwi, 2023).

Based on the need for digital textbooks as a learning resource combined with the development of the character of nationalism and the lack of maximum learning, researchers innovate to find solutions by utilizing technology to develop nationalism-based elementary

Civics digital textbooks for students assisted by *Hyzine software and Augmented Reality (AR)* in supporting the independent curriculum. This effort was made to prepare the research to enter the era of digital development, which will change many aspects of human life, especially education. This digital textbook, which uses technology, greatly helps students in learning the independent curriculum in the era of Society 5.0. By incorporating the character of nationalism and the culture of North Sumatra, which is the hometown of the researcher, if left unchecked, the value of the character of nationalism will be degraded and eroded by the changing times, the character of nationalism that has been maintained so far and has become an innovative and interesting learning resource (undergoing development from traditional teacher teaching materials) (Azhar & Muchtar, 2022; Sakundari & Rizqi, 2024). The formulation of the problem proposed, namely: "How is the development of teaching materials for “The Beautiful Diversity of My Country” to improve nationalism attitudes and learning outcomes of primary civics in supporting an independent curriculum that is valid, practical, and effective?". The goal is to produce digital teaching materials for elementary school Civics based on the Character of Nationalism in the North Sumatra region for students assisted by *Hyzine software* and *Augmented Reality (AR)* in supporting an independent curriculum with valid, practical and effective criteria.

Because this research will produce a product, this type of research uses the Research & Development (R&D) development model with the Thiagarajan (4-D) model. (Rahayu et al., 2021). The product created is an App.Yet Apk-based electronic teaching material that is used with the case method on Theme 7 Beautiful Diversity of My Country Sub-Theme 1 Diversity of Ethnicities and Religions in My Country, especially North Sumatra culture. The Thiagarajan (4-D) model consists of: *define* -defining the needs in the learning process by starting with analyzing the material for teaching materials to be developed; *design* -providing an overview of the form of teaching materials, *develop* creating teaching materials for research and disseminate-distributing revised teaching materials (Ferdianto & Setiyani, 2018; Salma, 2020).

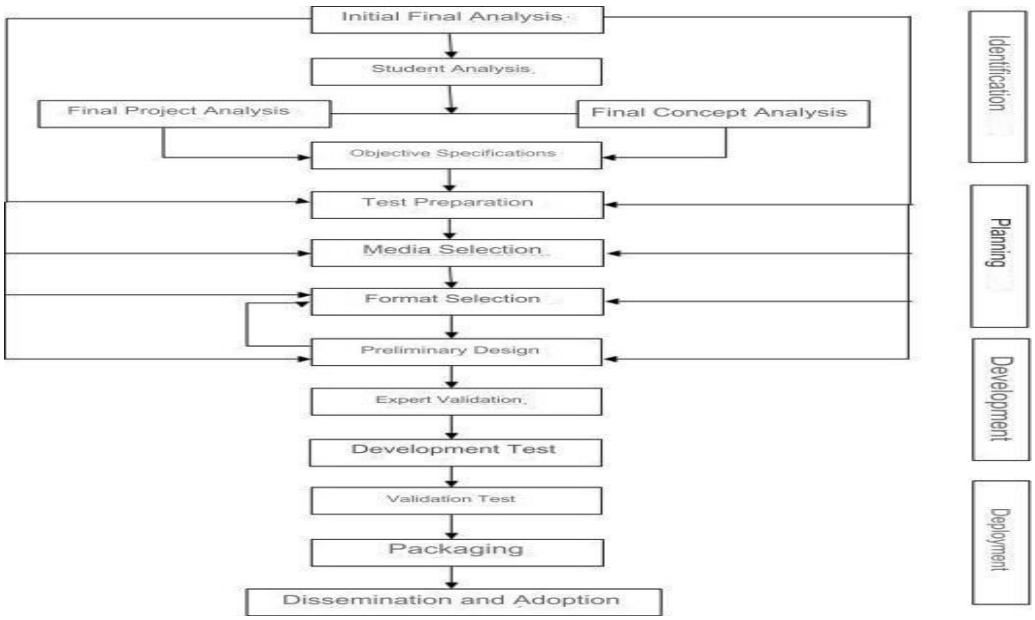


Figure 1. 4D Development Model Thiagarajan, and Semmel in 1974

To test the feasibility of this product, it consists of one lecturer who is a material expert in the Civic Education course; a language expert at the Indonesian Language Department, Faculty of Education; and a graphic expert at the Department of Curriculum and Educational

Technology, Faculty of Education. For data collection, this study used two research tools: an open-ended questionnaire and a closed-ended questionnaire. The open-ended questionnaire contains a review sheet containing suggestions and input from each expert on how to improve the teaching materials that have been developed. The closed questionnaire measures the validation value given by each expert for the teaching materials that have been developed, and the results of the developed validation. The provisions of the material validation questionnaire, design and technology are as follows:

Table 1. Likert Scale Instrument

Qualification	**Suspension**
Very Worth It	5
Worthy	4
Currently	3
Not Worth It	2
Not feasible	1

Source: Riduwan (2016)

Furthermore, the percentage results from validation data will be explained using percentages by qualification as follows.

Table 2. Eligibility Score Interpretation

Percentage	**Qualification**
81%-100%	Very Worth It
61%-80%	Worthy
41%-60%	Currently
21%-40%	Not Worth It
0-20%	Not feasible

Source: Riduwan (2016)

As for the effectiveness of teaching materials is calculated based on quantitative data analysis including initial data analysis, normality test, homogeneity, and T-test (Sugiyono, 2013, p. 199).

a. Normality Test
The normality test aims to see whether the distribution of data is normal or not. In the normality test, researchers used the Kolmogorov-Smirnov technique. The provisions are if the calculated kolmogorov-smirnov value < kolmogorov-smirnov table then H_o is accepted and H_a is rejected, meaning that the data is normally distributed.

b. Homogeneity Test
The homogeneity test is to determine whether the variance of the two samples is homogeneous or not. In testing the homogeneity of variance, researchers use the F test. The criteria in testing homogeneity with the F test are if Fcount < Ftabel then H_o is accepted and H_a is rejected, meaning that the variants of the two data groups are

homogeneous. If on the other hand Fhitung > Ftabel then H_o is rejected and H_a is accepted, it can be stated that the variants of the two data groups are not homogeneous

c. Hypothesis Testing
In hypothesis testing, if the research sample is less than 100 respondents, then hypothesis testing uses the t-test. In this study, the research sample amounted to 60 people, so the hypothesis testing used was the t-test. In testing the t-test, there are two types of t-tests, namely, parametric and non-parametric t-test. The parametric t-test is a test that is carried out if the data meets the requirements of normal distribution and homogeneity (Muyaroah, 2017). As for the parametric t-test in testing, the *paired sample t-test*, which is comparing the average *pretest* and *post-test* scores in the same group (Fausih & Danang, 2015; Laili, 1858; Zaakiyah et al., 2017). The provisions of the parametric t-test are if the sig value. (2-tailed) > 0.05 then there is no significant difference between the experimental class and the control class. Meanwhile, if the sig value. (2-tailed) < 0.05 then there is a significant difference between the experimental class and the control class. In processing data analysis, all researchers used the help of the SPSS version 26 application.

Result

Stage 1, *Analysis* (Analyzing Activity)

In the beginning stage, the development of electronic teaching materials using Hyzine and local culture-based nationalism characters was analyzed. Interviews were conducted with teachers of grades 5A and 5B to obtain information about the learning process, materials used, student learning constraints, and student learning characteristics. Student analysis was conducted to find out the characteristics of students following the needs in the development of students in grades 5A and 5B. Then, task analysis was carried out by identifying the stages of task completion according to basic competencies. Concept analysis was conducted to select concepts that follow local culture. Finally, a learning objectives analysis was conducted by detailing the success indicators of the subject matter based on the previous analysis.

Stage 2, *Design (Design* Activity)

In the design stage, researchers designed the development of electronic teaching materials based on the *Hyzine* App and the character of nationalism in grades 5A-5B of Ashabul Kahfi Elementary School. Some of the applications used are *PDF, YouTube, Google Sites, Corel Draw, Project*, and *Android. The* steps for designing teaching materials for Theme 7 Subtheme 1 Learning 3 and 4 include: designing lesson plans, making concept maps, designing display concepts, and designing content. (Astuti & Sari, 2017; Susilawati et al., 2022).. Lessons on national diversity and local culture are the main subjects studied. After that, validity instruments were designed to cover content (material), design, and technology. Furthermore, a practicality tool was made with a response questionnaire given to teachers and students regarding the development of digital textbook products. Designing material evaluation questions also looks at the effectiveness instrument itself.

Stage 3, *Development* (Product Development Activities)

The development stage is the initial stage in understanding the plan that has been designed into a product in the form of *Hyzine-based* electronic teaching materials *and the character of*

Nationalism as an effort to love student culture. The product design consists of: (1) collecting thematic learning materials theme 7 subtheme 1 learning 3 and 4 and learning exercises, (2) collecting images and information needed, (3) creating objects, learning videos, *icon* design and application design, (4) combining all materials into the *app. yet Apk* application, (5) validation of *Hyzine-based* electronic teaching materials by design and technology expert validators, material expert validation, and expert validation of educational practitioners. The sequence of contents of electronic teaching materials using links that can load all applications is *cover* and *apk* icon, guide, about, competence, material & practice, and exit**.**

1. Cover dan Icon *Apk*

Figure 2. Apk cover and icon display on teaching materials

2. Main Menu

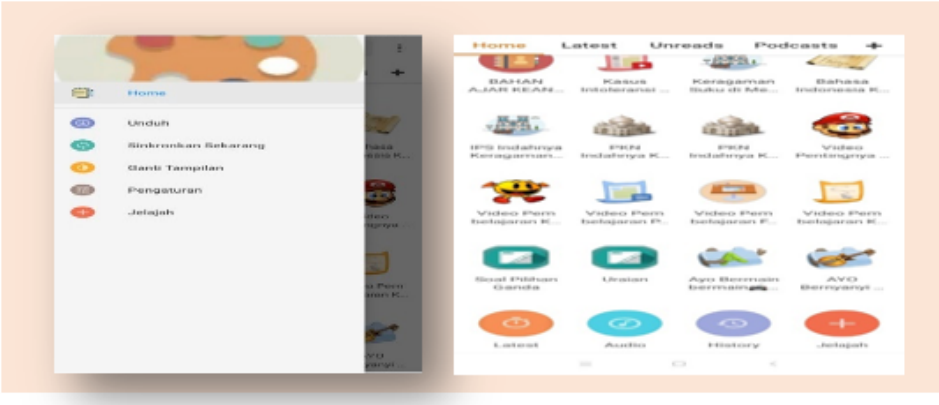


Figure 3. Apk Menu Display

3. Material

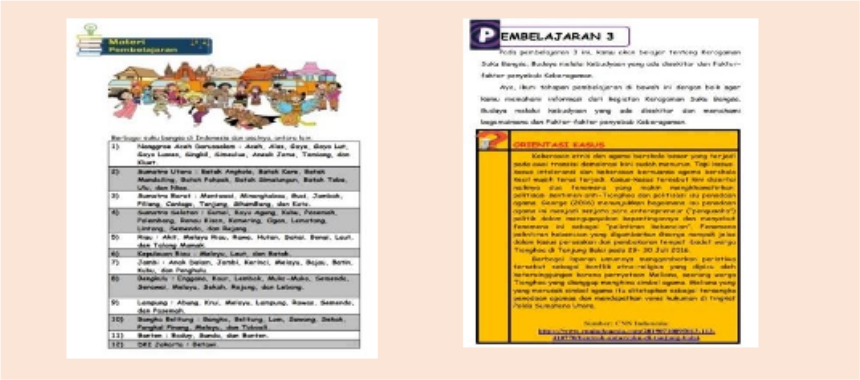


Figure 4. Display of material on teaching materials

4. Exercise

Figure 5. Exercise display on teaching materials

5. Summary

Figure 6. Conclusion on writing materials

4th Stage *Implementation* (Product Implementation Activities)

This stage aims to produce *Hyzine-based* electronic teaching materials *by improving the character of nationalism* through *love of culture* that has been revised based on expert input and trials to students. The purpose of this stage is to implement and see the effectiveness of hyzine-based electronic teaching materials in grade 5 Ashabul Kahhfi Elementary School and as materials to facilitate teaching in the classroom. The *Dissimante* stage is the stage of publication of teaching materials in the form of android-based electronics through application *links*. Teaching materials that have been designed are then validated by several experts, as for the validation that has been given by the expert team as follows:

Table 3. Recapitulation of Product Validation

NO	VALIDATOR	NAME	VALIDATION RESULTS	
			PERCENTAGE FINAL	CATEGORIES
1.	Material Expert I	Masta Marselina, S.Pd., M.Pd.	93, 75%	Very Decent
2.	Material Expert II	Dr Lukitaningsi, M.Hum	88,75 %	Very Decent
3.	Design Expert Teaching Materials and Technology	Said Iskandar Al Idrus, S.Si., M.Si.	91,57%	Very Decent
4.	Class Teacher IVA-IVB	1. Sulastri, S.E. 2. Putri Anggraini, S.Pd.	92,78%	Very Decent
AVERAGE PERCENTAGE			**91,75%**	
CATEGORIES			**Very Decent**	

From the table above, it can be concluded that the overall percentage of product validation is 8 9 .01% and is included in the "Very Feasible" category. This indicates that the teaching materials have good quality in terms of design or appearance, technology, material, and use. Furthermore, the researchers conducted an effectiveness test of product feasibility as follows:

a. Results of the Normality Test

Table 4. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PreTestEksperimen	30	20	70	41.20	15.135
PostTestEksperimen	30	50	90	73.17	10.866
PretestKontrol	30	20	70	44.33	13.692
PostTestKontrol	30	40	85	68.17	12.140
Valid N (listwise)	30				

The results of the Descriptive Test of data on student learning outcomes in the Experiment class with the number of each sample of 30 students in participating in Civics learning material “The Beautiful Diversity of My Country.”

Table 5. Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PreTestEksperimen	.132	30	.196	.944	30	.114
PostTestEksperimen	.135	30	.169	.953	30	.202
PretestKontrol	.091	30	.200*	.966	30	.447
PostTestKontrol	.147	30	.099	.942	30	.101

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

The normality test table shown above shows that *the* significant value *is* 0.200> 0.05, *so it can be said that the experimental class and control class Learning Outcomes data are normally distributed.*

b. Homogeneity Test Results

The homogeneity test is needed to test the similarity of normally distributed values and to ensure the variance of the same variables in a sample.

Table 6. Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar Matematika	Based on Mean	.485	1	58	.489
	Based on Median	.652	1	58	.423
	Based on Median and with adjusted df	.652	1	58.000	.423
	Based on trimmed mean	.510	1	58	.478

If the significant value > 0.05, the data is said to be homogeneous. As shown in Table 6 above, the results of the homogeneity test obtained a significant value of 0.489 which means 0.489> 0.05.

c. Product Paired Test Results

Table 7. Test of Normality

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	PreTestEksperimen - PostTestEksperimen	-31.967	17.375	3.172	-38.455	-25.479	-10.077	29	.000
Pair 2	PretestKontrol - PostTestKontrol	-23.833	13.689	2.499	-28.945	-18.722	-9.536	29	.000

Paired Sample T-Test Output Results:

1. Based on the Pair I output, the sig value is obtained. (2 tailed) of 0.000 <0.05, it can be concluded that there is a difference in the average student learning outcomes for the experimental class pretest with the experimental post-test (Hyzine-based electronics and Nationalism character).
2. Based on the Pair 2 output, the sig value is obtained. (2 tailed) of 0.000 <0.05, it can be concluded that there is an average difference in student learning outcomes for the control class pre-test with the control post-test (flipbook teaching material).

d. Test Results "Normalised Gain" (g)

To calculate the effectiveness of ethnomathematics-based media, it can use the Normalised Gain Test or *N-gain* aims to provide an overview of changes in learning outcomes between before the use of Hyzine-based electronics and the character of Nationalism and after learning the use of Hyzine-based electronics and the character of Nationalism.

Table 8. Case Processing Summary

		Cases					
		Valid		Missing		Total	
	Kelas	N	Percent	N	Percent	N	Percent
NGain_Persen	Eksperimen	30	100.0%	0	0.0%	30	100.0%
	Kontrol	30	100.0%	0	0.0%	30	100.0%

Table 9. Group Statistics NGain_Percent

	Class	N	Mean	Std. Deviation	Std. Error Mean
NGain_Percent	Experiment	30	76. 1329	23.71808	4.33031
	Control	30	41.6691	20.77064	3.79218

Based on the results of the N-gain score test calculation above, it show that the average N-gain score for the experimental class is 76.1329 or 56%, including in the Effective category. With a minimum N-gain score of 16% and a maximum of 83%. Meanwhile, the average N-gain score for the control class was 41.6691 or 41.6%, including in the less effective category. With a minimum N-gain score of 10% and a maximum of 75%.

Researchers observed the learning characteristics of class 5A and 5B students of Ashabul Kahfi Elementary School to know how the character of class 5A and 5B students of Ashabul Kahfi Elementary School which will guide researchers to make electronic teaching materials using *Hyzine-based* electronic teaching materials to improve the character of Nationalism Similar research was conducted by Winatha et al., (2018) aims with the learning substance so that it makes it easier for students to understand the material. Furthermore, in the stage of analyzing learning objectives, researchers analyze learning objectives through tasks at school or home and concepts so that they will be following KI and KD. And do the details of the indicators that will be following the *National character-based* electronic teaching materials. Furthermore, the *design* stage researchers make teaching materials using the *Hyzine app* application assisted by *YouTube, PDF, Google Slides, Google Sit, and Google*. Researchers make teaching materials using the application, first through the Adobe Photoshop application to design the appearance and icon of teaching materials, using objects in the form of animations and interactive learning videos after finishing the researcher uploads the learning videos, games, and teaching materials into the *application* and copies the link, Puriasih & Rati, (2022) teachers must maximally produce teaching materials to create appropriate and effective teaching materials.

The product validation stage involved design, technology, and learning material experts. At the initial stage, design and technology expert validation was conducted with 11 questions covering display assessment, image, and graphic design, as well as video and audio usage practices. The results showed the category "feasible with revision" with a percentage of 62.7%. Then, researchers conducted phase II validation based on suggestions and input from experts, with a percentage of 91.57% which included the category "very feasible". Furthermore, the learning material expert validation was carried out in two stages with the same questions, including the assessment of KI and KD, learning objectives, material relevance, and language, with the validation results showing a percentage of 63% in stage I and 93.75% in stage II, which was also included in the "very feasible" category. In this assessment, expert validators of the practicality of teaching materials with 5A and 5B homeroom teachers, with a validation percentage reaching 91.57%, teaching materials for learning based on the character of Nationalism through hyzine are very feasible to use in the teaching and learning process (Sunaryati, 2020; Susilo & Prasetyo, 2020).

The Effectiveness stage of the trial conducted was a trial by displaying teaching materials and demonstrating the teaching materials for four meetings, two meetings in the first wave and two meetings in the second wave.(Susilawati et al., 2022). For the first meeting, researchers introduced teaching material products to students about the menu, procedures for using and the contents of the application and administered *pre-tests to the control and experimental classes.* In the second meeting, researchers began to conduct learning by providing material through teaching materials in the material menu section, references (learning videos) & exercises, then researchers gave *post-tests in control and experimental classes* to class 5A and 5B students of Ashabul Kahfi Elementary School. There is a significant influence before (pretest) *Hyzine-based electronic teaching materials and Nationalism Characters* and after (posttest) *Hyzine-based electronic teaching materials and Nationalism Characters* on student learning outcomes in Civics Subjects The beauty of the diversity of nations, languages, and cultures of my country.

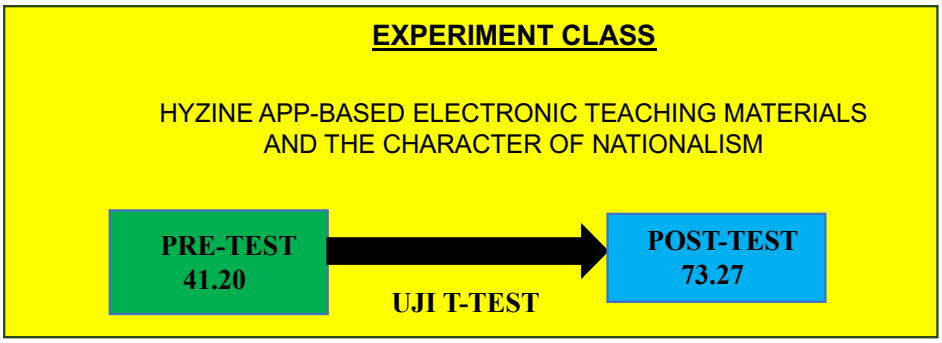


Figure 7. Effectiveness test on student learning outcomes

Conclusion

The results showed that flipbook-based electronic teaching materials were developed based on the 4 D development procedure by Thiagarajan (1974), which includes the stages of defining, designing, developing, and disseminating. For civic education material “The Beautiful Diversity of My Country” in class IV A-B, Hyzine-based electronic teaching materials and the Character of Nationalism are rated "Very Feasible" by material experts, technology experts, practicality experts and experts proven effective in improving learning outcomes and students' nationalism attitudes. Although in the process of making Hyzine-

based electronic teaching materials and the Character of Nationalism faced several obstacles, they could be overcome with the help of related parties such as application developers and supervisors.

Acknowledgements

We would like to thank the Indonesian Education Endowment Fund Scholarship (LPDP) for providing support in the form of conference fees, accommodation and our research materials and to Yogyakarta State University and Ashabul Kahfi Elementary School for providing a research site.

References

Amalia, G., Furnamasari, Y. F., & Dewi, D. A. (2021). Fostering a Sense of Nationalism in Elementary School Children through Civics Learning. *Tambusai Journal of Education*, *5*, 8985-8989.

Astuti, A., & Sari, N. (2017). Development of Student Worksheets (Lks) on Mathematics Subjects for Class X Students. *Cendekia Journal: Journal of Mathematics Education*, *1*(2), 13-24. https://doi.org/10.31004/cendekia.v1i2.16

Azhar, S., & Muchtar, T. (2022). Implementation of Teachers' Technology, Pedagogic, and Content Knowledge (TPACK) in Learning during the Covid-19 Period. *Basicedu Journal*, *6*(4), 6932-6938. https://doi.org/10.31004/basicedu.v6i4.3413

Fausih, M., & Danang, T. (2015). Development of E-Module Media Productive Subjects "Lan Network Installation (Local Area Network)" For Class Xi Students of Computer Network Engineering Department at Smk Nengeri 1 Labang Bangkalan Madura. *UNESA Journal*, *01*(01), 1-9. https://jurnalmahasiswa.unesa.ac.id/index.php/jmtp/article/view/10375

Ferdianto, F., & Setiyani, S. (2018). Development of Teaching Materials for Local WisdomBased Learning Media for Mathematics Education Students. *JNPM (National Journal of Mathematics Education)*, *2*(1), 37. https://doi.org/10.33603/jnpm.v2i1.781

Herpratiwi, H., Taufiqurrahman, T., Widodo, S., & Effendi, R. (2021). Application of Project Based Learning Based on Social Skills for Citizenship Subjects in Senior High Schools. *Educative: Journal of Education Science*, *3*(2), 487-495. https://doi.org/10.31004/edukatif.v3i2.313

Irawati, D., Iqbal, A. M., Hasanah, A., & Arifin, B. S. (2022). Profile of Pancasila Students as an Effort to Realise National Character. *Edumaspul: Journal of Education*, *6*(1), 1224-1238. https://doi.org/10.33487/edumaspul.v6i1.3622

Laili, I. (1858). THE *EFFECTIVENESS OF PROJECT-BASED LEARNING E-MODULE DEVELOPMENT IN INSTALLATION SUBJECTS. 3*, 306-315.

LIK Education, J. (2021). *DEVELOPMENT of an accompanying book for TEMATIC teaching materials for grade III SD / MI based on local wisdom of West Kalimantan region*. *9*(1), 6984.

Magdalena, I., Haq, A. S., & Ramdhan, F. (2020). Learning Citizenship Education at Bojong 3 Pinang Elementary School. *Journal of Education and Science*, *2*(3), 418-430. https://ejournal.stitpn.ac.id/index.php/bintang

Mahardika, I. (2021). The Role of Civic Education in Improving Students' Nationalism Attitudes at the Faculty of Teacher Training and Education, Primagraha University. *Journal of Pelita Bumi Pertiwi*, *02* (02), 8-16.

Menapace, B. (2018). Civic Education as Democracy Education with Character. *Print and Promo*, *56*(11), 40-42.

Muyaroah, S. (2017). The effectiveness of mobile learning as an alternative learning model. *Educational Science Gazette*, *46*(1), 23-27. http://journal.unnes.ac.id/nju/index.php/

Puriasih, L. P., & Rati, N. W. (2022). Problem Solving Based Interactive E-LKPD on Scale and Comparison Materials for Grade V Elementary School. *Journal of Pedagogy and Learning*, *5*(2), 267-275. https://doi.org/10.23887/jp2.v5i2.48848

Purnomo, A., & Yono, R. R. (2020). Cultivating the Values of Nationalism and Patriotism. *Journal of Citizenship Education*, *10* (November), 1-9.

Putri, R. D. P. (n.d.). Innovation in Learning Indonesian Language and Literature Based on Digital Literacy for Elementary School Class Vi in View of the Curriculum .... *Eprints.Uad.Ac.Id.* https://eprints.uad.ac.id/47260/1/SJES-ARTIKEL RAGIL DIAN.pdf

Rahayu, S., Ladamay, I., Ulfatin, N., Kumala, F. N., & Aminatun, S. (2021). Development of Electronic LKPD for Thematic Learning Based on High Order Thinking Skill (HOTS). *Journal of Basic Education*, *13*(2), 112-118.

Riwu, I. U., Laksana, D. N. L., & Dhiu, K. D. (2019). Development of Electronic Teaching Materials with Multimedia Content on the Theme of Caring for Living Things for Elementary School Students of Grade Iv in Ngada Regency. *Journal of Education Technology*, *2*(2), 56. https://doi.org/10.23887/jet.v2i2.16182

Safitri, S., & Ramadan, Z. H. (2022). Implementation of Cultural and Civic Literacy in Primary Schools. *Mimbar Ilmu*, *27*(1), 109-116. https://doi.org/10.23887/mi.v27i1.45034

Sagala, K., Naibaho, L., & Rantung, D. A. (2024). Challenges of character education in the digital era. *Journal of Kridatama Science and Technology*, *6*(01), 1-8. https://doi.org/10.53863/kst.v6i01.1006

Sakundari, K. I., & Rizqi, H. Y. (2024). Journal of basicedu. Basicedu Journal,. *Basicedu Journal*, *8*(1), 601-614. https://journal.uii.ac.id/ajie/article/view/971

Salma, D. K. (2020). Development of Contextual Based Teaching Materials Assisted by Qr Code in Accounting Practicum Subjects for Government Institutions / Agencies Class Xii Smk. *JOURNAL OF ECONOMIC EDUCATION: Scientific Journal of Education, Economics and Social Sciences*, *15* (1), 1-8. https://doi.org/10.19184/jpe.v15i1.20213

Sunaryati, T. (2020). Development of Digital-Based Learning Modules to Increase the Attitude of Love for the Country in civic education Learning. *Dikoda: Journal of School Education ...*, *1*, 26-29 http://jurnal.pelitabangsa.ac.id/index.php/JPGSD/article/view/2457

Susilawati, W. O., Veriyani, F. T. V., Pratiwi, Y., Sari, T. A. N., & Riani, S. (2022). Development of elementary PPKn digital textbooks integrated with the Pancasila learner profile in supporting the independent curriculum. *Journal of Education, Social Science, and Religion*, *8*(1), 187-201. https://doi.org/10.53565/pssa.v8i1.452

Susilo, S. V., & Prasetyo, T. F. (2020). Android-based 2D Mobile Learning Teaching Materials: A Technology-Based Learning in Facing the Industrial Revolution 4.0. *NATURALISTIC: Journal of Education and Learning Research Studies*, *4*(2b), 587-592. https://doi.org/10.35568/naturalistic.v4i2b.767

Ulandari, S., & Dwi, D. (2023). Implementation of the Pancasila Student Profile Strengthening Project as an Effort to Strengthen the Character of Learners. *Journal of Moral Society*, *8*(2), 12-28.

Utomo, A. C., Widyawati, L., Supyanti, R., Guntur, N., Dhita, L. A., Rahmadhanti, A., Pratama, E. A., Riskiana, A., Amilia, N. Y., & Marwan, M. (2020). Introduction to Traditional Culture through Dance Education in Early Childhood at BA Aisyiyah Ngadirejo, Sukoharjo. *Buletin KKN Pendidikan*, *1*(2), 77-82. https://doi.org/10.23917/bkkndik.v1i2.10791

Widiantari, N. N., Gading, I. K., & Astawan, I. G. (2021). Interactive Teaching Materials Based on Balinese Local Wisdom with the Theme The Beautiful Diversity of My Country. *Indonesian Journal of Multicultural Education*, *4*(1), 13-22. https://doi.org/10.23887/jpmu.v4i1.34796

Winatha, K. R., Suharsono, N., & Agustin, K. (2018). Development of Mathematics Project-Based Interactive E-Modules. *Journal of Technology and Vocational Education*, *4*(2), 188-199. https://ejournal.undiksha.ac.id/index.php/JPTK/article/viewFile/14021/9438

Zaakiyah, E. D., Asyafah, A., & Supriadi, U. (2017). The EFFECTIVENESS OF NUMBERED-HEADS-TOGETHER LEARNING MODEL TO INCREASE STUDENT RESULTS ON AKHLAK MATERIALS CLASS X (Quasi-Experimental Study in Class X MIPA SMAN 7 BANDUNG). *TARBAWY: Indonesian Journal of Islamic Education*, *4*(1), 66. https://doi.org/10.17509/t.v4i1.6993

Contact email: nurhayati.2023@student.uny.ac.id

Implementation and Future Trends of the Japanese Language Teaching Programme for the Undergraduate Programme at Mongolian National University of Education

Ganchimeg Ayurzana, Mongolian National University of Education, Mongolia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Japanese language courses have been offered in Mongolia for 48 years. According to the Japan Foundation's 2021 survey, there are 117 institutions that offer Japanese language courses in Mongolia including 23 universities, 29 secondary schools, and 65 language centers. MNUE, one of the largest educational institutions in Mongolia, began training Japanese language teachers and translators in 1998. In the 2023-2024 academic year, 89 students are majoring in Japanese Language Teaching and Japanese-English Language Teaching programmes. In this research, we aim to study and clarify the current status and future trends of the implementation of the "Japanese Language Teaching" and "Japanese-English Language Teaching" programmes within the "Teacher, Foreign Language Education" undergraduate programme at MNUE, which has been implemented since 2014. Any educational programme requires analysis for improvement. Therefore, a total of 64 first- to third-year students from the "Japanese Language Teaching" programme were asked about and analyzed for the implementation of the programme. This research analyzed the current situation related to various aspects of the programme, including programme selection, course teacher selection, independent assignments, assessment methods, textbooks, teaching methodologies, and satisfaction survey. In the end, the issues within the undergraduate programme will be summarized, and recommendations will be made for further improvement.

Keywords: Teacher Education, Programme, Students, Course

iafor
The International Academic Forum
www.iafor.org

Introduction: State Policy on Higher Education

According to Mongolian law on Education, the purpose of education is to cultivate healthy and responsible citizens with internationally recognized knowledge and skills, who value statehood, history, culture, tradition, and heritage, respect democratic and humanistic values, and contribute to socio-economic development.

In line with this, Mongolia's Five-Year Development Guidelines for 2021-2025, developed by the Government of Mongolia, outline the implementation of national educational programmes that promote Mongolian values and are enriched with Mongolian history, language, culture, traditions, patriotism, and national heritage, alongside internationally recognized content. These programmes will be introduced in all educational institutions, regardless of their ownership. The Guidelines also state that a competitive education system at the international level will be introduced in stages.

To prioritize education as a key sector, develop a world-class national education system, and continuously enhance the quality of education and skilled workforce, the Government of Mongolia has initiated the fourth Master Plan for Education of Mongolia from 2020 to 2030.

This policy document specifically emphasizes the importance of developing and implementing standards for teacher-training universities, increasing teachers' capacity and competency, enhancing the quality of education at teacher-training universities, and improving the quality of students. These measures are crucial, as the issue of teaching personnel is essential for implementing the tasks outlined in this master plan.

The Mongolian National University of Education (MNUE), the leading institution among teacher-training universities, aims to become a world-class center for quality training, education, and research. Currently, MNUE has 10,874 students, including 7,782 undergraduate students, and is ranked 4th in the country.

Eight study programmes of the Mongolian National University of Education such as the "English Language Teaching" programme and "Mathematics Teaching" programme were accredited by international accreditation institutions such as ASIIN and ACQUIN, and 36 programmes of the MNUE were accredited by the Mongolian National Council for Education Accreditation (MNCEA) at national level.

In an order issued by the Minister of Education and Science of Mongolia, it is stated:

> "Educational programmes offered by all higher education institutions, regardless of their type, must meet the following requirements. The Programmes of Study should be comprehensive documents that reflect the aims and objectives of the programme, the knowledge, skills, and attitudes to be acquired through students, the teaching methodology, assessment, learning environment, and tools, as well as the requirements for teaching personnel, new entrants, and graduates."

To enhance education quality, implement quality reforms in teacher education, and ensure continuous development, the Mongolian National University of Education has adopted new management practices. This includes formulating policies and programmes to improve quality assurance; update study programmes, standards, content, methodology, and technology for each major; establish an Evaluation Department to measure programme

outcomes; develop an evaluation system; create online courses; and develop and offer additional study programmes such as transformative courses, correspondence courses, and distance learning. These efforts are aligned with societal needs and demands and ensure that all programmes are accredited by both national and international accreditation bodies.

The School of Social Sciences and Humanities, a constituent school of the Mongolian National University of Education (MNUE), has four foreign language departments. In 2014, the lecturers from the foreign language faculty developed and began implementing an undergraduate programme, "Teacher, Foreign Language Education," which includes six languages such as English, German, Russian, Chinese, Japanese, and Korean.

Since the "Japanese language teaching" programme started in 1998, 185 students have graduated from MNUE as Japanese translators. Additionally, 23 students have graduated as Japanese teacher-translators, and 185 as Japanese teachers. Besides offering undergraduate degree programmes, the faculty also provides professional courses for a master's programme. In 2020, the Japanese teaching programme had been accredited at national level. Currently, 89 students are majoring in Japanese teaching and Japanese–English teaching at MNUE.

In this research paper, we aimed to assess the current status of the "Japanese Teaching" and "Japanese–English Teaching" programmes based on students' opinions and attitudes. The survey covered various aspects, including the selection of course teachers, independent assignments, textbook content, teaching methodology, and satisfaction survey. Based on the findings, we offer recommendations for improving the Japanese Language Teaching and Japanese–English Teaching programmes which is part of the "Teacher, Foreign Language Education" programme.

Research Methodology

In this research, we employed a mixed-methods approach to gather and analyze data. We collected data through structured surveys to evaluate the implementation process of the "Japanese language teaching" programme at MNUE. The surveys provided both quantitative data on student learning experiences and qualitative insights into their feedback.

We analyzed both quantitative and qualitative data to assess the effectiveness of the implementation of this programme. This combined approach enabled us to evaluate the programme's adherence to educational standards, its impact on student learning outcomes, and identify areas for improvement.

The Research Participants

Here, we conducted a questionnaire survey among the students majoring in "Japanese Language Teaching" and "Japanese-English Language Teaching" within the "Teacher, Foreign Language Education" undergraduate programme at MNUE. Out of the 64 students who participated in this survey for the 2023-2024 school year, 57 were female and 7 were male. Additionally, nine fourth-year students have been participating in an internship programme in Japan for one year. The distribution of students across the courses is as follows:

- First-year students: 38 (13 in Japanese Teaching, 25 in Japanese-English Teaching)
- Second-year students: 18 (all in Japanese-English Teaching)
- Third-year students: 8 (all in Japanese Teaching)

1. "Japanese–English Language Teaching" Programme Within the "Teacher, Foreign Language Education" Undergraduate Programme

The newly developed curriculum for each course was reviewed several times by the Sub-Committee of the Academic Programme of the School of Social Sciences and Humanities. This committee, consisting of lecturers from each department, provided feedback on the curricula. The curricula were then revised based on this feedback before final approval. The "Japanese-English Language Teaching" programme has been in implementation for two years. Below is the general structure of the syllabus.

Subject types	Compulsory subjects		Elective subjects		Total subject	
	Credit	Percent	Credit	Percent	Credit	Percent
General education	21	16.9%	4	3.2%	25	20.2%
Teacher education core courses	12	9.7%	4	3.2%	16	12.9%
Professional core courses	75	60.5%	8	6.5%	83	66.9%
Total mark 120< total credit to be collected for instruction <130	108	87.1%	16	12.9%	124	100%

Table 1. The syllabus of Japanese language teaching programme

This is the syllabus for the undergraduate "Japanese Language Teaching" programme. MNUE transitioned from a traditional system to a credit system in 2014, which allows students to create their own class timetables. Students in the "Japanese Language Teaching" programme are required to complete 124 credit hours during their studies. The professional courses include Japanese grammar, Japanese speaking skills, Japanese writing skills, Japanese listening skills, Japanese teaching methodology, and linguistics, and so on. In the academic year 2023-2024, a total of 145 students enrolled in foreign language teaching programmes offered by the university, and 17 of them are in their first year of the "Japanese Language Teaching" programme.

Subject types		Compulsory subjects		Elective subjects		Total subject	
		Credit	Percent	Credit	Percent	Credit	Percent
General education		18	11.9%	4	2.6%	22	14.5%
Teacher education core courses		12	7.9%	4	2.6%	16	10.5%
Professional core courses	Japanese	48	31.6%	8	5.2%	56	36.8%
	English	39	25.7%	4	2.6%	43	28.3%
Teaching practicum, graduation	Guided practicum	5	3.3%			5	3.3%
	Teaching practicum	8	5.3%			8	5.3%
	State examination and thesis	2	1.3%			2	1.3%
Total mark 120< total credit to be collected for instruction <130		132	87%	20	13%	152	100%

Table 2. The syllabus of Japanese-English language teaching programme

"The Japanese-English Language Teaching" programme began in the 2022-2023 school year. Currently, there are 29 students in their first year and 22 students in their second year. Students in this programme are required to complete a total of 152 credits during their

studies, with 132 credits allocated to compulsory courses and 20 credits to elective courses. Compared to the Japanese Language Teaching programme, this programme tends to attract more applicants.

The course curriculum outlined in the syllabus includes the skills, knowledge, and abilities that students must acquire. It also covers various components such as course content, which includes both theoretical and practical knowledge, course planning, teaching methodology, types of assessments, and a list of textbooks for each course.

1.1 Career Choice

A total of 64 students participated in the questionnaire survey, including 43 from the "Japanese-English teaching" programme and 21 from the "Japanese language teaching" programme. They responded to the question, "Why did you choose this major?" as follows:

- The largest percentage, 51.5% (33 students), chose this major with the purpose of studying in Japan.
- 21.8% (14 students) chose this major to become Japanese teachers.
- 20.9% (9 students) chose this major to become English teachers.
- 17.1% (11 students) chose this major based on the advice of their family members.

When asked, "Are you satisfied with the major you have chosen?", 73.4% (47 students) responded "Very satisfied," while 26.6% (17 students) responded "Neutral." No students selected the option "Dissatisfied." When we inquired why some students chose "Neutral," 4 students mentioned that traditional teaching methods were predominantly used, 5 students said that most of the courses were focused on educational studies, and 7 students found the study load to be heavy.

Additionally, in response to the question, "Will you work in your profession after graduating from university?", 54.6% (35 students) responded "Yes," 4.6% (3 students) responded "No," and 40.6% (26 students) were "Not sure."

Their responses suggest that although there are employment opportunities for English and Japanese teachers in Mongolia, relatively few students plan to pursue teaching careers. This may be related to the low wages for secondary school teachers in Mongolia. Many students want to study in Japan after graduation. Therefore, whether they pursue teaching careers depends on their future goals.

In recent years, the number of students choosing the "Japanese Language Teaching" programme has decreased. It is related to the increase in language centers and the growing tendency among young people to view language as a skill rather than a profession.

In response to the question, "Does the content of the teaching programme implemented at the university meet your needs or demands?", 59.4% (38 students) answered "very satisfied," 23.4% (15 students) responded "neutral," 1.6% (1 student) answered "dissatisfied," and 15.6% (10 students) responded "not sure."

The findings of this survey indicate that while the implementation of the "Japanese Language Teaching" programme has yielded positive results, further improvements are needed. To enhance this programme, quality research should be conducted on course selection, lecturer

performance, textbook quality, teaching methodology, independent assignments, assessments, teaching practicum, and satisfaction surveys.

1.2 Selection of Course Lecturers

Following the transition to a credit system and the implementation of a new undergraduate programme by MNUE in 2014, university students were given the option to select their lecturers. But the students' selection of lecturers has drawn our attention. We wanted to know the factors that they consider when selecting their lecturers. According to the survey, 50% of participants preferred flexible class timetables based on their learning loads when selecting lecturers, while 23% got advice from senior students and friends. Additionally, 21.2% of participants indicated that they do not consider any specific factors, and 10.9% chose lecturers they personally liked.

The survey findings suggest that students should be provided with transparent and detailed information about lecturers' experience and achievements in training and research, as well as guidance that helps students make informed class choices based on the content of the study programme.

1.3 Independent Assignment

When asked about the types of independent assignments given by lecturers, 51.5% (33 students) reported that they defend their assignments orally, 71.8% (46 students) said they write essays on given topics and make translations, and 56.2% (36 students) answered that they make presentations using PowerPoint.

Most students found it difficult to complete their independent assignments due to the following problems:

- Inadequate textbooks and sources
- Lack of guidance from some lecturers
- Limited examples or samples related to the assignments

A few students also noted additional challenges:

- Difficulty performing assignments due to simultaneous deadlines
- Unfavorable learning environment and restrictions on staying at the university until evening
- Limited vocabulary knowledge
- Poor internet speed
- Ineffective teamwork among students during group presentations and tasks

To solve these problems, lecturers should ensure coherence and integration between courses when assigning independent tasks and provide clear, detailed guidance and examples, including specifying appropriate sources. Additionally, the types of independent assignments should be expanded beyond short essays, conversations, and brief presentations to encourage their creativity. Lecturers should offer students more creative tasks that involve small-scale research, including data collection, processing, and analysis.

1.4 Teaching Methodology

While 79.7% of the research participants rated the teaching methodology of Japanese lecturers as good, 20.3% considered it to be at an average level. As MNUE is a leading teacher-training institution in Mongolia, it is essential for every lecturer to excel in teaching methodology. Best practices include using knowledge-creation methodology such as analyzing, discussing, reflecting, reviewing, and summarizing that suits the feature of each course.

Although many students view the lecturers' teaching methodologies as good, more creative methodologies and techniques should be introduced in language courses. Lecturers need to enhance their knowledge and skills to align with international language policies, social needs, and the latest teaching technologies for foreign language instruction. In addition, expanding partnerships between Japanese language teachers at both national and international levels and learning from their best practices is crucial for providing quality service to our students.

1.5 Textbooks of the Courses "Speaking Skills Development" and "Grammar in Use"

Students who took the professional Japanese language courses "Japanese Grammar in Use" and "Japanese Speaking Skills Development" were asked their opinions about the textbooks. Of the students who studied the professional course "Speaking Skills Development," 89% (57 students) responded that the textbook was suitable for their language level and that the content was good, while 11% (7 students) said they were unsure.

With the implementation of the "Teacher, Foreign Language Education" programme, there is a need to select and use textbooks with the latest content and methodology for university students. The textbook "Dekiru Nihongo," developed for elementary, middle, and intermediate levels according to the Japanese language education standards, is used as a basic textbook in professional courses.

When asked about the textbook used in the course "Grammar in Use," 87% of students (56 students) said that the textbook was suitable for their language level and had good content, while 13% (8 students) responded that they were not familiar with it.

In the "Teacher, Foreign Language Education" programme, the course name was changed from "Japanese Grammar" to "Grammar in Use". Although the name was changed to focus on usage-based teaching, students studying in Japan were not satisfied with the textbook's content. Therefore, in 2021, I authored the textbook "Grammar of Japanese Language-I" at the elementary level as part of a textbook project funded by the School of Social Sciences and Humanities at MNUE. This textbook, developed for first- and second-year students majoring in the "Japanese Language Teaching" programme, has been in use for three years since its publication.

Developing course curricula based on the content of only one or two textbooks is limited. This should be taken into further consideration**.** When developing course curricula, teachers are required to use or create textbooks that are suitable for Mongolian students.

1.6 Lecturer Satisfaction Survey

Lecturers at MNUE are evaluated by students at the end of each term. This evaluation is one of the criteria used to assess the professional development and skills of course teachers. According to the survey, 67.2% of students believe that such evaluations are necessary, while 12.5% think they are not necessary, and 20.3% are unsure about their necessity.

Additionally, some students reported that they did not pay much attention to completing the lecturer satisfaction survey because they felt the results were unreliable. This feedback suggests that certain questions on the satisfaction survey should be revised to enhance its effectiveness and accuracy.

1.7 Extracurricular Activities

When the “Japanese Language Teaching” programme was accredited by the Mongolian National Council for Education Accreditation in Mongolia in 2020, student personal development was the main area of concern. Extracurricular activities, such as student clubs, are essential for students to spend their free time, explore their hobbies, and foster personal growth. However, when surveyed, 87.5% of students reported that they were not involved in any clubs or activities, while only 12.5% said they were. This suggests that they are unable to join clubs that contribute to their personal development due to a lack of time, caused by heavy study loads, assignments, and teaching practicums.

Japanese language teachers run speaking and reading clubs, but these are not regular activities. Therefore, we suggest that the school administration and student office support the regular operation of student clubs at the university.

Conclusion

The lecturers and professors of the Foreign Language Faculty at the School of Social Sciences and Humanities, MNUE, have developed educational programmes following state education policies and international trends as part of the quality reform in higher education. Based on a questionnaire survey of students majoring in Japanese teaching programme, we reached the following conclusions:

- The number of students majoring in "Japanese Language Teaching" is declining annually, while enrolment in the “Japanese–English Language Teaching” programme is increasing. This suggests that the “Japanese–English Language Teaching” programme better aligns with current social needs and demands.
- Although the “Japanese Language Teaching” programme has several advantages, improvements are necessary. Over 50% of surveyed students indicated that they intend to work in their profession after graduation. So, it is essential to develop and implement a policy aimed at raising the value and reputation of the teaching profession.
- Many students studying Japanese in Mongolia aim to continue their studies in Japan. Learning foreign languages has become a common interest because most young people view language education as a necessary skill rather than a profession. Therefore, it is necessary to adapt to current trends and updates in language education and view language education from various perspectives to keep pace with changes.

- The research reveals that students face difficulties in doing independent assignments. Course teachers should provide clear instructions and examples, offer a list of sources, and design assignments related to the course content.
- To improve the programme, it is important to select textbooks that feature updated content, new solutions, and creative activities.
- Most students don't participate in extracurricular activities or join clubs. To support their personal development, study loads should be adjusted, and classrooms should be made available after class hours, provided students adhere to school rules.
- To promote Japanese language instruction, it is crucial to provide information about Japan and Japanese culture to children and youth.
- The JF Japanese education standard should be reflected in the educational programme.
- Expanding partnerships with Japanese language teachers at both national and international levels is necessary to learn from the teaching methods of other instructors.
- When updating the educational programme, the focus should be on preparing professionals who can compete at both national and international levels through internationally recognized study programmes.

References

Education Sector Mid-term Development Plan 2021-2030 Mongolia. (n.d.) https://en.meds.gov.mn/education-sector-mid-term-development-plan

Japan Foundation. (2021). *Survey on Japanese-Language Education Abroad 2021. (September 2021)* https://www.jpf.go.jp/e/project/japanese/survey/result/survey21.html

Mongolia's Five-Year Development Guidelines for 2021-2025. (2021). https://legalinfo.mn/mn/detail/15584

Contact email: ganchimeg@msue.edu.mn

The Unseen Toll of Academic Success: Shadow Education and Student Well-being

Deeksha Sharma, Panjab University, India
Satvinderpal Kaur, Panjab University, India
Guru Trisha Singh, Swami Vivekanand College of Education, India

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In the dynamic educational landscape, the transition to a profit-driven industry model has undermined the traditional conception of education as a public good (UNESCO, 2016). Adding to this shift is the recent surge of shadow education, a burgeoning billion-dollar coaching industry that originated in Asian countries and has since expanded globally. Shadow education, characterized by private supplementary tutoring conducted alongside regular schooling hours, has emerged as a significant influence. This paper aims to explore the impact of shadow education on the psychological and emotional well-being of students. Through empirical research conducted in Chandigarh City, India, the study focuses on 200 12th-grade students concurrently preparing for All-India level entrance examinations in Medicine and Engineering streams. Employing stratified random sampling and descriptive survey methods, the findings uncover concerning patterns, with shadow education institutes enrolling students in extensive two-year programs and charging hefty fees for tuition and accommodation/transportation services. Consequently, many students forego regular school attendance in favor of coaching centers. The study observes that a majority of students experience heightened levels of anxiety, stress, isolation, and reduced emotional resilience. This research underscores the urgent need to address the complex interplay between shadow education, student well-being, and the evolving educational landscape, where profit often takes precedence over educational priorities. The ramifications extend beyond the individual level, impacting critical aspects of sustainable development such as quality education, equity, and social justice.

Keywords: Shadow Education, Student Well-being, Psychological Well-being, Supplementary Tutoring

iafor
The International Academic Forum
www.iafor.org

Introduction

Shadow education, also referred to as private tutoring, cram schools or after-school learning programs, involves educational activities conducted outside of formal schooling that replicate the regular curriculum but require additional financial investment (Bray 2009; Stevenson and Baker 1992). Typically, those who seek tutoring do so to prepare for tests and enhance their children's chances of gaining admission to high-quality, academically selective schools (Bray 1999; Kosunen et al., 2020). The literature reveals that shadow education primarily comprises of tutoring in academic subjects that are also taught in schools, but which occurs outside regular school hours and involves a fee (Zhang, 2021). Providers of tutoring services include teachers seeking additional income, university students, informal providers, and entrepreneurs running commercial enterprises (Bray, 2022; Duong & Silova, 2021). Tutoring comes in various forms and differs in scale and intensity based on demand and the offerings of different individuals and groups. Additionally, the timing of tutoring can vary throughout the day, week and year. It has been observed that certain forms of shadow education enhance efficiency by helping slower learners keep pace with their peers, while others offer personalized support to further develop high achievers.

However, shadow education does not always yield positive outcomes, and a critical question is whether tutoring effectively enhances children's academic achievement (He et al., 2021; Omerogullari et al., 2020). In some cases, tutoring may conflict with formal schooling; for instance, students might become disengaged if they have already covered material in tutoring sessions and find school lessons repetitive (Guill & Bos, 2014; Zhang, 2019). Additionally, teachers who offer supplementary tutoring might become distracted from their primary responsibilities (Duong & Silova, 2021). There are also ethical concerns regarding current teachers providing tutoring to their own students, especially if they intentionally reduce content in regular classes to increase demand for private lessons (Ille & Peacey, 2019). Beyond these issues, research on shadow education often overlaps with regular schooling topics, such as administration, curriculum, pedagogy, tracking, personal skills, learning strategies, psychological well-being and classroom dynamics (e.g., Luo & Chan, 2022). As such, the research in shadow education research quite multilayered.

As more Indian students seek private coaching, supplementary classes, and intensive exam preparation, the effects of this trend are becoming increasingly apparent. These changes are influencing not just individual learners, but also broader socio-economic and cultural dynamics across the nation. The extent of private coaching among high school students in India is notably high, with 83% enrolled in coaching classes, according to the Asian Development Bank (2012). This figure is supported by recent data from the National Statistical Office (NSO, 2020), which shows that one in three high school students receives private coaching. The NSO report, based on the 75th round of the National Sample Survey, indicates that 19.8% of students across all educational levels, from pre-primary to graduate studies, participate in some form of private coaching. For students in Classes 9 and 10, who are preparing for crucial board exams and entrance tests, this percentage exceeds 30%. Urban upper-class students have particularly high access to private coaching, with over half of urban upper-class boys attending, compared to just 13.7% of rural boys and girls from minority communities. Private coaching entails significant financial costs, accounting for over 18% of the average annual education expenditure for secondary school students, a trend also observed among higher secondary students. In states like West Bengal, students allocate approximately 27% of their education budget to private coaching (NSO, 2020). The coaching centers offer a range of service packages customized to meet students' needs and parents'

financial capacities, often with accommodation options included. Annual fees vary widely, from ₹50,000 to ₹1 lakh for year-long coaching, highlighting concerns about the commercialization and possible exploitation within the education sector. These coaching institutes, now functioning as corporate entities, actively engage in educational policy advocacy to shape policies that align with their commercial interests. Their clientele includes not only the middle class but also economically disadvantaged families who invest substantial amounts in coaching fees to support their children's educational ambitions (Spreen & Kamat, 2018).

Recent years have seen a growing recognition of the intersection between mental health and education (Humphrey, 2018). Researchers have documented that heightened study time and extensive engagement in shadow education can negatively impact student development (Mori and Baker, 2010). Literature indicates that a major factor contributing to the compromised mental health of students involved in coaching is excessive parental pressure regarding academic decisions, which increases stress and anxiety. This pressure can significantly impact children's learning abilities. Additionally, students are often found to neglect extracurricular activities. A study examining shadow education revealed that most participants described their experiences with it negatively, using strong terms such as "tiring," "exhausting," and "regretful." While there were some acknowledged positive aspects, the overall sentiment was negative, with stress identified as the primary cause. Participants reported that the additional coaching, combined with schoolwork and extracurricular activities, made their lives very busy and sometimes overwhelming. Some participants also noted an over-reliance on their tutor, which seemed to affect their approach to classroom lessons. Furthermore, a poor relationship between the tutor and the student may have contributed to the stress and mixed feelings surrounding shadow education.

This paper examines the complex relationship between shadow education and student well-being, with a particular focus on the psychological toll associated with the relentless pursuit of academic success. By analyzing dimensions such as stress, anxiety and mental health outcomes, the study aims to shed light on the nuanced effects of shadow education practices on students' overall psychological welfare. Additionally, it explores the underlying factors driving participation in shadow education, including societal pressures, parental expectations and educational policies. Utilizing an interdisciplinary approach that combines psychological theory, educational sociology and policy analysis, this research seeks to deepen the understanding of the trade-offs between academic achievement and mental health in modern educational settings. By clarifying these dynamics, the study aims to help policymakers, educators, and parents create environments that support holistic student development while addressing the negative psychological impacts of excessive academic pressures.

Research Questions

1. What are the unseen costs and challenges linked to shadow education in India?
2. How do shadow education practices affect students' psychological well-being?

Objectives

1. To identify the unseen costs and challenges linked to shadow education in India.
2. To analyse how the shadow education practices affect students' psychological well-being.

Methodology

The study comprised 200 twelfth-grade students preparing for national entrance exams in Medicine and Engineering streams in Chandigarh, India. It focused on examining the challenges and opportunities encountered by this specific demographic. The research unfolded in two distinct phases to provide a comprehensive understanding of their experiences.

Phase 1 - Quantitative: Initially, a quantitative approach was employed. A structured questionnaire was crafted to gather data from the sample. This questionnaire encompassed various dimensions aimed at exploring different facets of the students' educational journey:

i) Socioeconomic Background: Information pertaining to the economic status, occupational backgrounds, and household conditions of the students' families.
ii) Access to Education: Investigation into factors such as school proximity, availability of educational resources, and transportation accessibility.
iii) Parental Involvement: Assessment of parental engagement in their children's education and their aspirations for their academic achievements.
iv) Educational Challenges, Socio-economic and Psychosocial Factors, Gender Disparities and Access: Identification of specific hurdles encountered by students in their academic pursuits, including financial constraints, learning environments, and peer influences.

Phase 2 - Qualitative: The subsequent phase adopted a qualitative approach. It involved conducting in-depth interviews with a subset of the sample, facilitating a deeper exploration of their experiences and perspectives. This phase employed open-ended questions to encourage participants to share personal experiences, challenges, and aspirations.

Findings

1. Unseen Costs and Challenges Linked to Shadow Education in India

The findings reveal that the average fee paid to coaching institutes is approximately INR 8 lakh over a combined two-year period, which highlights the financial commitment required to access shadow education services. This substantial expense underscores the perception of shadow education as a major investment by both parents and students, reflecting the high stakes associated with academic success in competitive fields. On top of this, the annual income range of parents also averages between INR 8-9 lakh, providing context regarding the economic background of the sample. While indicating a moderate financial standing, the allocation of a significant portion of household income towards coaching fees illustrates the prioritization of education within these families. The unseen costs and challenges linked to shadow education in India relate to the impact of shadow education on family dynamics, academic integrity, and students' overall well-being, which in turn reveals a complex interplay of factors that merit closer examination.

i) Economic Disparities

a) Unequal Access: Students from affluent families have better access to high-quality shadow education services compared to those from lower-income backgrounds. This disparity reinforces educational inequalities and limits opportunities for less privileged students (Kumar and Chowdhury, 2021).

ii) Impact on Family Dynamics

a) Financial Strain on Families: The significant expenditure on private coaching can strain family finances, leading to economic stress and impacting other areas of family life. The pressure to fund expensive coaching can lead to familial conflicts and increased parental stress, affecting overall family harmony (Mahmud, 2021).

iii) Impact on Academic Integrity

a) Unethical Practices: Some coaching institutes engage in unethical practices, such as inflating success rates or offering misleading promises, which can compromise the integrity of the educational system.
b) Academic Dishonesty: The competitive nature of shadow education may encourage dishonest practices among students, including cheating and plagiarism, as they strive to meet high expectations (Eaton, 2020).

iv) Decreased Engagement in Traditional Education

a) Reduced Classroom Participation: Overemphasis on shadow education can lead to disengagement from regular classroom learning, as students may rely more on private coaching than on their school education.
b) Curriculum Discrepancies: Shadow education often focuses on exam-specific content, which may not align with the school curriculum, leading to gaps in knowledge and understanding (Kumar and Chowdhury, 2021).

v) Impact on Long-Term Educational Goals

a) Narrow Focus: The focus on passing exams and achieving high scores in shadow education can narrow students' educational goals, limiting their broader intellectual and personal development.
b) Pressure-Induced Career Choices: High-pressure environments may influence students to choose career paths based on external expectations rather than personal interest or aptitude, affecting long-term career satisfaction and success (Yu and Zhang, 2022).

vi) Quality of Coaching Services

a) Variability in Quality: There is significant variability in the quality of coaching services, with some institutes offering inadequate or ineffective instruction, which does not justify the high fees charged.
b) Lack of Regulation: The coaching industry often lacks stringent regulation, leading to inconsistent standards and potential exploitation of students and parents (Bray, 2024).

vii) Community and Social Impact

a) Social Fragmentation: The emphasis on private coaching can create divisions within communities, as students and families with different levels of access to coaching may experience varying levels of educational success.
b) Decreased Community Involvement: As students focus more on private coaching, they may have less time to engage in community and social activities, reducing their involvement and contribution to communal life (Entrinch, 2021).

2. Analysing How the Shadow Education Practices Affect Students' Psychological Well-being

By delving into dimensions such as stress, anxiety and mental health outcomes, and investigating the mechanisms driving participation in shadow education, such as societal pressures, parental expectations, and educational policies, the study seeks to provide a comprehensive understanding of the complex trade-offs involved.

Domain	Sub-domain	Percentage of students	Factors
Stress	Academic pressure	83%	High expectations of parents, competitive academic environment, Pressure to achieve top grades
	Time management stress	94%	Balancing multiple responsibilities (school, coaching, extracurricular activities), tight schedules and deadlines, overlapping academic and personal commitments
Anxiety	Performance anxiety	88%	Fear of underperforming in exams or tests, Anxiety about meeting personal or external expectations
	Fear of failure	74%	Worries about not achieving academic goals, concerns about future prospects and opportunities
Burnout	Physical exhaustion	68%	Physical strain from continuous academic activities, insufficient rest and recovery time
	Emotional exhaustion	71%	Emotional drain from constant academic demands, feelings of apathy and lack of motivation
Fatigue	Mental fatigue	86%	Cognitive tiredness from continuous learning, difficulty in maintaining focus and concentration
	Sleep deprivation	93%	Inadequate sleep due to late-night studying or early classes, disrupted sleep patterns from academic stress

Self-esteem	Academic self-perception	54%	Self-worth tied to academic success and grades, feelings of inadequacy based on academic performance, Influence of academic achievements on self-image
	Comparison with peers	65%	Feelings of inadequacy when comparing oneself to high-achieving peers, Perceived failures in relation to others' successes, Impact of peer comparisons on self-confidence
Social isolation	Limited social engagement	86%	Reduced opportunities to interact with peers due to time constraints, impact of academic commitments on social interactions
	Loneliness	77%	Feelings of isolation from not having enough time for social activities, impact of busy schedules on emotional connections
Cognitive overload	Information overload	73%	Difficulty in processing and retaining large amounts of information, impact of extensive study materials on cognitive capacity
	Decreased concentration	56%	Struggles with focus and attention due to excessive study demands, impact of cognitive overload on concentration
	Learning fatigue	79%	Reduced effectiveness in learning due to constant academic pressure, impact of continuous study on learning efficiency

Table 1: Psychological Well-being of Students Enrolled Into Shadow Education

Table 1 provides insights into how shadow education practices impact students' psychological well-being, revealing significant stressors and challenges. Key findings show that a majority of students experience substantial stress from academic pressure and time management issues, with 94% struggling to balance school, coaching, and extracurricular activities. Anxiety is prevalent, with 88% of students feeling performance-related anxiety and 74% fearing failure. Burnout is evident in 68% of students who face physical exhaustion and 71% who experience emotional exhaustion from constant demands. Fatigue affects 86% due to mental tiredness and 93% due to sleep deprivation. Self-esteem issues are prominent, with

54% of students' self-worth tied to academic success and 65% comparing themselves unfavorably to peers. Social isolation is significant, with 86% having limited social engagement and 77% feeling lonely. Cognitive overload impacts 73% of students with information overload, 56% with decreased concentration, and 79% with learning fatigue. These findings highlight the complex interplay between academic pressures and students' overall psychological well-being.

Conclusion

The exploration of shadow education's impact on student well-being underscores a multifaceted and often unseen toll associated with the pursuit of academic success. The analysis reveals that while shadow education aims to enhance academic performance, it simultaneously imposes significant psychological burdens on students. The data shows pervasive stress and anxiety related to high academic expectations, performance pressures, and time management challenges. Additionally, students experience substantial burnout and fatigue from continuous academic demands, leading to physical exhaustion, emotional drain, and cognitive overload. Issues of self-esteem and social isolation further compound the psychological strain, with students' self-worth closely tied to academic success and limited opportunities for social engagement. These findings highlight the urgent need to address the hidden costs of shadow education by fostering supportive educational environments that balance academic ambition with mental health considerations. To mitigate these adverse effects, policymakers, educators, and parents must collaborate to create more holistic approaches to education that prioritize students' overall well-being alongside academic achievement.

References

Bray, M. (1999). *The shadow education system: Private tutoring and its implications for planners*. UNESCO International Institute for Educational Planning (IIEP).

Bray, M. (2009). *Confronting the shadow education system: What government policies for private tutoring?* In IIEP Policy Forum (Vol. 21). UNESCO IIEP. ISBN 978-92-803-1333-8.

Bray, M. (2022). Teachers as tutors, and tutors as teachers: Blurring professional boundaries in changing eras. *Teachers and Teaching: Theory and Practice, 28*(1), 64–77. https://doi.org/10.1080/13540602.2021.1948004

Bray, M. (2024). Still in need of confronting: Shadow education and its implications in the sustainable development goals. *International Journal of Educational Development, 104*, 102967. https://doi.org/10.1016/j.ijedudev.2024.102967

Duong, B. H., & Silova, I. (2021). Portraits of teachers in neoliberal times: Projections and reflections generated by shadow education research. *Globalisation, Societies and Education, 19*(5), 696–710. https://doi.org/10.1080/14767724.2021.1931986

Eaton, S. E. (2020). *Shadow courses and their impact on academic integrity*. Werklund School of Education, University of Calgary, Calgary, AB. pp. 1-5.

Entrich, S. R. (2021). Worldwide shadow education and social inequality: Explaining differences in the socioeconomic gap in access to shadow education across 63 societies. *International Journal of Comparative Sociology, 61*(6), 441–475. https://doi.org/10.1177/0020715220987861

Guill, K., & Bos, W. (2014). Effectiveness of private tutoring in mathematics with regard to subjective and objective indicators of academic achievement: Evidence from a German secondary school sample. *Journal for Educational Research Online, 6*(1), 34–67.

He, Y., Zhang, Y., Ma, X., & Wang, L. (2021). Does private supplementary tutoring matter? The effect of private supplementary tutoring on mathematics achievement. *International Journal of Educational Development, 84*(2), 1–10. https://doi.org/10.1016/j.ijedudev.2021.102417

Humphrey, N. (2018). Are the kids alright? Examining the intersection between education and mental health. *Psychology of Education Review, 42*(1), 4-16. https://research.manchester.ac.uk/en/publications/are-the-kids-alright-examining-the-intersection-between-education

Ille, S., & Peacey, M. W. (2019). Forced private tutoring in Egypt: Moving away from a corrupt social norm. *International Journal of Educational Development, 66*, 105–118. https://doi.org/10.1016/j.ijedudev.2018.11.003

Kosunen, S., Haltia, N., Saari, J., Jokila, S., & Halmkrona, E. (2020). Private supplementary tutoring and socio-economic differences in access to higher education. *Higher Education Policy*. https://doi.org/10.1057/s41307-020-00177-y

Kumar, I., & Roy Chowdhury, I. (2021). Shadow education in India: Participation and socioeconomic determinants. *Journal of South Asian Development, 16*(2). https://doi.org/10.1177/09731741211032472

Luo, J., & Chan, C. K. Y. (2022). Influences of shadow education on the ecology of education: A review of the literature. *Educational Research Review, 36*, 1–17. https://doi.org/10.1016/j.edurev.2022.100622

Mahmud, R. (2021). Learning in the shadows: Parents' investments, family burden, and students' workload in Dhaka, Bangladesh. *Asia Pacific Education Review, 22*, 41–52. https://doi.org/10.1007/s12564-021-09647-0

Mori, I., & Baker, D. (2010). The origin of universal shadow education: What the supplemental education phenomenon tells us about the postmodern institution of education. *Asia Pacific Education Review, 11*(1), 36–48. https://doi.org/10.1007/s12564-010-9008-0

Omerogullari, M., Guill, K., & Koller, O. (2020). Effectiveness of private tutoring during secondary schooling in Germany: Do the duration of private tutoring and tutor qualification affect school achievement? *Learning and Instruction, 66*, 1–23. https://doi.org/10.1016/j.learninstruc.2019.101272

Spreen, C. A., & Kamat, S. (2018). From billionaires to the bottom billion: Who's making education policy for the poor in emerging economies? In G. S. Khemi & A. Draxler (Eds.), *The state, business and education*. Routledge.

Stevenson, D. L., & Baker, D. P. (1992). Shadow education and allocation in formal schooling: Transition to university in Japan. *American Journal of Sociology, 97*(6), 1639–1657. https://doi.org/10.1086/229909

Yu, J., & Zhang, R. (2022). A review of shadow education. *Educational Review, 74*(2), 1579-1593. https://doi.org/10.1080/00131911.2021.1971458

Zhang, W. (2019). Regulating private tutoring in China: Uniform policies, diverse responses. *ECNU Review of Education, 2*(1), 25–43. https://doi.org/10.1631/jzus.B2000207

Zhang, W. (2021). Non-state actors in education: The nature, dynamics, and regulatory implications of private supplementary tutoring. *UNESCO*.

Contact email: deekshasharma23.11@gmail.com

Inclusive Education in the Digital Era: Special Education Teachers' Perspectives on Technology Integration and Inclusive Practices

Elif Gülbay, Università degli Studi di Palermo, Italy
Ylenia Falzone, Università degli Studi di Palermo, Italy
Savannah Olivia Mercer, Università degli Studi di Palermo, Italy

The European Conference on Education 2024
Official Conference Proceedings

Abstract
As innovative technologies continue to permeate educational settings as useful tools to enhance the learning experience, understanding the perceptions of teachers is crucial. Assistive technologies show promise in supporting diverse learners, and special educational needs (SEN) teachers are pertinent in ensuring the meaningful, directional use of such technologies. Existing research emphasises the importance of users feeling comfortable with the innovative technologies in order to effectively utilise them. Therefore, it is important to understand potential barriers to technology integration through the lens of trainee SEN teachers. With new technologies emerging as valuable tools for inclusive learning, we aim to explore the relationship between technological competence and attitudes toward inclusive education. To gain deeper insights, we investigate the perspectives of Italian students enrolled in the specialisation course for support activities, recognising the pivotal role of educators and future educator's voices. Utilising a quantitative, questionnaire-based, correlational design, the present study examines the Technological Pedagogical and Content Knowledge (TPACK, Mishra & Koehler, 2006) of SEN teachers in relation to their Sentiments, Attitudes, and Concerns about Inclusive Education (SACIE-R, Forlin et al., 2011). Grounded in a critical disability studies framework, the research aims to understand the socio-cultural, ethical and pedagogical implications of incorporating technologies into educational settings through the lens of SEN educators. Our findings contribute to understanding teachers' readiness to embrace innovative technologies in relation to their inclusive practice, offering valuable implications for teacher training programs, curriculum development, and the design of assistive technologies tailored to meet the diverse needs of students.

Keywords: Inclusive Education, Innovative Technology, TPACK, SACIE-R, Correlation, Questionnaire

iafor
The International Academic Forum
www.iafor.org

1. Introduction

Innovative assistive technologies (AT) increasingly permeate educational settings, offering valuable tools to enhance learning experiences, particularly in inclusive classrooms where the aim is to create safe and supportive environments for all students to participate and learn (Méndez et al., 2022). However, a gap remains in understanding how these technologies are effectively utilized by teachers, especially those working with special educational needs (SEN) students. Effective use of assistive technologies (AT) depends significantly on teachers' training and competence in navigating these new digital environments. Inadequate training often leads to the underuse or misuse of AT, which highlights the critical role of teachers in implementing these tools meaningfully (Pérez, 2014).

ATs have the potential to greatly benefit diverse student populations, however, teachers' comfort and competence are critical factors in their success. Many trainee SEN teachers face challenges in adopting these tools due to limited technological knowledge (Anderson & Putman, 2020), or practical concerns regarding implementation (Ellis, 2008). This study addresses the need to explore the relationship between SEN teachers' technological, pedagogical, and content knowledge (TPACK) (Mishra & Koehler, 2006) and their sentiments, attitudes, and concerns regarding inclusive education, measured by the Sentiments, Attitudes, and Concerns about Inclusive Education Revised (SACIE-R) (Forlin et al., 2011) scale.

Focusing on trainee SEN teachers in Italy, this research examines how TPACK intersects with attitudes towards inclusive education. The study employs a quantitative, correlational research design grounded in a critical disability studies framework highlighting the ethical dimensions of technology's role in shaping inclusive educational environments. By identifying relationships between TPACK and SACIE-R, the study aims to inform SEN teacher training programmes, curriculum development, and training for the effective and thoughtful use of ATs that align with the needs of future SEN educators.

This paper is organized into several sections: a literature review detailing an overview of the existing body of research and theoretical frameworks, a methodology section outlining the research design, sample, measures and data collection and analysis procedures, a presentation of the key findings, and a discussion understanding these results in the context of the existing literature. The conclusion provides insights and recommendations for practice, policy, and future research. This study is particularly relevant to the Italian context, where historical and ongoing efforts to integrate students with disabilities into mainstream education highlight the importance of revising school systems to incorporate innovative approaches (Marsili et al., 2021). By exploring the relationship between technological competence and attitudes towards inclusion, we offer guidance for professional development programmes and supporting diverse student needs.

2. Literature Review

Inclusive Education and Technology Integration

Inclusive education has significantly evolved in recent years, with an increasing recognition that inclusion is more than solely physical integration of students with disabilities into mainstream classrooms, instead true inclusive classrooms include social inclusion, agency, and meaningful participation (Francisco et al., 2020). According to Hoogerwerf et al. (2021),

inclusive education encompasses "how we develop and design schools, classrooms, programmes, and activities so that all students can learn and participate together" (p.1, 2021).

ATs are central to the success of inclusive education and have been identified as critical tools for achieving truly inclusive pedagogy (Yaskevich, 2021). These technologies are designed to empower students with disabilities to fully participate in educational settings. Assistive technologies encompass a wide range of devices, from established tools like screen reading assists and hearing aids to more advanced solutions like interactive learning platforms and communication aids. In recent years, the development of innovative ATs has further extended the possibilities for inclusive education (Karagianni & Drigas, 2023). Examples of these developments include; Online Inclusion Schools, which leverage digital platforms to create accessible learning environments for all students (Nurdyansyah et al., 2022), wearable technologies inclusive of smartwatches, augmented reality (AR) (Cascales Martínez et al., 2016), biosensors for physiological markers (Palermo et al., 2023), as well as integrated augmentative manipulation and communication assistive technologies (IAMCATs) (Encarnação et al., 2017) which offer new ways for students with disabilities to engage with educational content.

The integration of these innovative technologies into educational settings not only enhances the learning experience for students with disabilities but also promotes a more inclusive approach to education that benefits all learners. By reducing barriers to participation and creating more equitable learning opportunities, assistive technologies play a vital role in the ongoing evolution of truly inclusive learning.

Teachers' Perspectives on Technology Integration

A key concept arising from previous research is the role of SEN teachers in reinforcing inclusiveness using educational technologies. Their ability to design and implement inclusive practices, supported by technology, is critical in fostering an environment where all students can thrive. Teachers, as the primary facilitators of learning, play a pivotal role in determining if and how effectively these tools are utilized within the classroom. In the context of SEN settings, where the diversity of student needs requires tailored approaches, the effective use of technology can be transformative. Though attitudes of SEN teachers towards technology for inclusive education have been cited as generally positive (Mohamed, 2018), several studies have identified barriers to technology integration.

Teachers' confidence in using technology has long been cited as an influencing factor for their readiness to introduce new technologies, with anxiety (Henderson & Corry, 2021) and risk-aversion (Howard, 2013) identified as significant barriers. Within the context of SEN teachers, researchers exploring knowledge and confidence in using ATs with students with disabilities found that time spent in college programmes and AT training programmes was positively related to teachers' confidence levels in using these technologies (Alghamdi, 2021). Echoing this, Nordström et al. (2019) report in their study of SEN teacher perspectives of AT for students with reading difficulties that extensive training and support is needed (Nordström et al., 2019). This highlights the importance of training and experience in fostering teacher confidence, which is crucial for successful technology integration (Adamy & Boulmetis, 2006; Ertmer & Ottenbreit-Leftwich, 2010).

Another study revealed a significant relationship between teachers' attitudes toward online teaching and technological proficiency (Alieto et al., 2024). The researchers also found a

significant gender disparity in attitudes and competency with educational technologies. These findings further highlight not only the importance of competencies with technology in their willingness to use assistive technologies to create inclusive environments but also has implications for training programmes regarding gender-based considerations. Siyam (2019) used the Technology Acceptance Model (TAM) to explore influencing factors of SEN teachers' actual use of technology and found self-efficacy as well as access to technology to be significant influencing factors (Siyam, 2019).

In a case study of 18 elementary school teachers' opinions of obstacles within the implementation of new technologies, Kopcha (2012) identified that situated learning activities empowered teachers with knowledge and support that enabled them to utilise the technologies more effectively. Masterman (2023) echoed the need for educator preparedness, underscoring the need to hire technology integration specialists to support educators, with national and state legislative support, to ensure maintainable technology integration. This reinforces the idea that technological competence and confidence among teachers is not just a technical skill but an imperative component of sustainable inclusive pedagogy.

Critical Disability Studies Framework

Critical disability studies provide a valuable framework for understanding the barriers and challenges associated with integrating ATs into educational settings. A key consideration in the meaningful integration of ATs is the need for a collaborative approach that emphasizes empowerment and participation. This approach, often described as "doing with" rather than "doing to" individuals with disabilities, ensures that the use of ATs genuinely supports the needs and autonomy of disabled students (Mankoff et al., 2010; Williams & Gilbert, 2020).

Teacher preparedness, which was previously discussed in this article, is not only relevant in the context of practical skills implementing ATs, but also extends to the ethical and safe use of these technologies. Beardsley et al. (2019) in a study of two high schools identified that teachers had not received formal training in responsible data management. This lack of training can hinder not only the effective use of technology but also its safe application, raising concerns about the protection of student data and overall ethical considerations.

Italian Context and Research Gaps

Looking towards the Italian educational context in which our study took place, though Italy has historically been recognized for its progressive approach to mainstreaming students with disabilities (Aiello & Pace, 2020), there have been obstacles in fully aligning with international legislative standards for inclusive education. Recent studies have highlighted the need for revisions in the school system to incorporate innovative approaches and better meet these criteria (Marsili et al., 2021). It has been found that the attitudes of both mainstream and SEN teachers in Italy play a crucial role in the successful inclusion of students with disabilities in schools (Arcangeli et al, 2020), further highlighting the significance of exploration within an Italian context.

Despite the growing body of research on inclusive education, there is still limited exploration of the relationship between the Sentiments, Attitudes, and Concerns about Inclusive Education Revised (SACIE-R) scale and the Technological Pedagogical Content Knowledge (TPACK) framework. The present study aims to address this gap by contributing valuable insights from the perspectives of trainee SEN teachers in Italy, specifically examining how

their TPACK competencies influence their attitudes toward inclusive education. By doing so, this research not only enriches the existing literature but also offers a unique perspective on the integration of technology in fostering inclusivity within Italian schools.

Research Questions

1. Is there a positive correlation between overall TPACK scores and overall SACIE-R scores among trainee SEN teachers?
2. Does technological competence correlate with more positive attitudes, sentiments, and concerns towards inclusive education?
3. What are the relationships between the domains of TPACK and the subscales of SACIE-R?
4. Which specific domains of TPACK (e.g., Technological Knowledge, Content Knowledge) are most strongly correlated with specific aspects of SACIE-R (e.g., sentiments towards students with disabilities, attitudes towards inclusive education)?

3. Methodology

Research Design

This study employed a quantitative, questionnaire-based methodology with data collected online over a period of approximately two months between May and June 2024 using Google Forms. The research design is exploratory, utilizing Spearman's Rho correlational analysis to investigate the relationships between variables.

Sample

A convenience, non-random sampling method was used to select participants, targeting students enrolled in a specialization course for support activities at the University of Palermo, Italy. Participation was voluntary, and consent was gained in order to process the results. After data cleaning, the total sample consisted of 1723 students, with ages ranging from 22 to 63 years (M = 40, SD = 8.8). The sample included both in-service and pre-service teachers with varying levels of experience teaching students with disabilities, ranging from no experience to more than five years, distribution shown in Figure 1. The gender distribution was 85.43% female and 14.45% male.

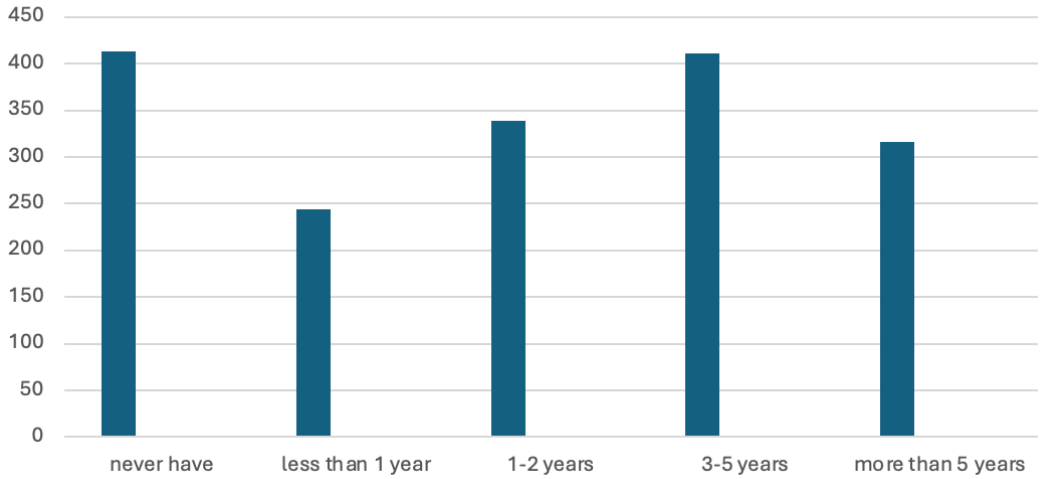


Figure 1: Distribution of participants' years' experience teaching students with disabilities.

Measures

The Sentiments, Attitudes, and Concerns About Inclusive Education-Revised (SACIE-R) Scale (Forlin, Earle, Loreman & Sharma, 2011)

The Sentiments, Attitudes, and Concerns about Inclusive Education-Revised (SACIE-R) scale (Forlin et al., 2011) was used to measure participants' sentiments towards people with disabilities, attitudes towards inclusive education, and concerns regarding inclusive education. The scale consists of 15 items, divided into three sub-scales, each rated on a 4-point Likert scale (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree), with total scores (of both total overall and subscale scores) calculated by averaging items. The Sentiments subscale addresses feelings towards individuals with disabilities, including items such as 'I am afraid to look directly at a person with a disability' and 'I dread the thought that I could eventually end up with a disability'. The Attitudes subscale assesses attitudes towards the inclusion of students with disabilities in regular classes, with items such as 'Students who need an individualized academic program should be in regular classes' and 'Students who require communicative technologies should be in regular classes'. The Concerns subscale evaluates apprehensions about the inclusion of students with disabilities in mainstream classrooms, featuring items such as 'I am concerned that I will be more stressed if I have students with disabilities in my class' and 'I am concerned that students with disabilities will not be accepted by the rest of the class'.

The SACIE-R has been validated with 542 pre-service teachers from Hong Kong, Canada, India and United States (Forlin et al., 2011). The authors reported acceptable internal consistency coefficients of $\alpha = .75$ for the total scale, $\alpha = .75$ for sentiments, $\alpha = .67$ for attitudes, and $\alpha = .65$ for concerns. In the current study, internal consistency coefficients were found to be high, Table 1 includes the Cronbach's alpha values from the present study, along with descriptive statistics for the total scale, and subscales. The Italian translation of the questionnaire was provided by the original author.

Technological, Pedagogical, and Content Knowledge (TPACK) Model (Koehler & Mishra, 2005; 2006)

The Technological, Pedagogical and Content Knowledge (TPACK) model (Koehler & Mishra, 2005; 2006) was used to assess participants' knowledge in integrating technology into their teaching. The survey was composed of the translated and adapted instrument that was developed and validated by Schmidt et al. (2009), inclusive of the 7 dimensions of the TPACK model (Technological Knowledge, Content Knowledge, Pedagogical Knowledge, Technological Pedagogical Knowledge, Technological Content Knowledge, Pedagogical Content Knowledge, and Technological Pedagogical Content Knowledge) (Mishra & Koehler, 2006; 2009). The survey consisted of a total of 49 items based on a 5-point Likert scale which allows for a self-assessment of participants' competencies and knowledge in relation to each of the 7 domains. Scores for each subdomain as well as the overall total were calculated by averaging items.

The TPACK framework is recognized as a critical foundation for the professional development of educators, including in higher education settings (La Marca et al., 2018). The model illustrates the interplay between three key knowledge domains: Content Knowledge (CK), which encompasses understanding the subject matter; Pedagogical Knowledge (PK), which refers to knowledge of teaching and learning strategies; and Technological Knowledge

(TK), which involves familiarity with relevant technologies. The interaction of these domains generates four complex components: Pedagogical Content Knowledge (PCK), which involves the integration of appropriate teaching methods with specific subject content; Technological Content Knowledge (TCK), which focuses on selecting the most suitable technologies for teaching a given subject; Technological Pedagogical Knowledge (TPK), which examines the influence of technology on teaching and learning processes; and finally Technological Pedagogical Content Knowledge (TPCK), which represents a nuanced understanding of how these domains interact and the ability to apply this expertise in various educational contexts.

The total TPACK demonstrated high internal consistency in this study, with a coefficient of α = .982. Cronbach's coefficients for the 7 domains were also high, demonstrated in Table 2 alongside descriptive statistics for the total overall TPACK, and each domain.

Dimension	No. Of Items	N	Mean	Standard Deviation	Minimum	Maximum*	Cronbach's alpha
Sentiments	5	1723	3.49	0.472	1.00	4.00	0.725
Attitudes	5	1723	3.64	0.454	1.00	4.00	0.820
Concerns	5	1723	3.29	0.499	1.00	4.00	0.736
Total scale	15	1723	3.47	0.365	1.87	4.00	0.834

** Theoretical minimum and maximum values for all domains and the total scale are 1 and 4, respectively.*

Table 1: Descriptive statistics and internal consistency of SACIE-R and subscales.

Dimension	No. Of Items	N	Mean	Standard Deviation	Minimum	Maximum*	Cronbach's alpha
TK	22	1723	3.72	0.696	1.73	5.00	0.967
CK	6	1723	3.94	0.679	1.83	5.00	0.923
PK	6	1723	3.93	0.688	1.50	5.00	0.952
PCK	3	1723	3.87	0.738	2.00	5.00	0.942
TCK	3	1723	3.87	0.772	1.33	5.00	0.931
TPK	5	1723	3.98	0.708	2.00	5.00	0.932
TPCK	4	1723	3.84	0.744	1.75	5.00	0.934
Total	49	1723	3.83	0.622	1.88	5.00	0.982

** Theoretical minimum and maximum values for all domains and total TPACK are 1 and 5, respectively.*

Table 2: Descriptive statistics and internal consistency of TPACK and subdomains.

Data Analysis

Statistical analysis was conducted using Jamovi 2.2.5, focusing on correlational analysis to investigate the relationships between the domains of TPACK and SACIE-R. This approach enabled an examination of the correlation between participants' technological, pedagogical, and content knowledge, and their sentiments, attitudes, and concerns regarding inclusive education. After data collection, the raw data underwent preparation, which included handling missing values and reverse scoring certain items in the SACIE-R due to negative coding. Assumption checks for correlational analysis were then conducted. Scatterplots indicated a positive relationship between the two variables, thus meeting the assumption of linearity. Given that responses on both instruments were based on Likert scales and thus treated as ordinal, Q-Q plots were used to assess normality. The plots confirmed a violation of the normality assumption, therefore the non-parametric alternative, Spearman's rho test was used. Cohen's guideline was used to interpret the strength of the correlation coefficient (Cohen, 1988, 1992), with .10 to .29 considered small, .30 to .49 considered moderate, and .50 to 1.0 considered large.

4. Findings

The study examined the relationship between perceived technological, pedagogical and content knowledge and sentiments, attitudes and concerns towards inclusive education. Relationships between the total combined TPACK and SACIE-R scales as well as the subscales and subdomains were evaluated using Spearman's rho correlation. The correlation analysis, as shown in Table 3, revealed statistically significant, small to moderate strength correlations between all domains and subscales. There was a significant positive correlation ($r = .26$, $p < .001$) between overall TPACK scores and overall SACIE-R scores, indicating that as participants' perceived competence in TPACK increases, so do their positive sentiments, attitudes, and confidence in supporting inclusive education. Additionally, small to moderate correlations were observed between specific TPACK domains and the SACIE-R subscales, which further highlights the integral role of TPACK in shaping teachers' approaches toward inclusivity.

Technological Knowledge (TK), which refers to the teachers' ability to use technology effectively, was positively correlated with all domains of the SACIE-R. Specifically, TK was significantly correlated with sentiments towards people with disabilities ($r = .11$, $p < .001$), attitudes towards the inclusion of students with disabilities in mainstream classrooms ($r = .19$, $p < .001$), and concerns about the challenges of including students with disabilities ($r = .11$, $p < .001$). Though the correlations are small in strength, the statistical significance of these findings provides evidence that teachers with higher technological knowledge tend to have more positive sentiments and attitudes towards inclusive education, while being less concerned about the challenges it might present.

Similarly, Technological Content Knowledge (TCK), which represents the intersection of technology and content knowledge, also showed significant correlations with all SACIE-R domains. The correlations were observed in the overall scale ($r = .25$, $p < .001$) as well as sentiments ($r = .14$, $p < .001$), attitudes ($r = .25$, $p < .001$), and concerns ($r = .20$, $p < .001$). This indicates that teachers with a strong understanding of how technology can enhance content delivery are more likely to support the inclusion of students with disabilities in their classrooms.

Technological Pedagogical Knowledge (TPK), which involves understanding how technology affects teaching methods and learning processes, was also significantly correlated with the overall SACIE-R domains. TPK was significantly associated with sentiments ($r = .17$, $p < .001$), attitudes ($r = .27$, $p < .001$), and concerns ($r = .21$, $p < .001$). These findings emphasize that teachers who are knowledgeable about the pedagogical implications of using technology are more inclined to have more positive attitudes towards inclusive education and are better equipped to address concerns related to the inclusion of students with disabilities.

The strongest correlation was between the total SACIE-R scores and Pedagogical Content Knowledge (PCK) ($r = .30$, $p < .001$), which indicates that teachers who are proficient in aligning their teaching strategies with the content they teach are likely to have more positive sentiments, attitudes, and fewer concerns regarding inclusive education. This indicates that a more inclusive learning environment is related to the adaptability of teachers.

In summary, the findings clearly demonstrate the importance of TPACK in shaping teachers' attitudes toward inclusive education. As teachers' knowledge and confidence in integrating technology with pedagogy and content increase, so does their readiness and positive

disposition towards inclusive practices. These results suggest that enhancing TPACK among educators is crucial for fostering inclusive educational environments.

		Sentiments	Attitudes	Concerns	Total
TK	Spearman's rho	0.113	0.188	0.108	0.174
	p-value	<.001	<.001	<.001	<.001
CK	Spearman's rho	0.161	0.242	0.207	0.257
	p-value	<.001	<.001	<.001	<.001
PK	Spearman's rho	0.159	0.284	0.240	0.288
	p-value	<.001	<.001	<.001	<.001
PCK	Spearman's rho	0.184	0.270	0.253	0.300
	p-value	<.001	<.001	<.001	<.001
TCK	Spearman's rho	0.144	0.246	0.201	0.254
	p-value	<.001	<.001	<.001	<.001
TPK	Spearman's rho	0.165	0.274	0.206	0.274
	p-value	<.001	<.001	<.001	<.001
TPCK	Spearman's rho	0.154	0.270	0.204	0.265
	p-value	<.001	<.001	<.001	<.001
Total	Spearman's rho	0.158	0.262	0.192	0.260
	p-value	<.001	<.001	<.001	<.001

Table 3: Spearman's rho correlation matrix.

5. Discussion

These results show that the trainee SEN teachers' technological, pedagogical, and content knowledge are related to their sentiments, attitudes and concerns regarding inclusive education. Thus, indicating that SEN teachers with greater knowledge and confidence in integrating technology into their teaching are more likely to hold positive dispositions towards inclusive education. Our findings build upon the existing body of research that highlights the importance of technological aptitude as a core element of an inclusive classroom by demonstrating a relationship between this technological readiness, and their sentiments about engaging with people with disabilities, attitudes towards including learners with diverse needs in mainstream classrooms, and concerns about inclusive education.

The analysis revealed significant, positive correlations between the overall and all domains of teachers' Technological, Pedagogical, and Content Knowledge, and overall and all subscales of their Sentiments, Attitudes, and Concerns about Inclusive Education (SACIE-R). The comprehensive correlations found in this study highlight the critical importance of technological competence in fostering inclusive educational practice. Our results suggest the need for more robust TPACK training, with a focus on practical applications that demonstrate the successful integration of AT in classroom scenarios. Echoing previous research (Kopcha, 2012; Masterman, 2023; Nordström et al., 2019), ongoing support and resources are also crucial in helping teachers develop and maintain their technological skills. The largest correlation coefficient occurring between Pedagogical Content Knowledge (PCK) and overall SACIE-R scores suggests that improving teachers' PCK could be a key strategy in promoting positive attitudes toward inclusion. This could guide the focus of professional development programs, emphasizing the integration of effective teaching methods with content knowledge to enhance inclusivity in the classroom.

Empowering SEN teachers with the skills and confidence to effectively utilize innovative assistive technologies is essential. It is not just about having access to these technologies but understanding their potential as a means of inclusion when used meaningfully. The results from the present study support this. By highlighting the key role of the SEN teacher, we also provide supporting evidence for the need to involve teachers in the design and implementation phases of new and developing ATs, ensuring that these tools are not only usable but also genuinely effective in meeting the needs of diverse learners. Their voices should be integral, not only as they will be one of the main users, but also because their perspectives offer valuable insights into the practical challenges and successes of integrating AT in educational settings.

Considering the central role that SEN teachers play in meaningfully integrating assistive technologies, this study examined the perspectives of future SEN educators on technology integration within their inclusive practices. By exploring the relationship between these variables, the study provides evidence supporting the need for comprehensive training in the integration of innovative technologies, specifically in the Italian context. Teachers who can confidently and meaningfully use technology as a tool to enhance their teaching and support student learning are more likely to successfully integrate it within their inclusive classrooms. On the other hand, those who are uncertain or lack confidence in their technological skills may be hesitant to fully embrace these ever-developing advances.

Recommendations

While this study offers a deeper understanding of pre-service and in-service SEN teachers and their readiness to integrate innovative technologies in inclusive classrooms, several limitations must be acknowledged, which will also guide our recommendations for future research. Firstly, whilst the specific Italian context offers useful cultural insights, the generalisability of these results is also limited by the specific demographic focus of the sample, which may not reflect the experiences of educators in different cultural or educational contexts. Future studies involving participants from various regions or countries would enhance the external validity of findings. Also, the reliance on self-report measures introduces the possibility of bias, as participants may not accurately report their true sentiments, either inadvertently or due to social desirability bias. Triangulating data sources with observational methods to provide a more comprehensive understanding of teachers' perspectives would overcome this.

Though quantitative approaches allow for the identification of patterns, closed questionnaires do not allow for a deep, rich exploration of the concerns and experiences of teachers. Qualitative research using interviews or focus groups, should be used in future studies to gain a deeper understanding of the underlying perspectives of educators. This would also help to inform research regarding the ethical concerns teachers may have surrounding technology integration, which is essential for the exploration of how these devices can be used sustainably, safely, and ethically. Future research could also focus on an exploration of the relationships between demographic factors, levels of experience, and prior knowledge related to technology use. Understanding how these variables influence teachers' readiness and attitudes could inform more targeted interventions and professional development programs, ensuring that educators are adequately prepared to incorporate assistive technologies in diverse classroom settings.

6. Conclusion

This study sought to contribute to the existing body of research by exploring the perspectives of Italian SEN teachers on technology integration within their inclusive attitudes. By focusing on teachers enrolled on the specialisation course for support activities, the findings offer insights for curriculum development for the effective, meaningful use of ATs in SEN settings.

The present study has highlighted the position of SEN teachers as the central figures in implementing ATs within the classroom. It is essential to provide SEN teachers with adequate support and knowledge for them to effectively carry out their important role in implementing inclusive practices (Chow et al., 2023) From a critical disability studies perspective, and to move towards a collaborative approach to the use of assistive technologies, it is important to focus not only on the student living with a disability but also on the teacher as the focal point of the classroom and champions of inclusive learning. This study is part of a wider research project that explores the measure of teacher emotion through electrodermal activity using wearable technology. The project conceptualises that emotionally regulated teachers contribute to emotionally safe classrooms, fostering coregulation with students. The present study serves as a foundational step toward using wearable devices to measure teacher emotion by first assessing teachers' readiness to use assistive technologies within the context of their inclusive dispositions.

Acknowledgements

This research was funded by "SiciliAn MicronanOTecH Research And Innovation CEnter "SAMOTHRACE" (MUR, PNRR-M4C2, ECS_00000022), spoke 3 - Università degli Studi di Palermo "S2-COMMs - Micro and Nanotechnologies for Smart & Sustainable Communities."

References

Adamy, P., & Boulmetis, J. (2006). The impact of modeling technology integration on pre-service teachers' technology confidence. *Journal of Computing in Higher Education*, *17*(2), 100–120. https://doi.org/10.1007/BF03032700

Aiello, P., & Pace, E. M. (2020). Inclusive Educational Principles, Policies, and Practices in Italy. In *Oxford Research Encyclopedia of Education*. https://doi.org/10.1093/acrefore/9780190264093.013.1282

Alieto, E., Abequibel-Encarnacion, B., Estigoy, E., Balasa, K., Eijansantos, A., & Torres-Toukoumidis, A. (2024). Teaching inside a digital classroom: A quantitative analysis of attitude, technological competence and access among teachers across subject disciplines. *Heliyon*, *10*(2), e24282. https://doi.org/10.1016/j.heliyon.2024.e24282

Anderson, S. E., & Putman, R. S. (2020). Special Education Teachers' Experience, Confidence, Beliefs, and Knowledge About Integrating Technology. *Journal of Special Education Technology*, *35*(1), 37–50. https://doi.org/10.1177/0162643419836409

Arcangeli, L., Bacherini, A., Gaggioli, C., Sannipoli, M., & Balboni, G. (2020). Attitudes of Mainstream and Special-Education Teachers toward Intellectual Disability in Italy: The Relevance of Being Teachers. *International Journal of Environmental Research and Public Health*, *17*(19), Article 19. https://doi.org/10.3390/ijerph17197325

Beardsley, M., Santos, P., Hernández-Leo, D., & Michos, K. (2019). Ethics in educational technology research: Informing participants on data sharing risks. *British Journal of Educational Technology*, *50*(3), 1019–1034. https://doi.org/10.1111/bjet.12781

Cascales Martínez, A., Martínez Segura, M. J., Pérez López, D., & Contero, M. (2016). *Using an Augmented Reality Enhanced Tabletop System to Promote Learning of Mathematics: A Case Study with Students with Special Educational Needs*. https://doi.org/10.12973/eurasia.2017.00621a

Chow, W. S. E., de Bruin, K., & Sharma, U. (2023). A scoping review of perceived support needs of teachers for implementing inclusive education. International Journal of Inclusive Education, 0(0), 1–20. https://doi.org/10.1080/13603116.2023.2244956

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Routledge. https://doi.org/10.4324/9780203771587

Cohen, J. (1992). A power primer. *Psychological Bulletin*, *112*(1), 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Ellis, J. B. (2008). *Special education teachers' perceptions of barriers to assistive technology integration in Ohio*. Library and Archives Canada = Bibliothèque et Archives Canada.

Encarnação, P., Leite, T., Nunes, C., Nunes da Ponte, M., Adams, K., Cook, A., Caiado, A., Pereira, J., Piedade, G., & Ribeiro, M. (2017). Using assistive robots to promote inclusive education. *Disability and Rehabilitation: Assistive Technology*, *12*(4), 352–372. https://doi.org/10.3109/17483107.2016.1167970

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect. *Journal of Research on Technology in Education*, *42*(3), 255–284. https://doi.org/10.1080/15391523.2010.10782551

Forlin, C., Earle, C., Loreman, T., & Sharma, U. (2011). The Sentiments, Attitudes, and Concerns about Inclusive Education Revised (SACIE-R) Scale for Measuring Pre-Service Teachers' Perceptions about Inclusion. *Exceptionality Education International*, *21*(3), Article 3. https://doi.org/10.5206/eei.v21i3.7682

Francisco, M. P. B., Hartman, M., & Wang, Y. (2020). Inclusion and Special Education. *Education Sciences*, *10*(9), Article 9. https://doi.org/10.3390/educsci10090238

Henderson, J., & Corry, M. (2021). Teacher anxiety and technology change: A review of the literature. *Technology, Pedagogy and Education*, *30*(4), 573–587. https://doi.org/10.1080/1475939X.2021.1931426

Hoogerwerf, E-J., Mavrou, K., Traina, I. (2021) The Role of Assistive Technology in Fostering Inclusive Education:Strategies and Tools to Support Change. Routledge Research in Special Educational Needs.

Howard, S. K. (2013). Risk-aversion: Understanding teachers' resistance to technology integration. *Technology, Pedagogy and Education*, *22*(3), 357–372. https://doi.org/10.1080/1475939X.2013.802995

Karagianni, E., & Drigas, A. (2023). New Technologies for Inclusive Learning for Students with Special Educational Needs. *International Journal of Online and Biomedical Engineering (iJOE)*, *19*, 4–21. https://doi.org/10.3991/ijoe.v19i05.36417

Kopcha, T. (2012). Teachers' perceptions of the barriers to technology integration and practices with technology under situated professional development. *Computers & Education*, *59*, 1109–1121. https://doi.org/10.1016/j.compedu.2012.05.014

La Marca, A., Gülbay, E., & Martino, V. D. (2018). Learning strategies, decision-making styles and conscious use of technologies in initial teacher education. *Form@re - Open Journal per la formazione in rete*, *18*(1), Article 1. https://doi.org/10.13128/formare-22617

Mankoff, J., Hayes, G. R., & Kasnitz, D. (2010). Disability studies as a source of critical inquiry for the field of assistive technology. *Proceedings of the 12th International ACM SIGACCESS Conference on Computers and Accessibility*, 3–10. https://doi.org/10.1145/1878803.1878807

Marsili, F., Morganti, A., & Signorelli, A. (2021). The Italian Leadership on Inclusive Education: Myth or Reality? *Science Insights Education Frontiers*, *9*(2), 1241–1263. https://doi.org/10.15354/sief.21.or048

Masterman, S. (2023). Educator Preparedness to Leverage Assistive Technologies in the Classroom. *Doctorate in Education*. https://digitalcommons.csp.edu/edd/44

Méndez, V. G., Suelves, D. M., Méndez, C. G., & Mas, J. A. R.-L. (2023). Future teachers facing the use of technology for inclusion: A view from the digital competence. *Education and Information Technologies*, *28*(8), 9305–9323. https://doi.org/10.1007/s10639-022-11105-5

Mishra, P., & Koehler, M.J. (2006). Technological Pedagogical Content Knowledge: A framework for integrating technology in teacher knowledge. Teachers College Record, 108(6), 1017–1054.

Mohamed, A. H. H. (2018). Attitudes of special education teachers towards using technology in inclusive classrooms: A mixed-methods study. *Journal of Research in Special Educational Needs*, *18*(4), 278–288. https://doi.org/10.1111/1471-3802.12411

Nordström, T., Nilsson, S., Gustafson, S., & Svensson, I. (2019). Assistive technology applications for students with reading difficulties: Special education teachers' experiences and perceptions. *Disability and Rehabilitation: Assistive Technology*, *14*(8), 798–808. https://doi.org/10.1080/17483107.2018.1499142

Nurdyansyah, N., Arifin, M. B. U. B., Astutik, I. R. I., & Rais, P. (2022). Online Inclusive School: A Technological Breakthrough in Inclusive Education During the Covid-19 Period. *Jurnal Kependidikan: Jurnal Hasil Penelitian Dan Kajian Kepustakaan Di Bidang Pendidikan, Pengajaran Dan Pembelajaran*, *8*(4), 806–816. https://doi.org/10.33394/jk.v8i4.5995

Palermo, E. H., Young, A. V., Deswert, S., Brown, A., Goldberg, M., Sultanik, E., Tan, J., Mazefsky, C. A., Brookman-Frazee, L., McPartland, J. C., Goodwin, M. S., Pennington, J., Marcus, S. C., Beidas, R. S., Mandell, D. S., & Nuske, H. J. (2023). A Digital Mental Health App Incorporating Wearable Biosensing for Teachers of Children on the Autism Spectrum to Support Emotion Regulation: Protocol for a Pilot Randomized Controlled Trial. *JMIR Research Protocols*, *12*. https://doi.org/10.2196/45852

Pérez, A. G. (2014). Characterization of Inclusive Practices in Schools with Education Technology. *Procedia - Social and Behavioral Sciences*, *132*, 357–363. https://doi.org/10.1016/j.sbspro.2014.04.322

Schmidt, D. A., Baran, E., Thompson, A. D., Mishra, P., Koehler, M. J., & Shin, T. S. (2009). Technological Pedagogical Content Knowledge (TPACK): The Development and Validation of an Assessment Instrument for Preservice Teachers. *Journal of Research on Technology in Education*, *42*(2).

Williams, R. M., & Gilbert, J. E. (2020). Perseverations of the academy: A survey of wearable technologies applied to autism intervention. *International Journal of Human-Computer Studies*, *143*, 102485. https://doi.org/10.1016/j.ijhcs.2020.102485

Yaskevich, D. (2021). Digital Technologies, as a Factor in the Search for a New Quality of Inclusive Education. *E3S Web of Conferences*, *258*, 07086. https://doi.org/10.1051/e3sconf/202125807086

Contact email: savannaholivia.mercer@unipa.it

Intercultural Competence in a Homogeneous and Monocultural Foreign Language Learning Group: Chances and Limits (A Case Study)

Alanoud Hamouri, Technical University of Berlin, Germany

The European Conference on Education 2024
Official Conference Proceedings

Abstract
The growing cultural diversity among language learners has led to an increased recognition of the importance of developing intercultural competence for both foreign language teachers and learners. This is particularly important when introducing foreign language learners to a new culture without underrating or underestimating their original one. Intercultural competence is generally considered a useful and necessary tool among multi- or intercultural learning or working groups. Yet, what is the opportunity to develop intercultural competence in the context of a monocultural learning group? German as a Foreign Language (GFL) is offered at three main universities in Jordan as a major subject and as a compulsory course for exchange year purposes. The teaching of GFL at these universities is based on commercial GFL textbooks, with a significant focus on content representing German culture. This content varies in many aspects of Jordanian culture, which raises the question of whether learning a new language through exposure to another culture necessarily implies the embrace or practice of intercultural competence. As part of the author's doctoral research on teaching GFL at Jordanian universities and dealing with what is considered taboo in Jordan due to its cultural and religious background, this article discusses the chances and limitations of improving intercultural competence when the target learning group is monocultural and homogeneous, based on the results of a case study of exchange students living in Germany, half of whom are Jordanian, and on Darla Deardorff's intercultural competence model.

Keywords: Monocultural Learning Group, Intercultural Education, Exchange Students, Darla Deardorff, Intercultural Competence Model

iafor
The International Academic Forum
www.iafor.org

Introduction

Wissenschaft Weltoffen's statistics for the year 2023 show that until winter semester 22/23, Germany has a total of 367.578 international students coming from all over the world to continue their studies and research as well (DAAD & DZHW, 2023). Considering the increasing numbers of international incoming students, it is reasonable and essential to focus on improving intercultural competence among these students so they can communicate and understand one another despite cultural and background differences. Yet gaining and improving intercultural competence is not as simple as talking about or discussing it, specifically for those students coming from a totally different culture and staying for a short period of time abroad to complete their study requirements.

The importance of intercultural competence caused many researchers to develop various models to view and clarify the structure of intercultural competence and how the process of being interculturally competent starts in the first place by understanding oneself and one's own culture. Therefore, this article discusses the possibilities and limitations of gaining and/or improving intercultural competence among exchange students who are staying for one to two semesters in Germany, focusing on students who originally studied GFL in their own country in a monocultural learning group and comparing their experiences with those of other students who studied in a multicultural learning group in Germany, considering German lectures as the main medium for cultural content. Before looking at the main aspects of research in relation to intercultural competence, it is important to understand when something can be described as intercultural and what competence is.

Intercultural Competence

The reply "it is culture" is commonly used to address or justify something that has been done in a certain way, such as the way people dress, eat, act or behave, yet culture is not limited to these things. It can go beyond them to the way people form their ideologies or control their actions. Kashima (2019) defines **culture**: "a set of information that is (a) socially transmissible; (b) potentially capable of influencing psychological processes (e.g., thought, emotions, motivations, and behavior) and, in this sense, is humanly meaningful; and (c) shared to some extent within a group of people." (Kashima, 2019, p. 124). To categorize something as a cultural thing that means it has been transmitted or inherited and not affected by recent or rapid changes in ideas or inventions, like using technology, although it is not definite that by next generations these ideas will not be considered as part of traditional culture, therefore Kashima believes that culture is a timeless information (cf. Kashima, 2019, p. 125).

However, Naik et al. (2023) simplifies the definition of culture and assure that culture form and structure the way "people think, feel, wish, value, and how they behave" in a certain setting, specifically the region, where people share traditions, social norms and beliefs (cf. Naik et al., 2023, "What is Culture?" section). Another term close to culture is *Society*, Kashima believes that new ideas or current commonly used technology (cf. previous para.) together with inherited culture form a society, where culture is part of it but not the same (cf. Kashima, 2019, p. 125). That is also seen by Naik et al. and they emphasize that culture gathers foundational elements of society, among others "language, education, religion, government, and the identity and personality of the people who are part of that culture." (cf. Naik et al., 2023, "What is Culture?" section).

Understanding the term *Culture* is a guide to understand and differentiate between the following terms: Monocultural, multicultural, intercultural as well as transcultural, also when to describe a group of people (e.g. working or learning group) with these characteristics. The following figure shows that all these terms are connected to each other in a way or another:

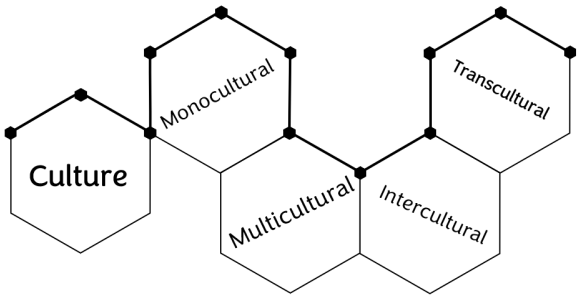


Figure 1: Culture and CO.

A **monocultural** group is a group of people who are **homogenous** by sharing the same culture and the contrast between these people, is barely visible and does not signify an obvious difference. When two or more monocultural groups gather in one place (e.g. society or institute) but they are neither connected nor interfering together and it is easy to spot the difference between them, in this case this will be referred as a **multicultural** group. When more than one monocultural groups get to know each other, begin to interact, exchange views, show understanding for the differences and learn about one another, in this case it is called **intercultural** group; coming to **transcultural** group, when people not only get to know each other but also learn and adapt from the other cultures and form a cultural blend, without completely switching their own culture (cf. Kultur Konfetti, 2016; Schriefer, 2016).

Intercultural competence as a target to achieve, one should work on both, understanding own and others' cultures as well as working on the skill to deal, act and interact with cultural differences, this being confirmed in the recommendations of the council of the European Union (2018) on key competences for life-long learning by defining **competence** as "a combination of knowledge, skills and attitudes" these to be considered as competence pillars, which basically are:

- **Knowledge**: Anything that helps with understating something, including facts, figures, concepts, ideas and theories.
- **Skills**: ability and capacity to handle something (e.g. cultural situation) along with using foreknowledge to achieve the required aim (here to manage a cultural situation).
- **Attitudes**: Mindset and disposition to respond to thoughts, people or situations (The Council of the European Union, 2018).

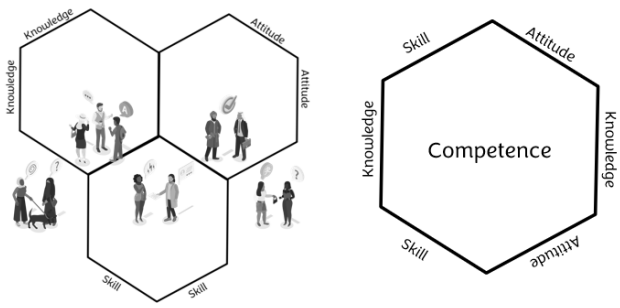


Figure 2: What Is a Competence.

Stemming from both definitions, intercultural group and competence, and according to the official page for Council of Europe intercultural competence can be defined as: “the ability to understand and respect each other across all types of cultural barriers.” (cf. Council of Europe, 2023, para. 1).

Intercultural Competence Models

The first intercultural competence model started back in the 80’s by Milton Bennett (Bennett, 1986, p.182) and followed by many researchers developing various models to cover intercultural competence in different occasions, among others is the intercultural competence model by Darla Deardorff, which was developed between 2004 and 2009, which emphasizes the role of educating oneself, self-awareness and attitude control to be able to manage cultural situation and be interculturally competent. Figure 3 shows Deardorff’s Pyramid Model of intercultural competence for the year 2004 (cf. Deardorff, 2006, p. 254):

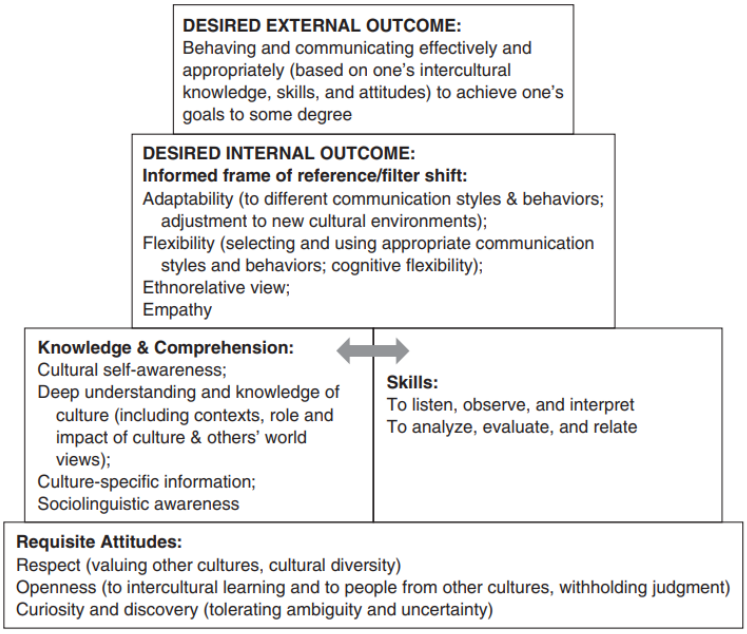


Figure 3: Darla Deardorff's Intercultural Competence Model (2004).

Looking into the base of this pyramid, it depends on the first place on established attitude and the behaviour of the person regarding being respectful, have the motivation to know about others and showing respect. Which means, if the person cannot behave well and not accepting the idea of the existence of the differences, it will be quite challenging to develop other skills, like listening and interpreting, which comes parallel with building knowledge about why something is culturally being done in a certain way, most importantly to understand one’s own culture first then reflect or compare it to other cultures to understand, where similarities and differences to be found and how to deal with it (cf. Deardorff, 2006, p. 247).

On the top of the pyramid is the “desired external outcome” which represents what the people see as a result of processing both, working on building cultural competence and reaching the internal outcome, by knowing what to proceed when facing cultural differences; achieving the top, shows that the person can behave and communicate with others from different cultures in tolerating and welcoming way (cf. Figure 3).

Being Interculturally Competent in a Monocultural Leaning Group

When it comes to intercultural context and interactions, monocultural and monolingual learning groups are usually neglected despite their role in understanding (inter)cultural context (cf. Colvin et al., 2015, p. 430); and to understand how monocultural and monolingual students enhance their intercultural understandings and interactions Colvin et al. (2015) examined a university-level learning group based on Bourdieu's social field theory[1]. Their study highlighted that other than the personality of the students and their openness to other cultures, there were coexisting, interdependent, and frequently conflicting structural and contextual components, which play a role to co-shape intercultural encounters among monocultural and monolingual local students by involving these students in learning activities, where they act and reflect on intercultural activities (cf. Colvin et al., 2015, p. 414; 418). This has revealed to students their actual position to other cultures and their limited and framed opportunities in understanding others as well as their actual role -if any- in (inter)cultural events and context (cf. Colvin et al., 2015, p. 430).

Taking Poland as an example of a homogenous culture, Górak-Sosnowska & Markowska-Manista (2022a) proved that regardless of the quantity and intensity of the intercultural learning content, the absence of a real experience and direct contact with the other cultures is a major obstacle for polish school students (Górak-Sosnowska & Markowska-Manista, 2022a, p. 7). Globalisation affected and limited intercultural education by a group of people[2], who are not directly in the field or not taking individual cases into consideration and only wants to force and provide intercultural education in a certain form, regardless of the suitability and possibility to include intercultural education content and activities in correspondence with national and regional values of a specific country: "The problematic nature of the term, the unclear scope and the relationship with its constituent or related terms form a challenging climate in which we can undertake measured, systematised and comprehensive activities." (Górak-Sosnowska & Markowska-Manista, 2022a, p. 9).

The evaluation of this intercultural educational content can differ based on how to view it, and according to Górak-Sosnowska & Markowska-Manista, when the community sees this intercultural content a chance to develop and cooperate internationally and catch the globalization, locally this intercultural content considered as a method to change on a social and individual basis (Górak-Sosnowska & Markowska-Manista, 2022a, p. 10). And this shows the gap between the target behind imposing intercultural education and the actual need of the learning group; having intercultural educational content among monocultural learning group only as an input will not bring much to the individual, especially when they cannot use or practice it.

Emphasizing intercultural education at schools in Poland was one of the results that Poland joined the EU in 2004 and started to employee EU standard to their policies, and despite the importance of including international education Górak-Sosnowska & Markowska-Manista

[1] Bourdieu's social field theory: Bourdieu's social field theory provides an analytic framework that understands social phenomena in terms of three interconnected concepts: field, habitus and capital. Bourdieu conceptualizes social activity as practice that occurs between actors in social spaces called fields. According to Bourdieu, fields are autonomous spaces that have rules and roles that inform social behaviour and distinguish them from other fields: in Bourdieu's words, they have their own 'logic' (Bourdieu 1992). In order to succeed within a field, an agent needs to understand the rules that govern social behaviour within it (cf. Colvin et al., 2015, p.416).
[2] Politicians, NGOs activities, practitioners and educators. (Górak-Sosnowska & Markowska-Manista, 2022a, p. 9)

(2022b) still argue that intercultural topics or teaching content is mostly a theoretical material and not related to dirct intercultural contact in Poland, specially that the school teachers themselves barely have the chance to share an personal intercultural experience with their students and mostly they are considered as narrators and prepared cultural content mediator (Górak-Sosnowska & Markowska-Manista, 2022b, p. 139). Compared to many countries in the EU, one of the factors found to influence the situation in Poland's monocultural schools, along with the fact that national minorities are very few in Poland, Poland does not host as many refugees or immigrants as other EU countries, which does not allow the intercultural content taught to monocultural leaning group to be used in everyday situation (Górak-Sosnowska & Markowska-Manista, 2022b, p. 144); which by default decreases the chances of gaining or improving intercultural competence.

The case of Poland can be generally applied to another country, like Jordan, where most lectures and classrooms have monocultural and monolingual learning groups. But when taking the German Jordanian University as an example, there is a chance to meet Germans, European or international German language lecturers, which opens a window to have a direct contact with someone from a different culture, but does learning a foreign language by a foreign teacher help improving intercultural competence?

Intercultural Competence in a Foreign Language Lecture

Vogt (2016) discusses the challenges to promote intercultural competence and argues, that intercultural competence is often neglected in foreign language teaching because it is seen as more difficult and less tangible to measure than other language skills (cf. Vogt, 2016, p. 77). Vogt points out that when assessing performance, the more easily measurable language skills are often given priority, while intercultural aspects are relegated to the background. As a result, intercultural competence is not adequately addressed in the classroom as teachers tend to focus on the content of the exam, which usually does not include intercultural elements (ibid.).

Despite having intercultural competence as an output, the absence of guidelines and clear assessment methods for testing intercultural competence makes practical implementation in the classroom difficult as well as intercultural competence as an outcome is hard to determine (cf. Vogt, 2016, p. 78).

Teacher's Background

Since learning and teaching a foreign language does not depend on the textbook, the language teacher has a major role in delivering (inter)cultural content. However, the awareness of the cultural topic, the way chosen to deliver it, and the background of the teacher are all essential to how students will perceive and deal with intercultural education. Morrier et al. (2007) highlight that when delivering a multicultural content, there is a need to pay attention to the cultural background and attitude of the teacher, because whether the teacher notices it or not, students are able to determine if a teacher is capable of delivering a cultural discussion or prefers to avoid what does not go along with his or her own culture (cf. Morrier et al., 2007, p. 33).

This view is supported by Yan (2021) who confirms that facilitating students' intercultural awareness is achieved by the ability of the language teachers to allow and steer cultural conversations and interaction between both the students' culture and the foreign one (cf. Yan,

2021, p. 394). Yan also mentioned that some teachers reflected their intercultural knowledge and pointed out that they struggle with some (inter)cultural topics, which restrict them from delivering intercultural content, and by time instead of finding a way to mention it, they found a way to avoid "complex intercultural phenomena" (ibid.).

Starting from the belief that language teachers should not be "Self-centred", aside from showing empathy while teaching, Yan emphasizes the necessity for teachers to integrate intercultural knowledge and skills into their teaching practices to effectively prepare students for engaging with diverse cultures (cf. Yan, 2021, p. 395).

To bring the last two points together, a recent study by Oberste-Berghaus (2024) enhances and highlights the importance of professional development for language teachers to help to improve intercultural competence in a foreign language lecture, taking German as a foreign language as an example. The study of Oberste-Berghaus suggests educators teaching German as a Foreign Language (GFL) to help to develop intercultural competence:

Among these suggestions is that educators should prioritize the development of intercultural competence as a core objective in their teaching. In addition to that, teachers should incorporate effective teaching strategies that help with better intercultural understanding. Reflecting and addressing challenges while teaching (inter)cultural content as well as collaborating with other educators to share and learn their followed strategies to improve intercultural competence while teaching the culture of the foreign language, mainly in a GFL-lectures (cf. Oberste-Berghaus, 2024, p. 3–12), means educators should adopt a comprehensive approach to language teaching that integrates cultural awareness and sensitivity, preparing students to engage in a globalized world.

Intercultural Competence in Higher Education

Intercultural communication competence plays a key role in shaping the international student experience, influencing their social integration, academic success, cultural adjustment, career readiness and personal development; this being discussed by Xiaoyan et al. (2024) how international students in higher education need to develop their intercultural competence; because students tend to experience intercultural situations mostly after they have enrolled in higher education and become involved in its international programs or joining exchange opportunities (cf. Janeiro et al., 2014, p.15). The detailed systematic literature review of intercultural competence by Xiaoyan et al. (2024) - with a main focus on communication - showed that intercultural communication competence (ICC) influences the experiences of international students in higher education by fostering cultural understanding and promoting personal growth as well as confidence. Students with well-established ICC can navigate diverse social interactions, engage effectively in academic settings, appreciate cultural differences, and develop essential skills for future careers, all of which contribute to a more positive and enriching educational experience (cf. Xiaoyan et al., 2024).

Method

To reach the objective of the research and answer its main question, an online questionnaire was designed, including a scale, multiple-choice, and open questions. This questionnaire was shared during the spring semester for the academic year 2023/2024 with 26 exchange students who stayed one semester or one year in Germany. These students were divided into two groups: the **first group** are students mainly from Jordan and Palestine, who are/were

enrolled at the German Jordanian University (GJU) and spent one year in Germany at different German universities to complete their study requirements; This group is considered a homogenous group, on the other hand, the heterogeneous group are students from different Asian, EU and non-EU countries, representing the **second group**, who chose to spend their exchange semester/year in Germany at the Applied University of Potsdam (FHP).

By answering 13 questions, students provided information about:

- Country of origin and Place of learning GFL
- Own experience with intercultural competence
- Mind-set and cultural perspectives before and after living in Germany
- Being introduced to a new culture through learning a foreign language
- Last GFL-Learning group and teacher's background as well as his/her attitude while teaching cultural content
- Recent cultural-conflict situations (Optional)

The data collected from the students are analysed to summarize the limitations and opportunities to gain, practice and improve intercultural competence. This based on students who learned in a monocultural group (Group 1), and to compare it with the experience of students of the second group (Group 2), which is a multicultural learning group. This determines if both groups have similar or different experiences regarding improving their intercultural competence.

Results

Students who took part in the questionnaire come from the following countries: Jordan, Palestine, China, France, South Korea, Taiwan, Ukraine, the USA and Vietnam; all of them studied GFL at the university, except one, who learned the language in a language centre.

A simple definition of intercultural competence was given to the participant, and they were asked if they believe they generally have this competence or have even improved it; The following pie chart (Figure 4) shows that all participants believe they are interculturally competent, but the only difference was how being in Germany affected their competence. While more than half of the students believe being in Germany makes them more (inter)culturally competent, the second-highest percentage shows that being interculturally competent depends on how sensitive the situation is, which might prevent them from practicing this competence, despite claiming to have it.

Figure 4: Having Intercultural Competence.

The exchange students shared factors, which helped them to gain and improve their intercultural competence, also shared the possibilities why someone might lack having this competence. Reasons are listed as follows:

Factors Behind Gaining and Improving IC Among Exchange Students

- Family and friends: being open to other cultures and allowing cultural conversations.
- The early and constant exposure to intercultural content through education, documentaries, and other possible media sharing cultural content.
- Travelling: either for tourism or educational purposes.
- more contact with locals: locals can explain and help understand how and why things are the way they are.

Factors Behind Lacking IC Among Exchange Students

- Language: not being able to fully speak or understand the language.
- Contacting mainly with people from one's own or similar culture.
- Practising different religion and following different society norms.
- When the new culture does not meet one's own values and cultural background makes it hard to tolerate cultural differences.

Exchange students were asked to rate some statements addressing some aspects that might be affected by their stay abroad. The Following Table shows students ratings of these statements, where **1** means that the statement does not apply to the student and **5** highly matches the student's situation:

Statement	1	2	3	4	5
I believed I am open to the new culture, despite the differences.	1	0	5	10	10
I was sure I can manage and handle all/most of cultural differences without problems.	0	3	5	12	6
I was afraid from the cultural and/or religious differences I might face.	2	15	3	4	2
Being in a monocultural studying group, did not help me improve my intercultural skills – because at that time we did not get the chance to be exposed to real different cultural situations.	4	4	7	7	4
I had neither worries nor negative expectations about living in Germany.	4	1	11	4	2

Table 1: Before Studying Abroad.

The second Table shows students ratings of similar statements, but addressing aspects after studying abroad:

Statement	1	2	3	4	5
I notice how much I am connected to my own culture and kept criticizing the culture and common social habits in Germany.	2	4	9	7	4
I started to practice and showing my own culture/religion more than I did in my country.	0	8	5	6	7
I became sure, that I am not able to deal with cultural differences.	2	15	3	4	2
I did not face any cultural situations that made me uncomfortable.	4	4	7	7	4
I changed my perspectives and my way to deal with things and became more open to others.	10	10	2	4	0
Being in a heterogeneous culture enhanced/improved my intercultural skills and I can accept that people are not meant to be the same.	5	4	11	3	3

Table 2: After Studying Abroad.

Despite teacher's background, language teachers' role is essential when sharing cultural content. For some students it might be much comforting when they discuss this cultural content based on their cultural or religious background without having to explain a lot or have a fear of being misunderstood. The following pie chart (Figure 5) shows what background similarities exchange students shared with their language teacher. Yet, more than 50% had at least one thing in common with their teacher.

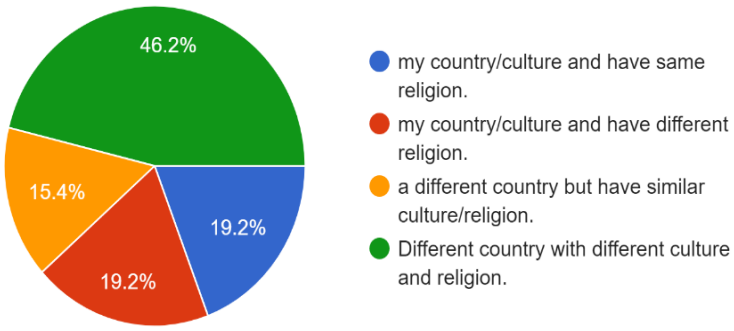


Figure 5: Language Teacher Background.

Being in a multicultural and heterogenous learning group enhances the chance to gain and improve intercultural competence, therefore, exchange students were asked if their colleagues in the last learning group have similar backgrounds. Figure 6 shows that more than half of the students were coming from the same country or culture.

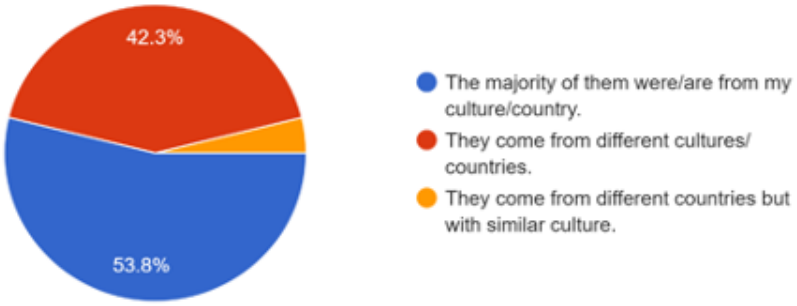


Figure 6: Learning Group Background.

Except for one participant, students reported that their language teacher either showed understanding of their concerns regarding cultural differences or was culturally prepared to introduce the other (foreign) culture without underestimating their own culture.

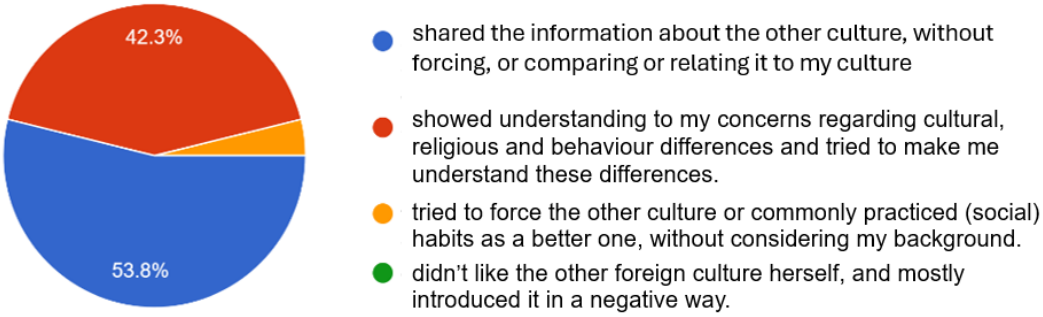


Figure 7: Cultural Awareness and Attitude of the Language Teacher.

Exchange students chose what describes their feeling about the culture or commonly practiced (social) habits in Germany when they knew about it in German language lecture:

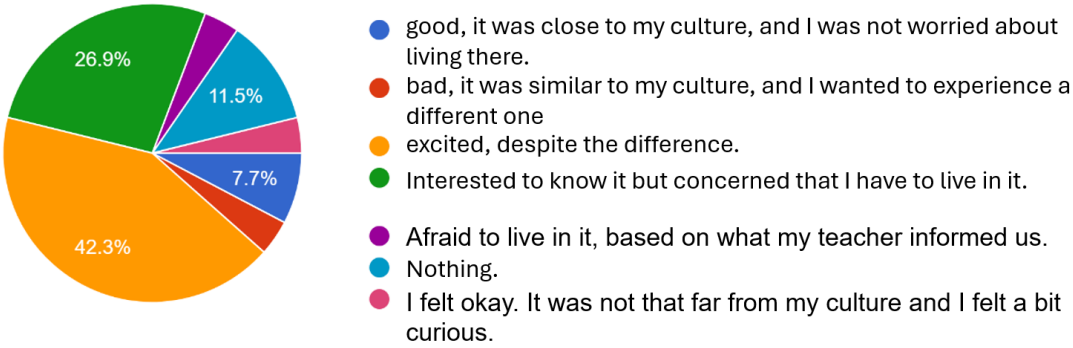


Figure 8: Thoughts on Being in a Different Culture.

Based on that, exchange students were asked to share the social habits and cultural differences that they experienced during their stay in Germany and could not deal with or understand. Despite the fact that they knew about some of these habits in the language course. Their responses are summarized as follows:

Habits and Differences Related to Social Life

- Socializing barriers and making friends are conditional: it was not easy to socialize with people, unless within a context, like work or a university project, to be able to make a new contact or friend.
- Direct to what you want: Asking "How are you" is not as easy as it sounds before making a request or explaining your need to the other person.
- Not knowing is not an excuse: people in Germany usually do not consider that foreigners (here exchange students) are not aware of the German context and might get offended if someone said or reacted in an unaccepted way.
- Rules come first, and showing warmth is rare: Compared to exchange students' countries, people in Germany act mostly in a practical way with fewer emotions.

Habits and Differences Related to Language and Communication

- Language barriers: learning GFL at the university was not sufficient to have a conversation with people speaking German.
- Communication barriers: due to language and socializing barriers, communication with others speaking German is difficult and leads to misunderstandings.
- Being direct: unlike the situation of most exchange students, in Germany people tend to communicate in a clear and straightforward way.
- Deeper conversations are not offered to international students, but only among foreigners themselves: people in the German culture usually avoid a full conversation and prefer to keep things on "a surface level".
- People being selective: in some cases, exchange students faced people who treat foreigners differently based on their nationality or cultural background.

Habits and Differences Related to Norms and Culture

- Life in Germany offers different social norms and behaviours, other than what an exchange student is used to, in their home country.
- Teamwork is a Must: to work individually at school/university is not the first option.
- "Taboos" are not taboos: compared to exchange students' background, what they consider taboo might turn to be a normal practice.
- Other's opinions are not a decision maker: it is noticeable that people in Germany do not give much attention to what others might say or think about them, and act only according to their needs and desires (mentioned as a positive statement).
- Food/Drink culture: carbonated water and alcoholic drinks are culture.

Habits and Differences Related to Society, Policies, and Individuals

- Communicating with strangers: In Germany one is more exposed to deal or talk with strangers, like in a restaurant or on a train, unlike some countries, where strangers initiating a conversation not usual and probably a sign of danger.
- Shops rest days and closing time: in Germany shops, malls, and café close early in the evening or even do not open in the weekend or mid of the week.
- Available Food and social activities as barriers: Going to pub with friends can be a common social activity and buying food without asking about the ingredients (except for allergies and vegans). Yet, if a student did not grow in a community where pubs are like

other places, and need to cover food restrictions, being in a different society takes time to find who and what is suitable for you.

- Appointment-Culture: in many cultures to show up by a doctor or go to any governmental department does not require having an appointment, unlike in Germany, having an appointment is a must, but finding a near date is quite hard.
- Smoking (incl. Weed): In some cultures, smoking in front of others considered impolite and a bad habit, also smoking weed is prohibited and a sign to avoid the person smoking it, for some international students it is noticeable that smokers are careless in general and ignore others health.
- People identifying themselves differently: in Germany it is a real matter to address people the way they like, yet it is hard for some exchange students, because they do not have this among their societies.

Conclusion

The main goal of the current study was to determine if being exposed to a new culture in form of cultural content in a foreign language lecture under monocultural learning group will increase the opportunity of being interculturally competent or not. Taking into account teacher's background and the nature of the learning group. The study results were based on exchange students' experience, who stayed for one semester or one year abroad to fulfil their study requirements. The following are significant findings to emerge from this study:

- Communicating about, reflecting to and understanding the background are the key to be interculturally competent.
- One semester or year in a multicultural environment is not enough compared to 20+ years in one's own culture.
- Accepting that there is a cultural difference, is different from accepting the other culture.
- Teachers are not the only mediators for cultural content, but teachers who have cultural awareness ease (inter)cultural discussions.
- In some situations, claiming to be interculturally competent does not exceed a temporary conversation.
- For some, to tolerate a cultural difference, it should provide an added value and not make the situation harder for the person, when they should go with it.
- It is not a surprise that learning in a monocultural group does not bring much to improve intercultural competence, yet, learning in a monocultural group that can discuss cultural differences might provide skill improvements and a chance to understand one's own culture.

In the method it was mentioned that exchange students were divided into two groups to compare the similarities and differences due to different origins and the homogeneity and heterogeneity of the learning group, yet it is concluded that all exchange students coming from Jordan and other Asian countries share similar cultural traits and habits, unlike the students coming from France and the USA, who have a closer culture to Germany, which means that living in a country that shares a similar culture to one's own culture is also a limitation not to improve intercultural competence.

Based on exchange students' experience: the media, (not) having locals as friend or reference, language proficiency level and one's own Background are core factors to or not to have and improve intercultural competence. To be raised in a homogenous society and culture, as well as learning in a monocultural group both reduce the chance to improve

intercultural understanding and competence. Not to forget the absence of direct contact with other cultures in any mean or/and unconsciously following one's surrounded culture without understanding it in the first place, all will hinder the process of gaining intercultural competence.

The absence of (inter)cultural awareness by a teacher, among family members or in the surrounding environment, and the contact with other cultures does not exceed theoretical facts, this decreases the chances of having or improving the required intercultural competence. On an **individual** level, instead of being only a cultural input receiver, one should have a direct contact with cultural differences to develop and enhance the skills and attitude to deal with these differences. On the **teaching** level, if the teacher was not able to create or manage a(n) (inter)cultural conversation in a language class, then this class is language-based and will not help achieve intercultural outcomes.

Intercultural competence and awareness might fade when students are in a monocultural learning group, and instead of being able to tolerate or respect cultural differences, students will ignore the importance of dealing with these differences and will not consider it, because these students are already surrounded with people sharing similar background, and this is another reason where students not only do not consider cultural differences but also will not be able to understand and reflect their own culture.

References

Bennett, M. J. (1986). A developmental approach to training for intercultural sensitivity. International journal of intercultural relations, 10(2), 179-196.

Colvin, C., Fozdar, F., & Volet, S. (2015). Intercultural interactions of mono-cultural, mono-lingual local students in small group learning activities: A Bourdieusian analysis. *British Journal of Sociology of Education*, *36*(3), 414-433.

Council of Europe (2023). *Building intercultural competence*. Intercultural Cities Programme. https://www.coe.int/en/web/interculturalcities/intercultural-competence. Last visited 10.08.2024

The Council of the European Union. (2018). COUNCIL RECOMMENDATION, the Council, The Council of the European Union: On key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01). *OfficiL Journal of the European Union* https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)

DAAD, & DZHW (Eds.). (2023, September 28). *Wissenschaft weltoffen 2023*. doi:10.3278/7004002vw

Deardorff, D. K. (2006). Identification and assessment of intercultural competence as a student outcome of internationalization. *Journal of studies in international education*, *10*(3), 241-266. https://doi.org/10.1177/1028315306287002

EU Science Hub (n.d.). *Defining 'Skill' and 'Competence.'*. https://joint-research-centre.ec.europa.eu/scientific-activities-z/skills-and-competences/defining-skill-and-competence_en. Last visited: 09.08.2024

Górak-Sosnowska, K., & Markowska-Manista, U. (2022a). Intercultural education in a monocultural context: global and local dimensions of sensitive topics. *Society Register*, *6*(1), 7-18. https://doi.org/10.14746/sr.2022.6.1.01

Górak-Sosnowska, K., & Markowska-Manista, U. (2022b). Living up to the intercultural education in a monocultural school. The case of Poland. *Edukacja Międzykulturowa*, *19*(4), 139-152. https://doi.org/10.15804/em.2022.04.09

Janeiro, M. G. F., Fabre, R. L., & de la Parra, J. P. N. (2014). Building intercultural competence through intercultural competency certification of undergraduate students. *Journal of International Education Research*, *10*(1), 15.

Kashima, Y. (2019). "What is culture for?" in The handbook of culture and psychology, eds. D. Matsumoto, and H. C. Hwang (New York, NY: Oxford University Press). p. 123–160. https://doi.org/10.1093/oso/9780190679743.003.0005

Kultur Konfetti. (2016, June 29). *Kultur Konfetti - Kulturbegriffe leicht erklärt* [Video]. YouTube. https://youtu.be/uGliHeQuWsI?feature=shared

Morrier, M. J., Irving, M. A., Dandy, E., Dmitriyev, G., und Ukeje, I. C. (2007). Teaching and learning within and across cultures: educator requirements across the United States. In Multicultural Education, 14(3), S. 32–40.

Naik, A. R., Baker, S., & Mohiyeddini, C. (2023). What is culture. *Neuroscience and Psychology*, *11*, 1-8. DOI:10.3389/frym.2023.1150335

Oberste-Berghaus, N. (2024). The Role of Teaching Foreign Languages in Developing Intercultural Competence. *Revista Romaneasca pentru Educatie Multidimensionala*, *16*(1), 01-15. https://doi.org/10.18662/rrem/16.1/808

Schriefer, P. (2016). *What's the difference between multicultural, intercultural, and cross-cultural communication?* Spring Institute. https://springinstitute.org/whats-difference-multicultural-intercultural-cross-cultural-communication/. Last visited: 09.08.2024

Vogt, K. (2016). Die Beurteilung interkultureller Kompetenz im Fremdsprachenunterricht oder: Testing the Untestable. *Zeitschrift für Fremdsprachenforschung*, *27*(1), 77-98.

Xiaoyan, W., Zainudin, S. S. S., & Yaakup, H. S. (2024). Intercultural Communication Competence Among Higher Education International Students: A Systematic Literature Review. *Migration Letters*, *21*(4), 712–725. https://doi.org/10.59670/ml.v21i4.7683

Yan, Y. (2021). The Role of Teachers in Intercultural Language Teaching. *Journal of Higher Education Research*, *2*(6), 394-395.

Contact email: alanoud.hamouri@outlook.at

Interactive Digital Design Skill Set: Crafting Executive Education Curriculum for the 21st Century

Bruno Nobre, IADE - Universidade Europeia, Portugal
Emília Duarte, UNIDCOM/IADE - Universidade Europeia, Portugal

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Portugal's education system offers a variety of non-degree programs essential for career advancement where Executive Education encompasses a critical role. Within this context, advancements have been made in recent years, both in the Executive Education field, as in the Interactive Digital Design education field. Nonetheless, ongoing challenges are still widely identified, from competition, technology advancements, institutional and societal changes, and efficient cooperation between Creative Industry and Academia. Based on an ongoing research aiming to establish a dynamic skill set framework in the Interactive Digital Design field for Executive Education postgraduate courses, this study applies a Delphi method to gather expert contributions on the evolution of Interactive Digital Design field, the professional profile and the essential skills needed for this area. With this method is intended to seek consensus over a set of 68 questions summarized from a first round stage, where valuable insights from main stakeholders were gathered –both from academia, the creative industry and students – revealing past and present trends on Interactive Digital Design, the evolution of required and expected skills, challenges, and opportunities in the field. The findings revealed a strong consensus over the presented topics among the participants with a high level of agreement, given way to the definition of a skill set to meet current and future professional needs and thereby guiding executive education's management in this field. The establishment of a skill set that may support postgraduate courses curricula design on an ever-shifting societal and technological landscape, aiming to better prepare professionals for the Interactive Digital Design sector, may represent an asset of great relevance in curricula governance and design. The attained knowledge is expected to support as a valuable resource for higher education institutions seeking to refine their educational offerings in response to evolving industry demands, societal changes, and technological advancements, thereby advising the strategic outlining, and guiding the design of future curricula.

Keywords: Executive Education, Design Teaching, Interactive Digital Design, Curricula Design, Delphi Method

iafor
The International Academic Forum
www.iafor.org

Introduction

As societies embrace digital transformation, the demand for skilled designers in the field of digital product design becomes increasingly urgent. Globalization further accelerates the adoption of trends, techniques, and emerging technologies, necessitating continuous skill updates across various domains. These dynamics significantly impact education, especially in interdisciplinary fields like Web Design, Interaction Design, or Digital Design. We observe now a recent proliferation of diverse learning modalities that blend formal, non-formal, and informal approaches across various contexts and formats. Executive Education (EE) courses exemplify this trend, evolving over time but facing persistent challenges. Intensified competition, rapid technological shifts, and institutional changes underscore the need for a holistic understanding of the ever-evolving landscape. Moreover, the Covid-19 pandemic has compelled a rapid shift to online learning, prompting the exploration of innovative ways to deliver program content and engage learners in virtual environments (Sawhney, 2021).

EE is widely acknowledged as a solution to the challenges posed by globalization and rapid shifts in science, technology, society, and closely linked to a Lifelong Learning approach, empowering individuals to acquire new skills and unlock their full potential (Demirel, 2009; Fulmer & Gibbs, 1998; Kaplan, 2016; Laal, 2011; Power & Maclean, 2013).

This approach has significant potential as a strategic tool for nurturing technical and leadership skills. It can serve as a catalyst for reshaping team dynamics by aligning fresh perspectives and strategies. Ultimately, it becomes a driving force for change, promoting innovative positions and organizational structures, playing a crucial role in bridging gaps and facilitating knowledge exchange between academic institutions, businesses, and society (Bolt, 1993; Conger & Benjamin, 1999; Gera, 2012; Ready, 1995).

Over the past few decades, there has been a gradual paradigm shift in EE teaching, reflecting an evolutionary trend. Presently, innovative programs prioritize student learning and foster closer ties with companies. This contrasts with the dominant trend until the 1980s, characterized by highly specific, specialized, and academically centered programs. Factors contributing to this shift include heightened sector competitiveness, rapid technological advancements, and institutional mergers driven by cost-cutting policies, and a growing tendency to establish partnerships with companies (Conger & Xin, 2000).

Within this context, Higher Education (HE) continues to grapple with significant challenges in establishing effective collaboration between academia and business. Universities have persistently sought to integrate industry and business into their EE programs through various initiatives. However, these efforts are often deemed incomplete or inefficient, lacking a cohesive strategic perspective or vision, with a noticeable gap in skill development, encompassing both skill acquisition and skill transfer. These skills serve as the essential value drivers in EE for both companies and executives (Clark, 1998a, 1998b, 2001; Djoundourian & Shahin, 2022; Moldoveanu & Narayandas, 2020).

In this regard, when designing an EE program, it is recommended that certain aspects of that program design consider inputs from multiple stakeholders. These stakeholders may include external company executives as well as university faculty. While achieving alignment among multiple stakeholders can be intricate, it has been demonstrated as crucial for purpose-driven, customized executive education, meeting individual needs rather than a one-size-fits-all approach. These changes have been made in response to the new realities of education and

the desire to provide tailored learning experiences (Boon et al., 2023; Conger & Benjamin, 1999; Conger & Xin, 2000; McCarthy et al., 2016; Myrsiades, 2001; Stopper, 1998; Vicere, 1998).

Also, it has been widely recognized the significant challenges in developing curricula in the field of Design education due to technical, technological, economic, and societal changes, as well as the rapid evolution of the industry, particularly addressing Interaction Design education, as stated by Meyer and Norman (2020), and pointed out in literature over the years (Culén et al., 2014; Faiola & Matei, 2010; Foley et al., 2005; Grudin & Salvendy, 2008; Heyer, 2013; Jill Anderson, 2022; Myers, 1994, 1996; Twining et al., 2021).

From another perspective, it is also highlighted that business organizations face significant challenges related to design skills within their structures, specifically at the C-level positions. These challenges encompass the requisite social skills for design management and leadership, as well as the underlying processes and methodologies inherent to design. Given the ongoing movement to elevate the designer's role in organizations and companies, new designations and skills have emerged, aligning with the evolving functions expected of today's designers, as these demands necessitate continuous adaptation and skill updates (Cruz, 2022; Groysberg et al., 2011; Sadun et al., 2022).

Within this context, this study arises as part of a broader research that aims to achieve a better understanding of design education in EE in the field of Interactive Digital Design, framed within a 10-year case study at IADE - *Faculdade de Design, Tecnologia e Comunicação da Universidade Europeia* in Portugal. Over the last decade, IADE executive education programs have consistently provided specialized training in Interactive Digital Design, attracting a diverse group of students, including active professionals from diverse sectors and fields, allowing to be in a privileged position in assessing the contextual and societal factors that have influenced EE in recent years.

As a result, it was identified that there was not substantial research addressing the specifics of this area and field, motivating the pursuit of a deeper investigation on the subject and aiming to deliver a skill set framework that may held a potential value for a wider audience, including other HE institutions aiming to shape future educational strategies within the Interactive Digital Design field, specifically in EE context. Such a framework holds the potential to encourage diverse and comprehensive viewpoints on the subject, thus informing the strategic development and design of future curricula.

The ongoing research started to provide a nuanced understanding of the student background within the Interactive Digital Design programs at IADE, moving to a deeper understanding about the Portuguese creative industry main strategic players and academic stakeholders perspectives. At that point was clear that some perspectives and point-of-views were aligned, however a richer knowledge was needed, attending the multiple dimensions of this phenomena, considering the overall perception on the evolution of this field, the professional challenges that design professionals were facing, and the convergence for a skill set that may address the specific challenges for this ever-evolving area.

That lead the need to collect insights that could converge toward a consensus among specialists and implied stakeholders regarding prior research findings. Additionally, this process aims to address the question of how to validate the gathered insights, thereby

providing a robust foundation for further analysis and interpretation and, thus, contributing to the development of a solid skill set framework in this domain.

Methodology

For this study, the Delphi methodology was selected as the preferred approach. This data collection method involves requesting expert opinions on the topic under investigation and resembles a structured questionnaire comprising a series of statements that experts evaluate. The method is widely used to explore validity and reliability issues in various domains, making it a powerful qualitative research technique. By leveraging experts' insights, Delphi method allows for in-depth interpretations of reality, enhancing our understanding of a specific phenomenon (American Philosophical Association, 1990).

This methodology represents a valuable approach for eliciting the most consensus-based opinions from a panel of recognized experts in a specific research domain, facilitating data collection without requiring physical presence, and making it particularly useful for geographically dispersed experts. Typically, the Delphi process involves multiple rounds of data collection, often in the form of sequentially administered questionnaires. These questionnaires provide aggregated insights into the group's responses, allowing for a deeper understanding of the research topic. After each round of data collection, researchers meticulously analyze the results. Dissonant opinions and their accompanying justifications are scrutinized during this evaluation. These insights are then compiled and subsequently shared with the expert group. At the conclusion of each round, participants are given the opportunity to revisit and defend their responses to the researchers. This iterative process continues until consensus is achieved among the consulted experts (Brás & Marques, 2018; de Liaño & Pascual-Ezama, 2012; Galanis, 2018; Osborne et al., 2003).

For this research, a first set of interviews and workshops were previously conducted on this topic, establishing a first round of data collection where questions were addressed to obtained significant insights over the same subject.

Participants were selected according to their relevance in the field within the dimensions of expertise in the Academic field (i.e., Faculty Deans, Design Courses Coordinators, Research Unit Coordinators and Executive Education Directors), Professional field (i.e. interlocutors in key-companies and organizations in the Creative Industry that were considered strategic and relevant for the study), excelling in 5 major characteristics: 1) More than 10 years of operation; 2) Global reach; 3) Interactive digital product main focus; 4) Acknowledge in its field of expertise; 5) Portuguese origin or affiliated. Also, students in the current postgraduate courses at IADE, thus encompassing all the stakeholders' sample for this study.

The data collection tool used was Google Forms, containing questions in a Likert type scale format with a range from 1 to 6, where: (1) Strongly Disagree; (6) Strongly Agree. We opted for a scale where the progression of choices totaled an even number, so that participants could clearly position themselves regarding their agreement or disagreement with the presented statement, with a value above 3 indicating agreement on the topic.

A total of 68 mandatory questions were included, organized in 3 main sections: 1) Interactive Digital Design field evolution; 2) Professional Profile; 3) Essential Skills. At the end of the questionnaire, an optional open-ended question was also addressed to collect additional insights not covered by the questions related to the discussed topics.

As a final note, all the questionnaires were sent to the participants directly and in some cases a follow up email or direct contact was sent or established.

In summary, these were the Delphi method stages applied in this study:

1. Question Definition and Pilot Questionnaire Design

The perception of this study dimensions, previously gathered from interviews and workshops, centered around 3 key aspects: 1) the evolution of the Interactive Digital Design field, 2) key aspects over the professional profile, and 3) the essential interactive digital design skills. Subsequently, a questionnaire model was devised to address the identified issues and assumptions, seeking consensus and validation from all stakeholders involved in this research with twofold intentions: first, to depict the current state of the field, and second, to offer insights into future prospects and recommendations for curricula design. A total of 68 mandatory questions were designed, facing the main outputs from the previous stated interviews and workshops on this subject.

2. Election of an Expert for the Pilot Questionnaire Validation

An expert from IADE faculty at *Universidade Europeia* in Portugal, recognized for one's research expertise in the field, was chosen and invited to validate and suggest improvements to the questionnaire. After a thorough analysis, some improvements in the questionnaire were identified. After receiving the improvement suggestions, adjustments were then made.

3. Final Questionnaire Design

Subsequently, the final questionnaire was then designed and organized into 6 main sections: 1) Introduction to the study; 2) Sociodemographic context; 3) Interactive Digital Design field evolution: a) between 2012 and 2020, b) during the Covid-19 pandemic, c) current and future perspectives; 4) Professional Profile; 5) Essential Skills; 6) Thank You note and open-ended question to any additional remark on the subject.

4. Select the Group of Experts and Send the Questionnaire

At this stage, representative stakeholders were chosen for the study. A total of 14 industry experts, 7 academic specialists, and 7 students were selected, resulting in a group of 28 participants. The link of the questionnaire was then sent via direct message and/or email, and a follow-up was conducted in some cases, also via email or by direct message.

5. Quantitative and Qualitative Analysis of Responses

An analytical framework was developed to process the data, involving the calculation of the mean for each response from the participants sample and the assessment of mean dispersion through standard deviation. Additionally, and recognizing the need to establish confidence intervals based on data distribution, we also determined the value of the mean minus the standard deviation in this statistical model. This approach ensured that if a consensus was found in the analysis, a minimum level of agreement across all questionnaire items was assured and that there was a high level of confidence in the results hence most of the interval dispersion was covered with this margin. Additionally, if any additional insight was offered by the participants through the open-ended question, a qualitative analysis will be performed.

6. Analysis of the Obtained Results

In this final phase, the collected data was analyzed, and a synthesis report was created based on the findings for expert consensus. The report focused on three major study areas: the evolution of Interactive Digital Design, professional profiles, and essential competencies for

the field, highlighting relevant topics for guiding future work. At this moment, it was highlighted the relevant topics where most significance divergences were found and signaled the overall considerations from the questionnaire.

Results

In this section will be presented the findings from the questionnaires. As specified, those were organized in *1) Sociodemographic context; 2) Interactive Digital Design field evolution; 3) Professional Profile;* and *4) Essential Skills*, as further detailed over the following topics:

1. Sociodemographic Context

The term "sociodemographic context" refers to the combination of social and demographic factors that define a specific group or population. It encompasses multifaceted attributes related to both social dynamics and demographic characteristics, facilitating our comprehension of shared traits among group members (Busayo, 2020). In this study context, the population sample comprised 28 participants that were consulted and responded to the questionnaire. All had professional or academic backgrounds closely aligned with the field of Interactive Digital Design, covering diverse dimensions bringing a multifaceted perspective of the phenomena. The demographic segmentation occurred across 3 defined categories: 1) creative industry experts; 2) academic specialists; and 3) students from post-graduate studies. The population sample comprehended 14 industry experts (50%); 7 academic specialists (25%), and 7 students (25%). Both industry experts and academic specialists all had over a decade of relevant expertise in the field of Interactive Digital Design, while the selected students no less than 5 years of experience in the field. Tables 1, 2 and 3 below, offer a more detailed perspective on the current role and academic degree from each participant of this study.

IE	Current Role	Academic Degree
01	Head of Design	Bachelor
02	Product Experience Design	Bachelor
03	Digital Product Design Lead	Bachelor
04	Advertiser	Bachelor
05	Head of User Experience	Master
06	Senior Product Designer	Bachelor
07	CEO	Bachelor
08	Product Designer	Bachelor
09	Head of Enterprise Design	Bachelor
10	Creative Director	Bachelor
11	UX Content Designer	Bachelor
12	Digital Public Services Specialist	Master
13	Senior Motion Designer	Master
14	Head of Product Operations	Professional Course

Table 1: Industry experts' (IE) profile

AS	Current Role	Academic Degree
01	Professor	PhD
02	Head of Strategy and Innovation	Master
03	Master Course Coordinator	PhD
04	Pos-graduate course coordinator	Master
05	Lead UX Researcher	Master
06	Faculty Dean	PhD
07	Product Design Lead	Master

Table 2: Academic specialists' (AS) profile

S	Current Role	Academic Degree
01	UX/UI Designer	Bachelor
02	Frontend Developer	Bachelor
03	Multimedia Designer	Bachelor
04	Designer	Master
05	Client Advisor	Bachelor
06	Student	Bachelor
07	Designer	Bachelor

Table 3: Students' (S) profile

2. Interactive Digital Design Field Evolution

The evolution of Interactive Digital Design reflects technological advancements, user-centric approaches, and the ever-expanding possibilities of developing and design digital experiences.

Nonetheless, Interactive Digital Design field faced several challenges throughout its existence.

This set of questions propose to better understand the evolution and nuances occurring in this field, framing the biggest challenges and attributes relating to 3 temporal moments: a) pre-pandemic (between 2012 to 2020); b) during the Covid-19 pandemic; and c) current and future perspectives. The following 4, 5 and 6 tables exhibit the obtained results on this subject, aiming to extend a more comprehensive understanding of the field's resilience, adaptability, and transformative potential over this ten-year period, compassing some of the key-points on the field evolution over the years, and proposing some insights for present and future.

Topics	Mean	Standard Deviation	Agreement Level (x̄-σ)	Mode
1. The domains of Engineering and Technology have seen substantial advancements catalyzed by the integration of Design. This evolution has manifested in two dimensions: greater complexity (of applications and platforms) and ease of use (for users).	4,89	1,05	3,85	5
2. Designers have been compelled to constantly update and learn. The rapid evolution and diversity of digital software have necessitated continuous skill updates, requiring a deeper technical understanding and a more holistic approach.	5,79	0,62	5,17	6
3. Increased possibilities for interaction. As technological solutions become more commonplace in everyday life (such as the significant evolution of smartphones during this period), the possibilities for interaction between users and systems have also grown.	5,57	0,68	4,89	6

4. The lack of consensus on best design and usability practices has become more evident. Designers needed a deeper understanding of human cognitive capabilities and awareness of usability principles and best practices.	5,43	0,73	4,70	6
5. The discipline of Interactive Digital Design has matured. It transitioned from being primarily concerned with appearance and visual impact (Web Design during the HTML and subsequent FLASH era) to integrating concepts such as Design Thinking, User Experience, User Interface Design, and User Psychology.	5,50	0,78	4,72	6
6. Digital services in the Public Sector have matured. Advances in digital maturity among public services and the bridging of gaps between organizations with varying maturity levels led to a greater awareness of the need to provide truly interactive digital services.	4,68	0,97	3,71	4

Table 4: Interactive Digital Design field evolution between 2012 and 2020

Topics	Mean	Standard Deviation	Agreement Level ($\bar{x}$-σ)	Mode
7. The outbreak of the COVID-19 pandemic was responsible for introducing incremental innovation and acting as a catalyst for change in the field of interactive digital design.	5,00	0,96	4,04	6
8. There was a clear digital acceleration across various sectors, further propelling the ongoing digital transformation.	5,32	0,76	4,56	6
9. Designers demonstrated great adaptability, creating increasingly relevant, effective, and accessible digital experiences.	4,89	0,98	3,92	6
10. Work processes were significantly impacted by this new reality. In companies, collaboration and communication became a challenge that has been successfully overcome, dispelling many myths about work methods.	4,96	1,05	3,91	6

Table 5: Interactive Digital Design field evolution during Covid-19 pandemic

Topics	Mean	Standard Deviation	Agreement Level ($\bar{x}$-σ)	Mode
11. The field of Interactive Digital Design is directly associated with disruption and innovation, creating a constant challenge in adopting new and emerging technological solutions.	5,11	1,01	4,10	6
12. The intersection of different digital technologies is also a widely recognized challenge in this area.	5,21	0,72	4,49	5
13. As a dynamic field that requires continuous research across various domains, designers constantly need to stay updated.	5,71	0,59	5,13	6
14. With the emergence of generative AI, designers face the additional challenge of questioning the processes and methodologies to use.	5,68	0,66	5,02	6
15. Designers now have a duty to leverage these new Artificial Intelligence tools to optimize and automate many of their daily tasks, posing additional ethical challenges in this new reality.	5,57	0,56	5,01	6
16. A paradigm shift: moving from user-centered design to a more globally focused design centered on humanity and planet, promoting greater responsibility in creating experiences that not only address individual needs but also anticipate their broader impact on society without causing direct harm to the planet.	5,43	0,82	4,61	6

17. Development of Digital Services that incorporate emerging technologies such as Artificial Intelligence and the Metaverse.	4,75	0,91	3,84	5
18. There is a need for reflection on the use and incorporation of emerging technologies and how we can predict and mitigate inherent risks related to security and information accuracy.	5,61	0,56	5,05	6
19. Extensive use of Design Systems in this field, allowing for greater consistency in the user experience and increasing efficiency in design and digital interface development teams.	5,07	1,07	4,00	6
20. Designing for a new generation of digital natives, more civically and environmentally aware and accustomed to immediacy.	5,18	0,97	4,21	6

Table 6: Interactive Digital Design field evolution, present and future perspectives

3. Professional Profile

Several challenges within the Interactive Digital Design field stem from the need to enhance our understanding of the professional profile and, consequently, the sector's expectations. This topic presents a broad overview of previously identified expectations, as follows.

Topics	Mean	Standard Deviation	Agreement Level ($\bar{x}$-σ)	Mode
21. Interactive digital design is, above all, collaborative and empathetic. Understanding the user and collaborating with different people who have diverse experiences is essential for the success of a digital product.	5,71	0,59	5,13	6
22. A full-stack professional is expected, proficient in Technical Skills, Application of Knowledge, and Strategic Thinking. The emphasis may vary according to the specific job description.	4,68	1,23	3,45	5
23. Skills related to autonomy and leadership, as well as social skills for teamwork and cooperation, are highly sought after.	5,25	0,95	4,30	6
24. Having diverse visual references and a broad visual culture is relevant.	5,32	0,89	4,43	6
25. Career progression is linked to the ability to add value and possess multidisciplinary skills, providing a comprehensive perspective.	5,43	0,78	4,65	6
26. For an entry-level professional profile (such as a collaborator, UX/UI Designer, or Web Designer), competencies lie in technical skills, such as user research, usability principles, and UI design.	5,11	0,98	4,13	6
27. For a professional profile at levels C and D (Creative Director, Head/Design Leader, CCO, or CTO), greater focus should be given to leadership and operational strategy-related skills.	5,39	0,67	4,72	6

Table 7: Interactive Digital Design Professional Profile insights

4. Essential Skills

There is an identified skill gap between the Creative Industry needs, the Academic offering and Students' expectations. With this in mind a selection of skills based on a previous round of data collection was acknowledge attending the specific profile of an entry level professional such as an UX/UI Designer or Web Designer (more associated to the mastery of technical skills and operational knowledge), a C or D Level professional such as Creative

Director, Chief / Head of Design, CCO or CTO (with skills more related to mastering management, leadership and business model skills), as presented in Table 8 and Table 9. Furthermore, as an exploratory evaluation, was intended also in this topic to grasp the possibility of perceiving an agreement to specific curricular units that would make sense for new curricular design on the Interactive Digital Design field, based on the previous inputs received from the Creative Industry, Academia and Students, as observable on Table 10 below.

Topics	Mean	Standard Deviation	Agreement Level ($\bar{x}$-σ)	Mode
28.1 Methods in Interaction Design The ability to master the User-Centered Design (UCD) approach and apply the different methods used in Interaction Design in context.	5,43	0,78	4,65	6
28.2 User Research The ability to conduct research processes to collect data about users and/or the usage of a digital product or service.	5,36	0,89	4,46	6
28.3 User Interface (UI) Design The ability to design graphical interfaces that are intuitive, suitable, and visually appealing, while applying the necessary methods and techniques in context.	5,46	0,87	4,60	6
28.4 User Experience (UX) Design The ability to master methods and techniques for designing a better user experience in interactive digital products.	5,61	0,67	4,93	6
28.5 Project Management (Lean/Agile) The ability to manage digital projects using agile and/or lean methodologies.	4,25	1,45	2,80	6
28.6 Interaction Data Analysis The ability to interpret collected interaction data and outline recommendations.	4,93	1,25	3,68	6
28.7 Interactive Tools (Figma) Technical proficiency in mastering the Figma tool.	4,93	1,28	3,65	6
28.8 Productivity Enhancement Tools The ability to master tools that increase productivity in tasks, such as Artificial Intelligence (AI) tools.	4,82	0,93	3,89	5
28.9 Programming (HTML, CSS, Js) The ability to master essential programming techniques and languages for the web.	3,57	1,29	2,28	4
28.10 Wireframing The ability to visually communicate the initial layout of a digital interface.	5,43	0,94	4,49	6
28.11 Design Systems The ability to operate within a digital design ecosystem, addressing various dimensions (organizational, technical, and design).	5,29	0,99	4,29	6
28.12 Prototyping The ability to create high and low-fidelity prototypes suitable for context and identified needs.	5,54	0,63	4,91	6
28.13 Usability The ability to master and apply usability concepts, rules, and techniques.	5,68	0,54	5,14	6

Table 8: Interactive Digital Design essential skills for entry-level professionals

Topics	Mean	Standard Deviation	Agreement Level (x̄-σ)	Mode
29.1 Team Management The ability to manage teams by facilitating communication, task distribution, problem-solving, and conflict resolution.	5,71	0,52	5,19	6
29.2 Digital Project Management The ability to manage digital projects, mastering project management methods, identifying and evaluating risks, managing time, resources, and prioritizing team tasks.	5,46	0,87	4,60	6
29.3 Leadership The ability to lead, demonstrating communication skills, empathy, collaboration, and strategic vision across the organization or agency.	5,79	0,49	5,30	6
29.4 Creative Team Leadership The ability to lead, demonstrating communication skills, empathy, collaboration, and strategic vision, with a focus on methods applied to managing creative teams.	5,75	0,57	5,18	6
29.5 Strategic Leadership The ability to lead, demonstrating communication skills, empathy, collaboration, and strategic vision, with focus on executing strategic objectives.	5,68	0,60	5,08	6
29.6 Design Strategy The ability to outline a guiding plan for the effective use of digital technologies, analyzing context, ecosystems, needs, and goals.	5,61	0,56	5,05	6
29.7 Business Strategy The ability to develop a long-term vision to achieve desired business objectives, aligning decision-making, task definition, resource allocation.	5,54	0,68	4,86	6
29.8 Decision-Making The ability to make strategic and creative choices, mastering methods for collecting, analyzing, and communicating information, considering task prioritization and resource allocation.	5,71	0,52	5,19	6
29.9 Innovation The ability to analyze and select idea proposals, creating environments conducive to creativity, fostering collaboration, learning from mistakes.	5,50	0,63	4,87	6
29.10 Ethics in Design The ability to reflect on and act upon ethical dilemmas that may involve complex decisions with significant impact, promoting positive values for current and future society.	5,46	0,91	4,56	6
29.11 Design Thinking The ability to apply design thinking methodology to problem-solving, bringing together diverse perspectives to address complex and multidisciplinary issues.	5,54	0,68	4,86	6
29.12 Service Design The ability to have a broad and holistic knowledge to act in the development of the overall customer experience and relationship.	5,29	0,84	4,45	6
29.13 Communication The ability to convey ideas and concepts clearly and objectively - both orally, in writing, and visually - while positioning oneself positively in response to feedback.	5,79	0,41	5,38	6
29.14 Presentation The ability to use techniques for effective presentations, such as storytelling, public speaking, strategic pauses, eye contact, vocal and postural positioning, empathy, persuasion, among others.	5,71	0,52	5,19	6

29.15 Emerging Technologies The ability to stay updated with the latest technological solutions and innovations to present a competitive edge, increase productivity or profit, or create innovative or differentiated products or services.	5,29	0,84	4,45	6

Table 9: Interactive Digital Design essential skills for C and D level professionals

Topics	Mean	Standard Deviation	Agreement Level (x̄-σ)	Mode
30.1 Macro Business Management	4,86	0,91	3,94	4
30.2 Business Processes	4,57	0,90	3,67	4
30.3 Design Ethics	5,25	1,02	4,23	6
30.4 Design Systems	5,43	0,73	4,70	6
30.5 Artificial Intelligence	5,39	0,72	4,67	6
30.6 Virtual Reality	4,43	1,32	3,11	6
30.7 Augmented Reality	4,61	1,21	3,40	6
30.8 Accessibility	5,68	0,66	5,02	6
30.9 Sustainability	5,43	0,82	4,61	6
30.10 Employability	4,82	0,93	3,89	5
30.11 Strategic Partnerships	4,79	0,98	3,81	5
30.12 Creative Services	5,11	1,05	4,06	6
30.13 Visual Culture	5,29	0,80	4,49	6

Table 10: Interactive Digital Design curricular units as possible asset

Conclusion

Briefly, the sample population Academic degree was found to have predominantly a bachelor's degree (16 of the participants, representing 57,1%), followed by master's degree (8 of the participants, representing 28,6%), doctorate degree (3 of the participants, representing 10,7%), and finally, professional course (1 of the participants, representing 3,6%). As expected, the background from the participants is very diverse. It was intended that different perspectives and point-of-views could be represented and bring diversity to this study.

Of the 68 questions presented, only 2 questions were below the agreement level rate (for this study, below 3, attending the 1 to 6 Likert type scale applied). Consequentially, it was found a 97% agreement rate among the participants regarding the total of 68 questions, with most answers trending to allocate towards the "strongly agree". The mode found was 6 (with 84%), followed by 5 (with 10%) and 4 (with 6%). The 1, 2 and 3 scale elements did not represent statistical significance in the mode analysis.

For this study, it was important to achieve a high level of consensus and thus, low dispersion. To a more cautious perspective on the collected data, was subtracted the standard deviation from the mean leading to create a confidence interval based on data distribution. This practice is common in statistical analyses to understand variability and generate reliable estimates within a specific sample (Lane, 2022). This calculus (x̄-σ) was proceeded for all questions individually, taking in consideration the exact standard deviation of each, offering thus a solid indicator of confidence on the attained result.

Overall, results shown a strong consensus among the respondents with an average standard deviation below 1 point. More precisely 0.83, varying from 0.41 to 1.45 point. Commonly recognized, a Low Standard Deviation with approximately 68% of the data falls within 1 standard deviation point from the mean (close to 1), with most of the data points clustered

around the average. A Moderate Standard Deviation is set where about 95% of the data lies within 2 standard deviations points from the mean (between 2 and 3), representing a wider range and including most of the data points. A High Standard Deviation (above 3) is where nearly 99.7% of the data is within 3 standard deviation points from the mean, encompassing a wider range and almost all data points (Khan, 2011).

From a specific point of view, topics 28.5 and 28.9, related to Interactive Digital Design essential skills for entry-level professionals, were identified as below agreement level: Topic 28.5 “Project Management (Lean/Agile), as the ability to manage digital projects using agile and/or lean methodologies”; and topic 28.9 “Programming (HTML, CSS, Js), as the ability to master essential programming techniques and languages for the web”.

Also, the following topics found general agreement, however not with a high agreement level:

- From the section Interactive Digital Design field evolution between 2012 and 2020, topics 1 and 6: Topic 1 “The domains of Engineering and Technology have seen substantial advancements catalyzed by the integration of Design. This evolution has manifested in two dimensions: greater complexity (of applications and platforms) and ease of use (for users)”; and topic 6 “Digital services in the Public Sector have matured. Advances in digital maturity among public services and the bridging of gaps between organizations with varying maturity levels led to a greater awareness of the need to provide truly interactive digital services”.

- From the section Interactive Digital Design field evolution during Covid-19 pandemic, topics 9 and 10: Topic 9 “Designers demonstrated great adaptability, creating increasingly relevant, effective, and accessible digital experiences”; and topic 10 “Work processes were significantly impacted by this new reality. In companies, collaboration and communication became a challenge that has been successfully overcome, dispelling many myths about work methods”.

- From the section Interactive Digital Design field evolution, present and future perspectives, topic 17: “Development of Digital Services that incorporate emerging technologies such as Artificial Intelligence and the Metaverse”.

- from the section Interactive Digital Design Professional Profile insights, topic 22: “A full-stack professional is expected, proficient in Technical Skills, Application of Knowledge, and Strategic Thinking. The emphasis may vary according to the specific job description”.

- From the section Interactive Digital Design essential skills for entry-level professionals, topics 28.6, 28.7 and 28.8: Topic 28.6 “Interaction Data Analysis, the ability to interpret collected interaction data and outline recommendations”; Topic 28.7 “Interactive Tools (Figma), technical proficiency in mastering the Figma tool”; Topic 28.8: “Productivity Enhancement Tools, the ability to master tools that increase productivity in tasks, such as Artificial Intelligence (AI) tools”.

- From the section Interactive Digital Design curricular units as possible asset, topics 30.1; 30.2; 30.6; 30.7; 30.10 and 30.11: Topic 30.1 “Macro Business Management”; Topic 30.2 “Business Processes”; Topic 30.6 “Virtual Reality”; Topic 30.7

"Augmented Reality"; Topic 30.10 "Employability"; and Topic 30.11 "Strategic Partnerships".

In conclusion, this study demonstrated a high level of consensus and strong agreement from stakeholders, creative industry specialists, academic experts and students, for all the presented topics, exception made to the essential skills for entry-level professionals, "Project Management (Lean/Agile)" and "Programming (HTML, CSS, Js)", were there was a consensus on a low agreement level on these skills.

It is acknowledged that additional efforts are required to enhance our understanding of the Interactive Digital Design field, where this study has its due limitations.

Further research, incorporating diverse perspectives - including key stakeholders from other Executive Education programs - presents an opportunity for more comprehensive insights. Nevertheless, these obtain inputs provide rich insights from specialists and give way to a future framework design for strategic guideline on curricula design in Executive Education, where such endeavors can apprise strategic outlines and aid the development of innovative curricula for Higher Education.

Acknowledgements

This study was initially funded by *Fundação para a Ciência e a Tecnologia* (FCT/MEC grant SFRH/BD/51387/2011) and supported by NOVA LINCS Research Laboratory (formerly CITI/FCT-UNL) Pest UID/CEC/04516 / 2013. UNIDCOM/IADE, *Unidade de Investigação em Design e Comunicação* (UIDB/00711/2020 and UIDP/00711/2020), also granted support which enabled the commitments for this study to take place. The authors have no competing interests to declare that are relevant to the content of this article.

References

American Philosophical Association. (1990). *Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Research Findings and Recommendations*.

Bolt, J. F. (1993). Achieving the CEO ' s agenda : Education for executives. *Management Review*, *82*(May), 44–48.

Boon, E., Church, G., Burger, C., Paeztron, O. De, Grasselli, N., Guo, N., Gurzki, H., Hübener, M., Papachroni, A., Raasch, J., Schmitz, B., & Williams, B. (2023). *The future of executive education. Learning leadership in a digital age* (N. Grasselli (ed.)). ESMT Berlin.

Brás, J., & Marques, V. (2018). Método DELPHI : caracterização e potencialidades na pesquisa em educação. *Pro-Posições*, *2*(87), 389–415.

Busayo, L. (2020). Socio-Demographic: Definition & Examples in Surveys. *Formplus*. https://www.formpl.us/blog/socio-demographics

Clark, B. (1998a). *Creating entrepreneurial universities. Organisational pathways of transformation. Oxford: International Association of Universities and Elsevier.*

Clark, B. (1998b). The entrepreneurial university: Demand and response. *Tertiary Education and Management*, *4*(1), 5–16. https://doi.org/10.1007/BF02679392

Clark, B. (2001). The Entrepreneurial University: New Foundations for Collegiality, Autonomy, and Achievement. *Higher Education Management*, *14*(1), 9–24.

Conger, J. A., & Benjamin, B. (1999). *Building leaders: How corporations are developing the next generation.* Jossey-Bass.

Conger, J. A., & Xin, K. (2000). Executive Education in the 21st Century. *Journal of Management Education*, *24*(1), 73–101. https://doi.org/10.1177/105256290002400106

Cruz, L. (2022). *Desafios para elevar a maturidade de design nas empresas*. https://www.design2022.com.br/artigos/desafios-para-elevar-a-maturidade-de-design-nas-empresas

Culén, A. L., Mainsah, H. N., & Finken, S. (2014). Design, creativity and human computer interaction design education. *International Journal on Advances in Life Sciences*, *6*(3–4), 97–106.

de Liaño, B. G. G., & Pascual-Ezama, D. (2012). La metodología Delphi como técnica de estudio de la validez de contenido. *Anales de Psicologia*, *28*(3), 1011–1020. https://doi.org/10.6018/analesps.28.3.156211

Demirel, M. (2009). Lifelong learning and schools in the twenty-first century. *Procedia - Social and Behavioral Sciences*, *1*(1), 1709–1716. https://doi.org/10.1016/j.sbspro.2009.01.303

Djoundourian, S., & Shahin, W. (2022). Academia–business cooperation: A strategic plan for an innovative executive education program. *Industry and Higher Education*, 095042222210838. https://doi.org/10.1177/09504222221083852

Faiola, A., & Matei, S. A. (2010). Enhancing human-computer interaction design education: Teaching affordance design for emerging mobile devices. *International Journal of Technology and Design Education*, *20*(3), 239–254. https://doi.org/10.1007/s10798-008-9082-4

Foley, J., Beaudouin-Lafon, M., Grudin, J., Hollan, J., Hudson, S., Olson, J., & Verplank, B. (2005). Graduate education in human-computer interaction. *Conference on Human Factors in Computing Systems - Proceedings*, 2113–2114. https://doi.org/10.1145/1056808.1057112

Fulmer, R. M., & Gibbs, P. A. (1998). Lifelong learning at the corporate university. *Career Development International*, *3*(5), 177–184. https://doi.org/10.1108/13620439810229389

Galanis, P. (2018). The Delphi method. *Archives of Hellenic Medicine*, *35*(4), 564–570. https://doi.org/10.4324/9781315728513-10

Gera, R. (2012). Bridging the gap in knowledge transfer between academia and practitioners. *International Journal of Educational Management*, *26*(3), 252–273. https://doi.org/10.1108/09513541211213336

Groysberg, B., Kevin Kelly, L., & MacDonald, B. (2011). The new path to the C-Suite. *Harvard Business Review*, *89*(3). https://hbr.org/2011/03/the-new-path-to-the-c-suite

Grudin, J., & Salvendy, G. (2008). A Moving Target: The Evolution of HCI. *The Human-Computer Interaction Handbook*, 1–40.

Heyer, K. Den. (2013). *The challenges of curriculum change*. 16–20. https://www.gse.harvard.edu/ideas/news/22/06/challenges-curriculum-design

Jill Anderson. (2022). *The Challenges of Curriculum Design*. Harvard Graduate School of Education. https://www.gse.harvard.edu/ideas/news/22/06/challenges-curriculum-design

Kaplan, A. (2016). Lifelong learning: Conclusions from a literature review. *International Online Journal of Primary Education*, *5*(2), 43–50. www.iojpe.org

Khan, S. H. (2011). Standard Deviation. In M. Lovric (Ed.), *International Encyclopedia of Statistical Science* (pp. 1378–1379). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-04898-2_535

Laal, M. (2011). Lifelong learning: What does it mean? *Procedia - Social and Behavioral Sciences*, *28*, 470–474. https://doi.org/10.1016/j.sbspro.2011.11.090

Lane, D. (2022). *Introduction to Normal Distributions*. Libretexts Statistics. https://stats.libretexts.org/Bookshelves/Introductory_Statistics/Introductory_Statistics_%28Lane%29/07%3A_Normal_Distribution/7.01%3A_Introduction_to_Normal_Distributions

McCarthy, P., Sammon, D., & O'Raghallaigh, P. (2016). Designing an executive education programme: towards a programme design matrix. *Journal of Decision Systems*, *25*, 566–571. https://doi.org/10.1080/12460125.2016.1189640

Meyer, M. W., & Norman, D. (2020). Changing Design Education for the 21st Century. *She Ji*, *6*(1), 13–49. https://doi.org/10.1016/j.sheji.2019.12.002

Moldoveanu, M., & Narayandas, D. (2020). The Future of Executive Development: The CLO's Compass and The Executive Programs Designer's Guide. *Working Papers -- Harvard Business School Division of Research*, 1–51. http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=bsu&AN=141746927&site=ehost-live

Myers, B. A. (1994). Challenges of HCI Design and Implementation. *Interactions*, *January*, 73–83.

Myers, B. A. (1996). A brief history of human-computer interaction technology. *Interactions*, *5*(2), 14.

Myrsiades, L. (2001). Looking to lead: A case in designing executive education from the inside. *Journal of Management Development*, *20*(9), 795–812. https://doi.org/10.1108/EUM0000000006161

Osborne, J., Collins, S., Ratcliffe, M., Millar, R., & Duschl, R. (2003). What "ideas-about-science" should be taught in school science? A delphi study of the expert community. *Journal of Research in Science Teaching*, *40*(7), 692–720. https://doi.org/10.1002/tea.10105

Power, C. N., & Maclean, R. (2013). *Lifelong Learning: Meaning, Challenges, and Opportunities* (pp. 29–42). https://doi.org/10.1007/978-94-007-5937-4_2

Ready, D. A. (1995). *In charge of change: insights into next-generation organizations*. x, 190.

Sadun, R., Fuller, J., Hansen, S., & Neal, P. J. (2022). The C-Suite Skills That Matter Most. *Harvard Business Review*, *2022-July-*. https://hbr.org/2022/07/the-c-suite-skills-that-matter-most

Sawhney, M. (2021). Reimagining Executive Education. *Havard Business Publishing*. https://hbsp.harvard.edu/inspiring-minds/reimagining-executive-education

Stopper, W. G. (1998). Agility in action: Picturing the lessons learned from Kodak and 23 other companies. *Journal Article by William G. Stopper; Human Resource Planning*, *21*. http://www.questia.com/googleScholar.qst?docId=5001349749

Twining, P., Butler, D., Fisser, P., Leahy, M., Shelton, C., Forget-Dubois, N., & Lacasse, M. (2021). Developing a quality curriculum in a technological era. *Educational Technology Research and Development*, *69*(4), 2285–2308. https://doi.org/10.1007/s11423-020-09857-3

Vicere, A. A. (1998). Changes in practices, changes in perspectives:The 1997 International Study of Executive Development Trends. *Journal of Management Development*, *17*(7), 526–543. https://doi.org/10.1108/02621719810227624

Contact emails: bruno.nobre@universidadeeuropeia.pt
emilia.duarte@universidadeeuropeia.pt

Exploring Differentiation of Chinese Public English Education in Middle School

Guiping Yang, University of Glasgow, United Kingdom

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This study aims to find out how English teachers in Chinese public-school view and apply stratified teaching in their classroom. The study is part of a larger qualitative study. Four participants are from a middle (junior-high) school in China. This study adopts the combination of interpretivist paradigm and constructivism worldview. The methods used for the study included: one to one semi-structure interviews, and classroom observations. Based on the analysis of the field data, this paper explored the differentiation in teaching. Detailed examples are given to illustrate how and why teachers apply multi-level teaching in English teaching. The main findings include: The middle school English teachers in China consider differentiation as an effective method and tend to apply it in their classrooms. The reasons are not only to implement teaching students per their aptitude but to better meet the teaching objectives related to Zhong Kao (Chinese High School Entrance Examination).

Keywords: Differentiation, Differentiated Instruction, Stratified Teaching

iafor
The International Academic Forum
www.iafor.org

Introduction

Since 1949, English education in China has experienced several ups and downs that are closely related to the socio-political climate and economic development of this country. Several reforms and reforms have been implemented regarding English curricula and standardized tests (Adamson, 2004). Due to the influence of globalization, the Chinese government has long considered English as a vital strategy towards survival in the global era. The role of English in China is currently at the highest point in history as a compulsory subject in the curriculum of public education; nevertheless, Chinese society still has a huge influence on English education (Adamson, 2004; Richards, 2017). Government and bureau of education policies, parents' and teachers' attitudes and beliefs about English education, and national economic development have all influenced the English curriculum today.

In June 2001, the Ministry of Education of the People's Republic of China (MOE) published "The secondary Education Curriculum Reformation Guideline (Beta)". It raised five specific goals for secondary education course reformation: 1) reform the large input-based curriculum; 2) amend the degree-oriented curriculum system and the lack of attention among various subjects; 3) adjust the current situation where course content being 'challenging, manifold, biased, timeworn', and focus too much on the textbook knowledge, 4) change the current situation that curriculum emphasizes on memorizing and reception learning acceptance, 5) modify the over-emphasized function of differentiation and selection for curriculum evaluation, 6) improve the over-centralized course management situation. Based on the Guideline (Beta), the key points of the secondary education curriculum reformation are to make student form a positive and initiative learning attitude, modify teaching approach to encourage students participate in active, hands-on learning; to develop students' ability on collecting and processing information, on obtaining new knowledge, on analyzing and solving problem, and on communication and collaboration. Teachers are expected to rethink one's educational pedagogical approach, reflect on one's teaching approach, redefine one's teaching objectives and rebuild teaching quality evaluation system.

In April 2003, the Chinese government published the new "English Curriculum Standard" (MOE, 2003), which symbolize another round of English curriculum reformation. The purpose of the high school English curriculum revolution include: 1) structure a new language teaching ideology, modify the curriculum settings to be more contemporary, fundamental, and selective; 2) build a flexible teaching objective system that is more instructional to English education in different stages and regions; 3) form a multi-dimensional and open English curriculum evaluation system to include feedback as an actual part of teaching process; 4) construct a standardized textbook system and a resourceful curriculum system to ensure the success application of the English courses.

In 2011, the new curriculum reform (MOE, 2011) requires that in the educational and teaching activities, teachers should base themselves on the individual differences of students, recognize and respect the differences of students, and promote the comprehensive development and individual development of students. The new English curriculum standard puts forward the core concept of "facing all students, highlighting the subject of students, respecting individual differences, and focusing on quality education" (MOE, 2011). Therefore, in the educational and teaching process, teachers must proceed from reality, treat students differently according to their individual differences in their learning ability, learning methods, learning interests and learning attitudes, organize teaching activities in a targeted manner, unify requirements, and teach students in accordance with their aptitude, to meet the

different learning needs of students at different levels and ensure that every student can learn something. To further explore differentiation in real classroom, this research stepped into a middle school in Chinese public educational system.

Middle School English Education

Most official documents mentioned in the chapter above indicate that English teaching methods are expected to create an "active class" and use English as the primary target language (MOE, 2011). Yet, observation has shown a gap between what happens in the classroom and the government "promoted" teaching method in the previous curriculum reforms (Wu, 2012). The motivation behind teacher-centered, grammar-translation methods in Chinese secondary English education is the "deeply rooted examination culture," where National Matriculation English Test (NMET) plays a key factor in deciding what will be taught and learned in classrooms (Pan & Block, 2011; Xue, 2015). Thus, English teachers in China focus primarily on vocabulary and phrases provided in the textbook. Explicit grammar teaching and reading comprehension is also emphasized to better serve students' need for high scores in NMET (Zhu, 2011).

However, the significant amount of grammar content in teaching has hindered students' achievement in using English as a language to communicate (Zhou, 2017). The instruction of focus on form but not focus on meaning in secondary English education results in few opportunities to use this language communicatively and leads to so called "dumb English" (Zhou, 2017). Many students have no trouble writing or reading but have little to no oral competence (Yu et al., 2019). Meanwhile, Chinese society addresses the importance of oral English and emphasizes the "standard" English spoken by native speakers (NS) in England and North America (Wei, et al., 2016; Fang, 2010). Given this attitude, students feel anxious about their Chinese accent and lack confidence to use English communicatively (Wei, et al., 2016; Fang, 2010). Moreover, students are used to interacting with "created materials" (Richards, 2017) in both textbooks and exams, which aim to cover learned vocabulary and grammar. As a result, some students fear being criticized when talking to NS.

The status of English teachers in China also adds to the drawbacks of students' listening and speaking competence. Teachers are toned down by teacher education that does not emphasize oral competence, less professional development on pedagogical transformation, limited school resources, and pressure from exam-focused students and parents. Teachers' options are limited unless the exams change (Luo et al., 2019; Yan, 2015; Zhao et al., 2016).

Zhong Kao

With the ups and downs of English education, the teaching resources, theories, and approaches changed accordingly. Zhong Kao (high school entrance exam) is a required test to be taken before a student graduate from middle school. It aims to examine students' English competence level comprehensively and accurately. Zhong Kao differs in various regions in China according to the local policy. It is a proficiency test most of time, but also acts as an achievement test at times (Huang, 2008). In most second-tier cities including Harbin, the grade of Zhong Kao could decide which high school the student will attend. Therefore, the content of this exam has great impact on learning objectives in middle school English classes.

Theoretical Basis of Differentiated Instruction

Differentiated instruction has a long-standing theoretical and practical foundation worldwide. Confucius (BC 551-479), an ancient Chinese sage, was the first to notice the individual differences of students during the Spring and Autumn period. He advocated "teaching students in accordance with their aptitude"(Confucius, 2016). Different teaching methods are implemented according to different students' interests, individual intelligence, learning habits and methods, so that students can develop better. In the western world, the concept of the Zone of Proximal Development (ZPD) raised by Vygotskiĭ (1978), has become a cornerstone of educational theory. The ZPD refers to the difference between what a learner can do without help and what they can achieve with guidance and encouragement from a skilled partner, which is the potential ability and possibility that students will acquire through learning (Vygotskiĭ et al, 1978). Different students have different zones of proximal development, so teaching must follow the principle of teaching students in accordance with their aptitude. This concept underscores the importance of scaffolding in education, where the teacher or a more capable peer supports the learner's development, gradually transferring responsibility as the learner becomes more proficient (Thompson, 2015). American educator Bloom's (1976) mastery learning theory believes that although each student's learning methods, learning levels, and learning potential are different. Based on collective teaching, teachers provide students with the necessary personalized help and guidance and sufficient learning time, and the vast majority of students can achieve the mastery standards specified in the course objectives. These educational theories all become fundamental theories of differentiated teaching.

According to Tomlinson (2000), differentiation is associated with the efforts teachers make to respond to variance among their learners. And whenever a teacher adjusts their teaching approach for an individual or small group to enhance the learning experience, they are practicing differentiated instruction. Differentiated instruction means that in the same class, teachers scientifically divide students into several groups of similar levels and size according to differences in students' existing knowledge, ability levels, interests and hobbies, potential tendencies, etc (Algozzine and Anderson, 2007). Then carry out differentiated standard setting, differentiated teaching, differentiated evaluation, so that students at all levels can learn something and develop (Algozzine and Anderson, 2007). Differentiation is not just one strategy or a collection of strategies; it is a comprehensive approach that takes individual differences into account for every task, offering flexibility in how students engage in their learning (Tomlinson, 2000). For differentiation to be effective, it requires a well-thought-out plan, a strategy that enables teachers to transform their intentions into practical application (Tomlinson, 2000). In mainstream classrooms, teachers can achieve differentiation via content, process and product (Fitzgerald, 2016).

Methodology

Research Design

The purpose of this study was to explore the differentiation practices and the teachers' perception in Chinese middle school classroom setting. This study employed a qualitative approach with semi-structured interview as the main data collection instrument. Qualitative approach is considered the most effective approach to illuminate and explore multiple realities, particularly within collaborative research environments. It allows researchers to get an in-depth view on specific cases, especially when it takes place in real-life context.

(Creswell, 2017). Qualitative research interviews are employed by researchers to uncover the meanings of central themes within the life world of their subjects (Jupp, 2006).

Sampling and Recruiting

Selecting the participants requires careful consideration to ensure appropriateness. The target population in this study was EFL teachers who were respectively teaching in public middle schools in Harbin. I was able to involve 2 teacher participants (P1 and P2) from the chosen middle school. P1 has sixteen years of public middle school teaching experience, P2 has six years. Participation was voluntary in this study. Thus, it was important to explain the purposes and process of the study. A PIS (plain information sheet) and consent form clarifying the study's purpose was given to participants. I emphasized during my explaining that participants (teachers and pupils) can withdraw their consent at any time during the research project.

Ethics

In qualitative research, it is essential to protect human participants and follow ethical standards. The requirement of ethics review procedures when conducting educational research in universities has heavily grown since the 1990s. Institutions require researchers to submit applications seeking approval to conduct research (Head, 2020). When planning the research, I considered ethical issues addressed in Crocker (2009) and followed the ethical guidelines provided by the British Educational Research Association (BERA, 2018). The study was approved by the College of Social Sciences Research Ethics Committee at the University of Glasgow.

It was essential for this study to ensure participant's anonymity and confidentiality. Researchers should ensure the anonymity and confidentiality of informants by removing identifiable details and securing data (BAAL, 2021). All contributions made by them that have been video recorded will be deleted, and copies of materials previously shared by them will be destroyed. Participant pseudonymity (Bulmer, 2001) will be incorporated into the consent. Besides mentioning the anonymizing in the consent forms, at the beginning of all interviews, I also told the participants that I would try to as much as possible to protect their privacy. They were assured that the information they provided would be made anonymous, and any identifiers would be either deleted/blurred out or exchanged with codes.

Data Collection

For this study, I gathered data via individual interviews with each teacher. These interviews took place in a quiet and private setting on the school premises, chosen by the participants to ensure their comfort. Each face-to-face interview section was expected to last approximately 40 minutes and was scheduled at a time convenient for the participants. To ensure accuracy and prevent the loss of data, I recorded the interviews using a voice recorder, and an additional device was available as a backup in case of technical issues, ensuring compliance with GDPR (General Data Protection Regulation) regulations for data protection.

Data Analysis

According to Kowal and O'Connell (2014), as a step of qualitative data analyzing, "the generic term transcription here refers to any graphic representation of selective aspects of

verbal, prosodic and paralinguistic behavior (p. 5)". All collected data was first transcribed in mandarin into a separate Word document. After completing the transcripts of all interviews, I entered the data analysis stage. Thematic analysis (TA) was used to analyze the research data, following the approach in Braun and Clarke (2017). Having undertaken a rigorous analysis of inductive coding and developing themes of the transcripts, the researcher presented the findings under five main headings: (1) student stratification; (2) differentiated teaching/learning objectives; (3) differentiated instruction; (4) differentiated assessment and evaluation; (5) challenges and considerations.

Findings

Student Stratification

Student stratification is the key to the stratified teaching model and plays the most important role in the entire stratified teaching activity. The teacher participants firstly comprehensively grasped the individual differences, learning foundation, emotional attitude and learning potential of the students in their classes. Then, according to these situations of the students, they dynamically stratified the whole class into three layers in the way of invisible stratification within the class, the grade level.

> *T1: The students in my class are extremely polarized. Let me give you an example. When we first started our class, there were 18 kids who couldn't write the 26 letters (in 3rd grade). There were 48 children in our class. When the good kids in our class already understand the things for the nineth grade. I divided the class into three levels, A, B and S. Well, at first, it was actually divided into two levels, A and B. Later on, because the good kids at the front of our class were particularly good, I added a S level.*

Based on T1, it is clear that in this context, T1 stratify students mostly based on their competency level, instead of their learning habits.

Differentiated Teaching/Learning Objectives

Achieving teaching/learning objectives is the ultimate goal of conducting hierarchical teaching activities. According to the high school English teaching syllabus and the individual differences of students at different levels, different teaching objectives that match the actual abilities and actual levels of students at different levels are studied and designed to establish a clear orientation for teaching. According to the overall requirements of the new curriculum standards, teaching objectives are hierarchical into basic objectives, middle-level objectives and extended objectives.

In differentiation practice, basic objectives require all students to complete. For example, all students in 4 classes are required to master the majority of words, phrases and grammatical structures that appear in each unit. Middle-level objectives require students at levels A and B to complete and encourage students at level C to master them through hard work. For example, P1 and P2 require students to memorize the new vocabulary, grammar, and sentence structures in each unit; but level C students are expected to memorize less new vocabulary. Extended objectives are an extension of the high school English curriculum content, cultivating the comprehensive language application ability of excellent students, and

this goal can be achieved as long as students at level A are achieved. Below are the examples that T1 and T2 shared with the researcher in their interviews.

> *T1: For example, if I take the word "look" and expand it, the basic students only need to remember "look at, look after", "look for", etc., because these are phrases that sixth graders need to master. But I will let the students with higher abilities expand it in depth, such as "look through" and so on.*
>
> *At the same time, for example, "look at something carefully", normally it is "look at something carefully", but I will put "carefully" in the middle of "look at", and then do a fill-in-the-blank question or multiple-choice question, and let the high-ability students, choose one of these options. In this way, it also exercises the analytical ability of the high-ability students. So basically, in my class, I use this way more to create questions to test the high-ability students. Then it is more about the children's abilities, rather than simply being taught phrases.*
>
> *T2: ... So the premise is that you have to tell them, you have to let them know which level they are, and what they need to do, so that there will be some students who are not very clear about what to memorizing at the beginning ... and during my lecture, I will tell them that this is what the A-level students need to memorize, this is what the S-level students need to memorize, and this is what the B-level students need to memorize*

As we could see in the transcripts, for T1, help students achieving good scores ZhongKao was not her only teaching objectives. Where it was possible, she preferred to go depth in the knowledge point for the level A and S students to help them develop language competency.

Differentiated Instruction

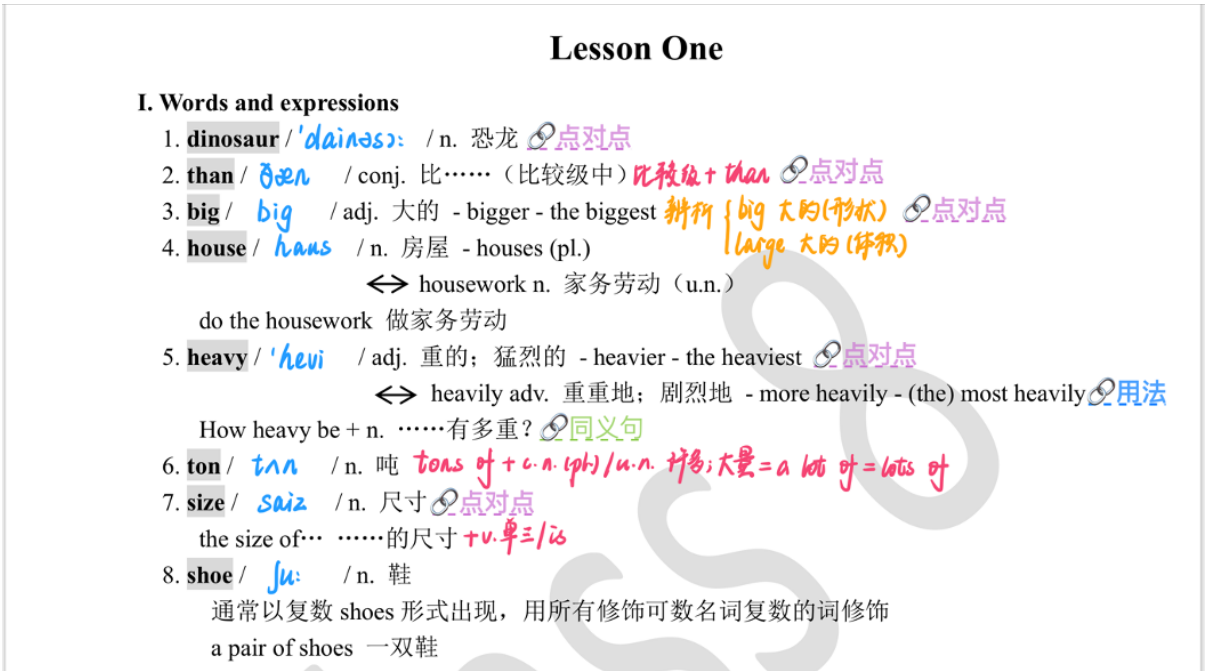
When talked about differentiated instruction in classroom practice, both participants shared their thoughts.

> *T2: ...I will first focus on the textbook, that is, I will explain the things in the textbook to them thoroughly, and then, the requirement is that all students in the class must master the knowledge points. Then for those good students, I will take the knowledge related to the, 7th, 8th , and 9th grades, or some typical questions from the high school entrance examination, to let them do a deep expansion. In this way, in the classroom, for ordinary students, they will know the basic knowledge, and for good students, they will also be improved, so my class is basically designed like this.*

To make it clearer, below is a real example in practice when T1 used for her 6th grade class. In figure 1, the fifth sentence of “how heavy” is a key sentence pattern in the first unit of the 6th grade, which is “how heavy + be”, a verb plus a noun. For all students in level S, A, and B they need to master this sentence pattern.

In figure 2, there are more sentence added at the end, “what's the weight of”, “how much do/does something weight”, which should be a knowledge point in the 7th grade of junior high school. And the word weight’s transform into the verb weigh. T1 took somethings from the higher grade here. For level A students, they need to master those. Furthermore, there are two groups of Chinese-English translations below. These two groups of Chinese-English

translations are designed according to the three sentence patterns of “how heavy + be” and make the sentence structure meaningful. If for students whose foundation is not very good (level B), they can put nouns into these three sentence patterns, and they will get three sentence patterns even they are not sure how to use them. But for good students (level A and S), they should be able to memorize and understand these three sentence patterns. At the same time, they can also remember the other extended equivalent sentence. To comparing the two groups of sentences together, which allows “good students” to integrate knowledge.

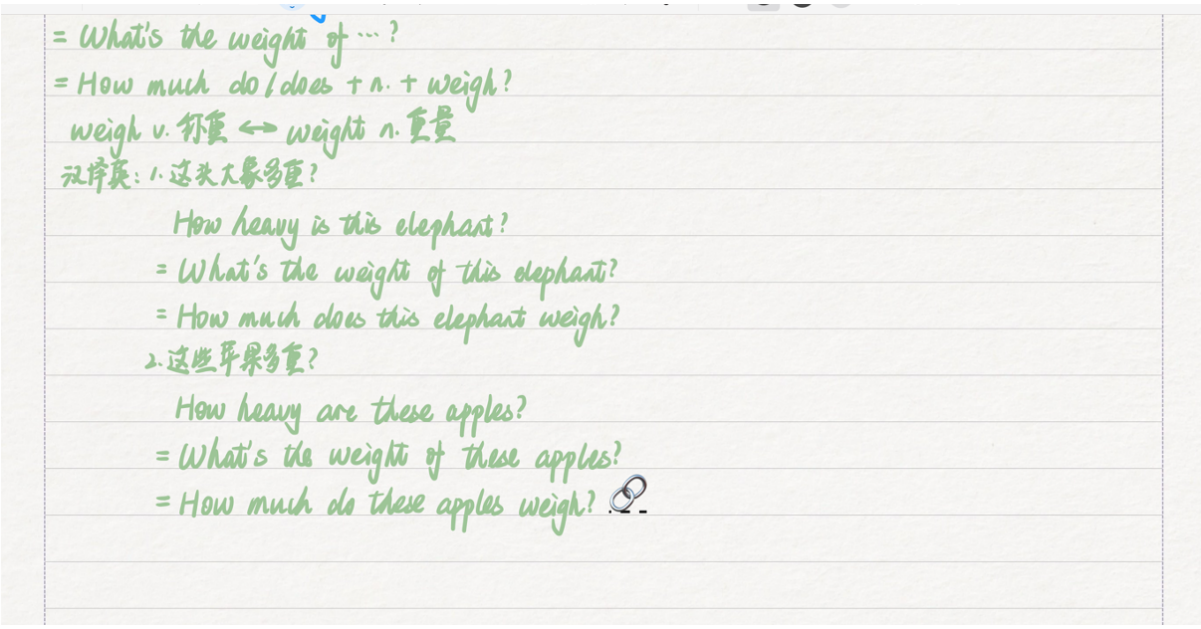


Lesson One

I. Words and expressions

1. **dinosaur** / 'daɪnəsɔ: / n. 恐龙 点对点
2. **than** / ðæn / conj. 比……（比较级中）比较级 + than 点对点
3. **big** / big / adj. 大的 - bigger - the biggest 辨析 { big 大的(形状) / large 大的(体积) } 点对点
4. **house** / haʊs / n. 房屋 - houses (pl.)
   ↔ housework n. 家务劳动（u.n.）
   do the housework 做家务劳动
5. **heavy** / 'hevɪ / adj. 重的；猛烈的 - heavier - the heaviest 点对点
   ↔ heavily adv. 重重地；剧烈地 - more heavily - (the) most heavily 用法
   How heavy be + n. ……有多重？同义句
6. **ton** / tʌn / n. 吨 tons 吨 + c.n.(pl)/u.n. 许多；大量 = a lot 吨 = lots 吨
7. **size** / saɪz / n. 尺寸 点对点
   the size of… ……的尺寸 + v.单三/is
8. **shoe** / ʃu: / n. 鞋
   通常以复数 shoes 形式出现，用所有修饰可数名词复数的词修饰
   a pair of shoes 一双鞋

Figure 1: T1’s Note on Learning Guide



= What's the weight of …?
= How much do/does + n. + weigh?
weigh v. 称重 ↔ weight n. 重量
汉译英：1. 这头大象多重？
How heavy is this elephant?
= What's the weight of this elephant?
= How much does this elephant weigh?
2. 这些苹果多重？
How heavy are these apples?
= What's the weight of these apples?
= How much do these apples weigh?

Figure 2: T1’s Note on Differentiated Learning Objectives

Differentiated Assessment and Evaluation

In the research context, two commonly used assessment are vocabulary quiz in class and everyday homework. In the data collected, besides differentiated objectives, T1 adjust assessments based on student levels as well.

> T1: *Then, in addition to the stratification in teaching, I also adopted differentiation in the quiz of words and phrases. So, when the students in these three levels were tested on words and phrases, I used a different setting. Well, because. I used English handout created myself for teaching. There were all the usages of words, the collocations of words, the sentences in the text, and the original text in the textbook. It was something like this.*
>
> *…in terms of homework, we also divide it into different levels. For students with poor grades, we basically ask them to memorize words, …focus more on memorization. And for children with better grades, there will be extra test papers. I will find some questions for them to do.*

However, T2 thought of the topic slightly differently.

> *T2: As for homework, it is usually difficult to stratify it, because every assignment has to be covered in class, so basically, um, everyone thinks it is similar, um, as long as it is written, it is similar.*
>
> *There will definitely be different requirements in the evaluation. Well, because students with average or slightly lower levels, um, may not be able to do some physical work, for example. Well, for such students, the requirements may be slightly relaxed.*

Challenges and Considerations

Both participants raised the same concern on the challenge part of apply differentiation in their teaching, which is the size of class. They both mentioned it was hard to divide the class to equal amount to all level of students. So that they could all gain something from their teaching.

> *T1: Even I think differentiated instruction is very good, but it also has a drawback…Some students may be neglected because of my stratification, …what about the children in the middle? … but they are not yet that kind of extreme good. If you put them in the bad ones, it will be a waste for them. So I divided they into three layers, …then there are too many layers. Then there is a problem, that is, you may only be able to pay more attention to one certain layer.*
>
> *T2: Actually, this method, as I said, is still a problem of applying it. Well, because, you always have to teach the whole class. In the classroom, you teach nearly 50 people. For example, if you have to teach 15 questions today, then if you say that this question is difficult, the students behind can stop listening. I think for those children, in this class, they don't gain much.*

Another point worth noting is that the two participants consider the psychological impact of differentiation to their students in opposite ways. T1 consider differentiation brought her students a positive environment of competition. While T2 worried about that will cause negative emotions for level B students.

> *T2: I think it is difficult to apply, because students with good and bad grades are all in the same classroom, so it is impossible to say that a certain homework, some students do not need to do it. Well, I think for the students with poor grade, this will also cause a psychological gap for them.*

Conclusion

The study explored the ddifferentiation in classroom practice and their views of two teachers using semi-structured interviews. The study showed positive results as both preservice teachers developed their own pedagogical strategies and considerations regarding applying differentiated instruction on their teaching. This study is, however, small in scope as only two participants were involved in the data collection. Thus, the findings of this research may not be generalizable or apply to other teaching contexts.

References

Adamson, B. (2004). China's English: A history of English in Chinese education. Hong Kong: Hong Kong University Press.

Algozzine, B., & Anderson, K. M. (2007). Tips for teaching: Differentiating instruction to include all students. Preventing School Failure, 51(3), 49-54. https://doi.org/10.3200/PSFL.51.3.49-54

Bloom, B. S. (1976). Human characteristics and school learning. McGraw-Hill.

British Educational Research Association [BERA] (2018). Ethical Guidelines for Educational Research, fourth edition, London. Available at: https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018-online (Accessed: 3 April 2024).

Clarke, V., and Braun, V. (2017). 'Thematic analysis', *The Journal of Positive Psychology*, 12(3), pp. 297-298. doi:10.1080/17439760.2016.1262613

Confucius. (2016). *The analects*. Open Road Media.

Croker, R.A. (2009). An Introduction to Qualitative Research. In: Heigham, J., Croker, R.A. (eds) *Qualitative Research in Applied Linguistics*. Palgrave Macmillan, London. https://doi.org/10.1057/9780230239517_1

Fang, F. (2010). A discussion on developing students' communicative competence in university English teaching in China. *Journal of Language Teaching and Research*, *1*(2). https://doi.org/10.4304/jltr.1.2.111-116

Head, G. (2020). Ethics in educational research: Review boards, ethical issues and researcher development. *European Educational Research Journal EERJ, 19*(1), 72-83. https://doi.org/10.1177/1474904118796315

Huang, L. (2008). 英语中考考察目标与备考策略 [English high school Entrance examination objectives and test preparation strategies]. *Journal of Basic English Education, 10*(1), 71-77. https://kns.cnki.net/kcms/detail/detail.aspx?dbcode=CJFD&dbname=CJFD2008&filename=SDWG200801018&uniplatform=NZKPT&v=5d3bmFUm0g_o2h-wlk0EvMwalv8qU-B0hiI8FAEcFPJ0lqX3OCLMaP3PzQ_gQLVG

Jupp, V. (2006). *The sage dictionary of social research methods*. London: Sage publication. Ltd.

Kowal, S., & O'Connell, D. (2014). Transcription as a crucial step of data analysis. In *The SAGE Handbook of Qualitative Data Analysis* (pp. 64-78). SAGE Publications Ltd, https://doi.org/10.4135/9781446282243

Luo, M., Main, S., Lock, G., et al. (2019). Exploring Chinese EFL teachers' knowledge and beliefs relating to the teaching of English reading in public primary schools in China. *Dyslexia (Chichester, England), 26*(3), 266-285. doi:10.1002/dys.1630

The Ministry of Education of the People's Republic of China (MOE). (2001). 基础教育课程改革纲要(试行). [The secondary Education Curriculum Reformation Guideline (Beta)]. 北京: 人民教育出版社.

The Ministry of Education of the People's Republic of China (MOE). (2003). 普通高中英语课程标准:实验. [Curriculum standard of Senior English: Experimental]. 北京: 人民教育出版社.

The Ministry of Education of the People's Republic of China (MOE). (2011). 义务教育英语课程标准. [Compulsory Education English Curriculum Standard]. 北京: 人民教育出版社.

Pan, L., & Block, D. (2011). English as a "global language" in China: An investigation into learners' and teachers' language beliefs. *System (Linköping), 39*(3), 391-402. doi:10.1016/j.system.2011.07.011

Richards, J.C. (2017). Curriculum development in language teaching (2nd ed.). New York, NY: Cambridge University Press.

Vygotskiĭ, L. S., Cole, M., John-Steiner, V., Scribner, S., & Souberman, E. (1978). *Mind in society: The development of higher psychological processes.* Harvard University Press. https://www.vlebooks.com/Product/Index/353559?page=0&startBookmarkId=-1

Wei, R., Yuan-shan, C., & Chih-Ying, L. (2016). University students' perceptions of ELF in mainland China and Taiwan, *System*, *56*, 13-27. Doi.org/10.1016/j.system.2015.11.004.

Xue, S. (2015). 浅析高考英语听力测试的"去"与"留" [On the future of the English listening test for University Entrance Examination]. *校园英语,* (15), 104.

Yu, T. G., & Zhang, H. (2019). Intercultural challenges, intercultural practices: How Chinese and Australian students understand and experience intercultural communication at an Australian university. *Higher Education, 78*(2), 305-322. doi:http://dx.doi.org.proxy.library.upenn.edu/10.1007/s10734-018-0344-0

Zhao, J., Joshi, R.M., Dixon, L.Q. et al. (2016). Chinese EFL teachers' knowledge of basic language constructs and their self-perceived teaching abilities. *Ann. of Dyslexia 66*, 127–146. https://doi.org/10.1007/s11881-015-0110-2

Zhou, Z. (2017). The Investigation of the English Grammar Learning Strategy of High School Students in China. *Theory and Practice in Language Studies*, *7*(12), 1243. https://doi.org/10.17507/tpls.0712.11

Zhu, J. (2011). Chinese and American English teaching methods in contrast. *Overseas English, 2011*(8), 166-167.

Contact email: 2701092y@research.gla.ac.uk

Beyond the Game: Enhancing Emotional and Physical Childhood Resilience With FlexiŠerming

Stephan Drescher, Foundation Science21, Czechia
Blanka Drescher, Foundation Science21, Czechia
Leonard Bernau, Foundation Science21, Czechia

The European Conference on Education 2024
Official Conference Proceedings

Abstract
FlexiŠerming is an innovative method aimed at cultivating resilience in children through playful engagement, grounded in the experiences of an educator and father of four. This approach utilizes a simple, adaptable game to develop resilience as a learnable and expandable skill, addressing contemporary challenges such as overprotection, ubiquitous technology, and increasing social and emotional detachment. FlexiŠerming involves a game that merges physical activity with the playful overcoming of challenges, thereby training children's physical and emotional resilience. The method is based on social learning theory principles, emphasizing the significance of imitation and role-playing in children's cognitive and emotional development, and fostering social interactions and empathy. FlexiŠerming is presented not just as a game but as a life lesson, easily integrated into both home and educational settings, offering an affordable, inclusive, and flexible way to bolster resilience in children, preparing them to face life's challenges with confidence and determination.

Keywords: Resilience, Childhood Development, FlexiŠerming, Social Learning Theory, Playful Engagement

iafor
The International Academic Forum
www.iafor.org

Introduction to Modern Challenges in Child Development

The modern era presents numerous challenges for children's development, including overprotection, ubiquitous technology, and increasing social and emotional detachment To address the growing need for effective, accessible, and low-cost methods that can be easily implemented in everyday educational settings—such as schools, kindergartens, and families—to foster resilience in children, it is crucial to explore innovative approaches.

1. FlexiŠerming: An Innovative Approach to Building Resilience

FlexiŠerming, a novel approach rooted in social learning theory, provides a playful yet powerful solution that meets these demands. This method offers a practical and impactful way to enhance children's resilience in a variety of educational contexts, making it a valuable contribution to contemporary educational practices. Developed by an educator and father, FlexiŠerming presents a method to cultivate resilience as a skill, preparing children to face life's challenges with confidence and determination. Resilience in children, understood as the capacity to adapt and thrive amidst adversity, is gaining recognition as a fundamental aspect of healthy development. In a rapidly changing world where challenges such as family stress, socioeconomic hardships, and environmental uncertainties are increasingly common, resilience is not merely a desirable trait but a vital necessity. This discussion delves into the significance of resilience in children, the factors that contribute to its development, and strategies for fostering resilience.

2. Resilience as a Developmental Process in Childhood

Resilience is not an innate quality but a dynamic process that develops over time through the interaction of various individual, familial, and environmental factors. According to Condly (2006), resilience allows children to overcome significant adversities and achieve successful social and academic outcomes. His review highlights that resilience is shaped by a complex interplay of factors, including the child’s own characteristics, family support, and the broader community context. For instance, children who are able to navigate through challenging circumstances often exhibit strong problem-solving skills, emotional regulation, and a supportive social network. These findings underscore the importance of creating supportive environments that can foster resilience, especially in at-risk children who are exposed to higher levels of stress and adversity.

Masten and Barnes (2018) further expand on the concept of resilience by discussing the advances in developmental resilience science. They emphasize that resilience should be viewed as a common and dynamic process, influenced by multiple systems ranging from biological to sociocultural. Their work stresses the importance of early intervention and the role of healthcare practitioners, educators, and family caregivers in nurturing resilience. They argue that human resilience is not a rare trait but a fundamental aspect of healthy development that can be cultivated through targeted strategies. For example, Masten and Barnes highlight the significance of timing in interventions, noting that the earlier the intervention, the more effective it is in fostering resilience. This perspective aligns with the idea that resilience is not a fixed attribute but one that can be developed and strengthened over time through appropriate support and guidance.

3. Neuropsychological Approaches to Strengthening Resilience in Children

The integration of neuropsychology and prevention research is explored by Greenberg (2006), who emphasizes its importance in promoting resilience. He argues that preventive interventions targeting the enhancement of executive functions—such as inhibitory control, planning, problem-solving skills, and emotional regulation—are essential for building resilience in children and youth. According to Greenberg, these cognitive and emotional skills act as protective factors that enable children to manage stress, navigate social relationships, and make informed decisions, thereby strengthening their overall resilience. He also highlights the critical role of educational settings in fostering these skills, noting that schools are uniquely positioned to implement resilience-building programs that can have a lasting impact on children's development. The convergence of insights presented in this article illustrates that resilience in children is a multifaceted construct that can be nurtured through a combination of individual, familial, and systemic interventions. Supportive environments and the role of community are crucial in fostering resilience, while the dynamic and developmental nature of resilience underscores the need for early and sustained interventions. Additionally, cognitive and emotional skills are integral to resilience and can be enhanced through targeted educational programs. Supporting studies in this article illustrate the effectiveness of these approaches in cultivating resilience in children. In conclusion, resilience is a vital component of healthy child development, enabling children to cope with and overcome the adversities they may encounter. The research reviewed here suggests that resilience is not a static trait but a dynamic process that can be cultivated through intentional and well-timed interventions. By understanding the factors that contribute to resilience and implementing strategies to promote it, educators, healthcare providers, and caregivers can play a crucial role in supporting the well-being and success of children, particularly those at risk. As society continues to face new challenges, the importance of fostering resilience in the next generation cannot be overstated, making it a priority in both research and practice.

4. The Role of Play in Developing Resilience and Cognitive Skills

Play, particularly role-play, is increasingly recognized as a fundamental component of child development, contributing significantly to the cultivation of social-emotional, cognitive, language, and physical skills (Milteer, Ginsburg, & Mulligan, 2012). Through imaginative activities, children engage in role-play, which allows them to explore various social roles, refine linguistic and communicative abilities, and deepen their understanding of the surrounding environment (Yogman et al., 2018). Role-play is particularly instrumental in enhancing executive functions such as self-regulation, problem-solving, and goal-directed behavior—skills that are crucial not only for academic success but also for overall life outcomes. This structured and secure environment facilitates the rehearsal and refinement of these skills, enabling children to explore potential outcomes, negotiate social norms, and collaborate with peers, thereby fostering empathy, social cognition, and a prosocial orientation (Masten & Obradović, 2008). Moreover, play serves a critical role in mitigating the detrimental effects of toxic stress by providing a controlled and supportive setting where children can express and process emotions associated with stressful experiences, which is essential for building resilience (Feldman, 2020). This resilience equips children with the psychological tools necessary to effectively navigate adversity and thrive in challenging circumstances. FlexiŠerming, an innovative approach designed to engage children in physical activity through playful challenges, further emphasizes the importance of role-playing and imitation in fostering cognitive and emotional growth. The method is adaptable, allowing for

modifications based on the children's needs and contexts, and it encourages them to face difficulties, learn from failures, and develop perseverance.

Early mastery of rules through play is also crucial for children's social and cognitive development, as it helps them understand social conventions and commitments (Hardecker, Schmidt, & Tomasello, 2017). By mastering rule use in early childhood, children enhance their ability to navigate complex structures, which is fundamental for later cognitive and social competence (Mathy et al., 2015). These processes collectively underscore the importance of integrating play into early childhood education and care practices to promote holistic well-being and long-term success: Here's an overview of the set of rules that apply for FlexiŠerming:

a. Arena Setup:
   - Fighting/playing only in the "Arena" with a diameter of 3-5 metres.
b. Greeting:
   - Before each round, greet each other by crossing the tips of your clubs.
c. Game Duration:
   - Play until a predetermined number of points is reached (3 points is a quick game of 2-4 minutes).
d. Scoring:
   - Points are only awarded for hitting the head or the torso.
   - Arms and legs do not count and can be used for defense.
e. Fair Play:
   - The aim of the game is FairPlay.
   - Each player reports a hit on their body.
   - A code word, e.g., "stop" signals that a pause is needed.

4.1. Cost-Effective Strategies for Enhancing Learning in Everyday Practice

Teachers benefit from using straightforward and cost-effective methods in their daily practice to improve children's overall learning behavior. Easily implementable techniques, such as distributed practice and retrieval practice, have been shown to significantly improve learning outcomes without substantial costs, making them accessible for teachers to use effectively in the classroom (Dunlosky et al., 2013). Additionally, these cost-effective methods not only foster creativity and cooperation among students but also enable teachers to work collaboratively with children and to foster cooperation within the learners group (Butler et al., 2014). FlexiŠerming can be easily integrated into both home and school environments. In schools, teachers can incorporate FlexiŠerming into physical education or recess activities. At home, parents can use the method as a way to bond with their children while teaching them valuable life skills. The method's adaptability makes it suitable for children of all ages and abilities, promoting inclusivity and accessibility. Integrating educational practices from school into the home environment is beneficial for children, as it ensures consistency in teaching strategies and supports their learning progress across different settings (Sandler & Coren, 1981). Studies have shown that increased parent engagement in home learning activities, facilitated by practices used in early childhood education, is associated with better academic readiness and overall development in children (Barnett et al., 2020).

Figure 1: Male PE teacher

Figure 2: 7 years old boys

Figure 3: Mother and son

Figure 4: Female teacher

Conclusion

The extensive application and observation of the implemented method over several years, both in private settings and within the educational system, have yielded significant findings. The method was rigorously employed by the author and eight physical education teachers across three different schools, as well as in the Science21 Foundation's student program, engaging children and educators alike. These longitudinal observations, supplemented by substantial feedback, lead to several key conclusions regarding the method's effectiveness.

Preliminary results from various implementations of FlexiŠerming indicate significant improvements in children's physical and emotional resilience. Educators and parents have reported increased confidence, better stress management, and enhanced social interactions among children who participate in FlexiŠerming activities. These findings highlight the potential of FlexiŠerming as a valuable tool for fostering resilience in children. Initially, participants' fear of pain transforms into a profound sense of respect, illustrating a shift in emotional response. This evolution is accompanied by notable improvements in emotional and mental stability, indicating that the method contributes significantly to psychological resilience. Participants exhibit enhanced self-awareness and spatial perception, coupled with improved reflexive responsiveness, which underscores the method's impact on cognitive and physical faculties. Moreover, the method fosters heightened self-control and discipline among participants. It ingrains the ability to comprehend and adhere to a simple set of rules, demonstrating its educational value in teaching respect for regulations. Additionally, the

method enhances positive self-perception and self-reflection, crucial elements for personal growth and self-improvement. Participants also develop a better understanding of their own limits and those of others, which is essential for fostering empathy and social cohesion.

Feedback from educators highlighted the method's flexibility and cost-effectiveness, as it requires no special equipment or dedicated spaces and can be implemented within a wide range of timeframes. Teachers frequently utilized the method during physical education classes, either in short, focused sessions or as part of class competitions. Furthermore, classroom teachers favored the method during afternoon sessions to energize and activate students.

In conclusion, the method not only promotes physical and mental well-being but also instills essential life skills and values, making it a valuable tool in both educational and personal development contexts. Its adaptability and ease of use, combined with its minimal resource requirements, further enhance its applicability and appeal within various educational settings. The success of FlexiŠerming can be attributed to its foundation in social learning theory, which underscores the role of social interactions and imitation in learning. By addressing contemporary challenges such as overprotection and social detachment, FlexiŠerming offers a practical and effective means of building resilience. Compared to other methods, FlexiŠerming stands out for its adaptability, inclusivity, and ease of integration into various settings. FlexiŠerming presents a novel approach to enhancing childhood resilience through playful engagement. Grounded in social learning theory, it addresses modern challenges and offers a flexible, inclusive, and affordable way to prepare children for life's adversities. Future research should continue to explore the long-term impacts of FlexiŠerming and its potential applications in diverse contexts.

Acknowledgements

I would like to express my sincere gratitude to the Science21 Foundation for enabling the scientific development and research of this method. Additionally, I extend my heartfelt thanks to my four children, whose constant application of this method has brought me immense joy and insight and inspired me to further develop this method and make it accessible to other children.

References

Barnett, M., Paschall, K., Mastergeorge, A., Cutshaw, C., & Warren, S. (2020). *Influences of Parent Engagement in Early Childhood Education Centers and the Home on Kindergarten School Readiness*. Early Childhood Research Quarterly, 53, 260-273. https://doi.org/10.1016/j.ecresq.2020.05.005

Bigelow, B., Tesson, G., & Lewko, J. (1997). *Learning the Rules: The Anatomy of Children's Relationships*. Journal of Marriage and Family, 59, 497. https://doi.org/10.2307/353492

Butler, A., Marsh, E., Slavinsky, J., & Baraniuk, R. (2014). *Integrating Cognitive Science and Technology Improves Learning in a STEM Classroom*. Educational Psychology Review, 26, 331-340. https://doi.org/10.1007/S10648-014-9256-4

Carson, V., & Kuzik, N. (2021). *The association between parent-child technology interference and cognitive and social-emotional development in preschool-aged children.* Child: care, health and development. https://doi.org/10.1111/cch.12859

Dunlosky, J., Rawson, K., Marsh, E., Nathan, M., & Willingham, D. (2013). *Improving Students' Learning With Effective Learning Techniques.* Psychological Science in the Public Interest, 14, 4-58. https://doi.org/10.1177/1529100612453266

Feldman, R. (2020). *What is resilience: an affiliative neuroscience approach*. World Psychiatry, 19. https://doi.org/10.1002/wps.20729

Fleer, M., & Hedegaard, M. (2010). *Children's Development as Participation in Everyday Practices across Different Institutions*. Mind, Culture, and Activity, 17, 149-168. https://doi.org/10.1080/10749030903222760

Hardecker, S., Schmidt, M., & Tomasello, M. (2017). *Children's Developing Understanding of the Conventionality of Rules*. Journal of Cognition and Development, 18, 163-188. https://doi.org/10.1080/15248372.2016.1255624

Hosokawa, R., & Katsura, T. (2018). *Association between mobile technology use and child adjustment in early elementary school age*. PLoS ONE, 13. https://doi.org/10.1371/journal.pone.0199959

Koeners, M., & Francis, J. (2020). *The physiology of play: potential relevance for higher education.* International Journal of Play, 9, 143-159. https://doi.org/10.1080/21594937.2020.1720128

Masten, A., & Obradović, J. (2008). *Research, part of a Special Feature on Managing Surprises in Complex Systems Disaster Preparation and Recovery: Lessons from Research on Resilience in Human Development*. https://doi.org/10.5751/ES-02282-130109

Mathy, F., Friedman, O., Courenq, B., Laurent, L., & Millot, J. (2015). *Rule-based category use in preschool children*. Journal of experimental child psychology, 131, 1-18. https://doi.org/10.1016/j.jecp.2014.10.008

Menendez-Garcia, A., Jimenez-arroyo, A., Rodrigo-Yanguas, M., Marín-Vila, M., Sánchez-Sánchez, F., Román-Riechmann, E., & Blasco-Fontecilla, H. (2020). *Internet, video game and mobile phone addiction in children and adolescents diagnosed with ADHD: a case-control study*. Adicciones, 0 0, 1469. https://doi.org/10.20882/adicciones.1469

Milteer, R., Ginsburg, K., & Mulligan, D. (2012). *The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bond: Focus on Children in Poverty*. Pediatrics, 129, e204-e213. https://doi.org/10.1542/peds.2011-2953

Sandler, A., & Coren, A. (1981). *Integrated Instruction at Home and School: Parents' Perspective*. Education and training of the mentally retarded, 16.

Strauss, A. (1954). *The development of conceptions of rules in children.* Child development, 25 3, 193-208. https://doi.org/10.1111/J.1467-8624.1954.TB04755.X

Tlhah, M., Halim, N., & Rahman, N. (2023). *Challenges and effects of technology in emotional and psychological development of children*. Al Athfal: Jurnal Kajian Perkembangan Anak dan Manajemen Pendidikan Usia Dini. https://doi.org/10.52484/al_athfal.v6i1.410

Yoo, H. (2023). *Coping With Changes in the World Affecting Children*. Journal of the Korean Academy of Child and Adolescent Psychiatry, 34, 189-189. https://doi.org/10.5765/jkacap.230060

Contact email: stephan.drescher@science21.cz

Making a Real Difference in Physical Education: The Contribution of Reflection in Initial Conceptions of the Teaching Profession

Ana Rita Águeda, University of Porto, Portugal
Paula Silva, University of Porto, Portugal
Paula Queirós, University of Porto, Portugal

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In Physical Education literature, reflective practice has been praised through its integration into curriculum programs. Especially in initial teacher education (ITE), the path to follow aims to overcome the barriers imposed by behavioral and technicist approaches, refraining from any critical thinking, questioning or autonomy to both teachers and students. Given the relevance of reflection to access new lens to view teachers practice and alter their perspectives, the purpose of this study was to comprehend the contribution of reflection in changing, or not, the understandings that future teachers have about teaching practices in Physical Education. A total of one hundred and twenty-two participants from the first year of a master's program in Physical Education were included in this study, during the 2021/2022 academic year. Data collection was carried out through individual reflections of teaching professionalism curricular unit. A deep familiarization with the data was conducted and central themes were generated using thematic analysis (Braun & Clarke, 2006). The results showed that: i) future teachers have a limited conception in the initial phase of their training, which is shaped through reflection stimulated throughout the semester; ii) reflection allowed an understanding of pedagogical practice focused on reflective practice, adapting to the contexts diversity. These results indicate the need for ITE to promote spaces for reflection among professionals, who consider continuous critical reflection, in order to integrate it into daily professional practice. Therefore, it will be possible to guarantee quality in Physical Education, which effectively contributes to students' development as critical and participatory citizens.

Keywords: Reflection, Initial Teacher Education, Physical Education, Teaching Profession

iafor
The International Academic Forum
www.iafor.org

Introduction

Teacher education programs play a critical role in shaping the capabilities, attitudes and conceptions of future educators. A straightforward look at professional legacies reveals that teachers have oscillated noticeably between a mission of reproducing the system and one of social transformation and progress. In both cases, they often operated under a logic that functionalizes teaching activity, frequently positioning themselves as agents who comply with instructions without questioning them.

Little attention has been given to the significance that initial training programs can have in developing a reflective and critical attitude. However, there is an evident dedication to research the impact of reflection in the teaching profession. Understanding how complex the process of a teacher's training is requires starting with an investigation in the initial phase, where initial conceptions and reflective awareness reveal the lenses through which future teachers will interpret new knowledge.

Reflection in the Physical Education Teacher Education Programs

The global landscape of education is constantly evolving, influenced by diverse factors such as technological advancements, shifting societal needs, and changing educational policies. In this dynamic environment, the ability to reflect critically on one's practices and adapt to new challenges becomes increasingly essential. As such, initial teacher education programs must equip future educators with the reflective skills necessary to navigate these complexities and foster inclusive and effective learning environments.

However, the scenario is not as bright as expected. In fact, teacher education programs are still battling to overcome technical approaches. As so, teachers were only focused on technical aspects and did not consider student's needs, acting like "robots".

In the field of education, despite the definition of reflection is ambiguous and not clearly defined (Jay & Johnson, 2002; Zeichner & Liston, 2013), its power and impact on initial teacher education is significant. In recent decades, there has been a growing recognition of the importance and need of reflective practices within initial teacher education frameworks (Minott, 2019; Zeichner, 1983).

Reflection continually emerges as a suggested way of helping practitioners better understand what they know and do, as they develop their knowledge through reconsidering what they learn in practice. Reflection, then, places an emphasis on learning through questioning and investigation to lead to a development of understanding. Therefore, is seen as a key element of building a 'self' and developing an ongoing need for professional development (Martínez & Collado, 2019). As such, Lizana and García (2022) affirm that is essential to promote systematic and conscious reflective processes, where teachers strive to develop their capacity to the fullest and also gain and understanding of their own professional practice.

Accordingly to recent investigations, it seems consensual that initial teacher training programs fail to prepare future teachers for the multiplicity of situations that arise in the real context of practice, much less to provide all the content and strategies required throughout their teaching career (Crawford et al., 2012). Nevertheless, it is recognized that the preparation and development of reflective teachers has been one of the goals of these programs, enabling the training of future educators being based on effective decision-making

and the ability to translate and adjust pedagogical knowledge to the real practice context (Zeichner, 1986).

In the specific context of Physical Education, reflection has been one of the fundamental and central elements for improving teacher effectiveness in student learning (Larrivee, 2008). This is why many current theories and empirical evidence have emphasized the relevance of reflection in teaching (Marshall, 2019).

If we consider the existing research on Physical Education pedagogical practices, educational aspirations often remain unrealized in practice. Studies demonstrate that teachers may place more emphasis on maintaining high levels of physical activity than on what students actually learn (Quennerstedt, 2019). Also, this subject may be perceived merely as a break from academic subjects where students can let steam off (Morgan & Hansen, 2008), and teachers may use direct instruction as their predominant pedagogical approach to deliver the entire depth of the curriculum.

In the initial training for Physical Education, although it has been dominated by technical rationality (Schön, 1983) and behavioral models (Zeichner, 1983), reflection has gained the importance it deserves (Tsangaridou & O'Sullivan, 1994). The recent contribution by Fernández et al. (2022) highlights the attempt to break away from traditional trends in Physical Education, which are exclusively centered on the body, favoring a deeper understanding of how practice develops through reflection. Ultimately, this discussion seeks to illuminate the path toward creating a generation of educators who are not only skilled practitioners but also critical thinkers and changemakers capable of fostering equity and excellence in diverse educational settings.

In addition to enhancing professional capacities (Tsangaridou & O'Sullivan, 1997), the reflective dimension in the initial training of teachers triggers conscious, systematic, and deliberate decision-making, through which educators can cyclically review their practices, aiming to achieve high standards of quality in Physical Education teaching. Moreover, there has been recognition of the importance of continuing to strive for a more critical and democratic Physical Education, where reflection is a fundamental basis of pedagogical practice (Brasó i Rius & Torrebadella Flix, 2018).

For this reason, it is crucial that educational institutions training teachers, in this case for Physical Education, stimulate students' reflective capacity and promote its importance, fostering ongoing monitoring and evaluation of practice.

Considering that reflection serves as powerful tool for prospective Physical Education teachers, by enabling them to critically analyze, understand and adapt their teaching, this study was conducted through the first semester in a specific Physical Education Teacher Education scenario and examined how reflection can impact the initial conceptions that students in initial training have about the teaching profession.

Methodology

Context

This study was conducted in the Faculty of Sports of University of Porto (FADEUP) , during the 2021/2022 academic year, more specifically throughout the first semester of the Master's degree in Physical Education Teaching in Primary and Secondary Education.

FADEUP is characterized as an educational context of good practices, where the development and encouragement of reflection and critical thinking among future Physical Education teachers are constant and permanent in the curriculum plan.

Within the scope of Teaching Professionalism curricular unit, the students were often called upon to reflect, individually or in groups, and to write evaluative documents at the end of each task. At the end of the first semester, they were asked to create a final reflection illustrating how they felt they were "learning to be teachers", by mentioning any changes in their understandings and positions regarding the teaching profession.

Participants

In the 2021/2022 academic year, the 122 students enrolled in the Teaching Professionalism curricular unit elaborated a final written reflection. Despite the association of this final document with a specific curricular unit, they were also invented to reflect on the contribution of the entire semester to their professional development.

Data Collection

The data emerged from the final and individual reflections of the 122 participants. Document analysis, as a research method, is particularly applicable to qualitative studies, which produce rich descriptions of a single phenomenon, event, organization or program (Stake, 1995). Therefore, this method adapts to our investigation purposes.

Written documents can serve a variety of purposes, such as: a)provide data on the context within which research participants operate; b) suggest some questions that need to be asked and situations that need to be observed as part of the research; c) provide supplementary research data; d) provide a means of tracking change and development; e) documents can be examined as a way to verify findings or corroborate evidence from other sources (Bowen, 2009).

Document analysis is recognized as a source in which the researcher can obtain evidence that support the participant's statements, with a permanent access and has a low financial cost, providing greater accessibility (Guba & Lincoln, 1981). Moreover, this type of analysis is reported as a non-reactive source, allowing information to be obtained after long periods of time and written reflections can be considered as a natural contextualized source of information (Kripka et al., 2015).

The data collected through the analysis of the final reflections allows to verify the contribution of reflection in initial education training, but also to understand whether there are significant changes in their thoughts and conceptions about the teaching profession. This

was possible by skimming (superficial examination), reading (through examination) and interpreting (Bowen, 2009) students reflections.

Data Analysis

The analysis was guided by the guidelines of Braun and Clarke (2006) due to the use of thematic analysis. Each phase of the coding process and theme development ensured the evolution of the themes was clear and traceable, which helped ensure the rigor of the research.

Familiarization with the data was achieved through repeated readings of the documents, complemented with initial annotations. Subsequently, the documents were read line by line, and the initial codes were written in a column attached to the respective document. Major patterns were sought throughout the data set, grouping them into themes (Braun & Clarke, 2006). A more inductive and data-driven approach was emphasized, acknowledging the role of the researchers in the co-creation of the themes.

The quotes added to the prose of this analysis were reread in their original context to ensure that their representations were a credible reflection of what was written. Finally, names were assigned to the themes, identifying their respective essence, so that the excerpts were coherent and internally consistent within each theme (Braun & Clarke, 2006; Joffe, 2012).

Trustworthiness

Given the qualitative nature of the study, this investigation was not developed by sustaining universal generalizations and unidirectional patterns. Our investigation team guaranteed a continuous evaluation (peer debriefing), through periodic meetings to discuss points of view and review the investigation procedures in a critical perspective.

Besides all this, the questioning of formulated ideas and a permanent discussion of personal conceptions were also taken into the investigator's consideration (Strauss & Corbin, 1998). Additionally, a permanent combination between the data and the investigator's interpretations was carried out, allowing an in-depth understating of the phenomenon that initially was set out to investigate.

Results and Discussion

Rediscovering the Teaching Profession

Through the first semester of this master's program in Physical Education, final reflections showed changes on student's initial conceptions about the teaching profession. While assuming the dual role of students and teachers, it was reported the necessity of thinking and acting from the teacher's perspective, allowing their thoughts on teaching-learning process to transcend their student experiences and misconceptions.

The first steps taken during the first four months of this Physical Education Teaching Program were assumed as fundamental in altering students' understandings about the demands of what being a teacher is all about, simply because it became evident a limited and generalized conception. The highlighted aspects were: a) the complexity of the teaching

profession; b) the importance of theory-practice link; c) learning as process ("continuum"); d) reflective teaching at the basis of Physical Education curricular programs.

The Complexity of the Teaching Profession

Based on the reflection that was stimulated during the first semester, students were able to understand the complex nature of the teaching profession and developed an awareness that teaching was much more than transmit content and behavior control.

> *"Being a good teacher is not just about these perceptions, so throughout the semester I was able to learn and be conscious that the profession is much more complex than what I was particularly willing to find."*

> *"Through reflection, I was able to understand that when it comes to characterize the aspects of a good teacher, it is impossible to list all due to the complexity of the profession."*

This extracts indicate that, over time, students understandings about the teaching profession follow Perrenoud (2001) perspective, which claims the teaching is complex, requiring educators to have the ability to adapt and systematically seek new solutions. Although students emphasize changes of various understandings and conceptions, increased autonomy in teaching and conducting the teaching-learning process was also highlighted. Therefore, future teachers began to build their professional identity.

It is important to highlight that, due to the complexity of the teaching profession, final reflections stated that "they still haven't learned to be teachers" and emphasized the need for continuous professional development in teacher training. Consequently, this thoughts resonate with the definition of teaching profession proposed by Altet (2001) which describes it as a relational practice, influenced by multiple interactions and constrained by unique, complex and unpredictable situations.

The Importance of Theory-Practice Link

The relationship between university-taught theory and its application in practice context is still seen as a problematic aspect when considering the preparation of physical education teachers (Standal et al., 2014). As previously mentioned, traditional approaches restricted teaching by sending students into schools to apply the theoretical content. Despite research has acknowledged the limitations and difficulties of this theory-practice approach (Standal et al., 2014), the final reflections of FADEUP students revealed how important reflection was to change their understanding and thoughts about this specific topic.

> *"Exactly what we are doing right now, we are learning how to be professors by trying to increase our theoretical knowledge, but also associating it later with practice."*

> *"When I was asked what it means to be a teacher at the beginning of the school year, my response was: to transmit the theoretical content to the students. However, being a teacher is much more than that. It is not easy to be a teacher because it is an extremely complex profession. It is essential that we have several fundamental ingredients, such as the connection between theory and practice, professional culture and professional commitment."*

> *"... I understand that I will have many moments of learning ahead, and only practical experience will provide me with solutions to resolve them. I will have the theoretical knowledge to make informed choices and the ability to argue the 'why' behind my decisions, but each situation will be a new challenge."*

Although theory provides the knowledge necessary for understanding the essential principals of Physical Education, when applied in practical settings, teachers tend to develop a much more comprehensive understanding of how-to facility students learning. Despite content knowledge is critical, future teachers must consider their pedagogical methods and their personal choice of what and how to teach will be dependent and directly connected on theoretical knowledge from a different number of fields (Grimen, 2008).

In order to avoid the disconnection between what is learned in university and what is needed in real-world teaching scenarios, linking theory and practice enables future teachers to apply concepts in a meaningful way, reinsuring that a strong connection is being built.

The students of this mater's program tend to prioritize the future of Physical Education on a set of knowledge through which practical actions are grounded, but also a robust involvement between theory and practice which is essential for cultivating professionals who are not only knowledgeable but also effective in fostering meaningful Physical Education classes.

In their perspective, these concepts (theory and practice) act in a complementary way, providing the best tulles to justify their professional attitude and decisions based on scientific knowledge and not just through experience. As Winterstein (1995) states: theory without practice is empty, and practice without theory is blind.

Learning as a Process

Through the analysis of the final reflections of FADEUP students, the results demonstrated that at the beginning of this master's program, the future Physical Education teacher's conception of what it meant to be a teacher was limited to initial training. Once the professional internship year was completed, they expected and believed to be fully prepared for all the challenges, demands and difficulties that may arise from diverse practice scenarios.

However, due to reflection processes, at the end of the first semester this conception was totally altered, as the importance of continuous training was taken into consideration and repeatedly emphasized as essential for the teacher's professional development.

> *"It is curious to increasingly realize that initial training is, just as the name suggests, initial. And despite having completed the internship, my knowledge will never be complete and will change throughout my career."*

> *"If during my training as a student I created the idea that being a teacher would be a monotonous profession over the years, in this first semester I began to understand that this is not true; being a teacher is a work that is constantly updated and never finished."*

> *"In summary, I have not yet learned to be a teacher. It is in practice that we learn to be professionals, as our training is continuous, and this is just a small chapter in our careers."*

From this point of view, the importance of continuous education was highlighted, allowing future teachers to be in the center of their own careers, by transforming their conceptions, fostering self-awareness, improving self-image and becoming open to change and professional development (Lima et al., 2015). Therefore, students reinforce that teaching should be perceived as a career centered on lifelong learning and professional development.

The field of Education, including Physical Education, is constantly evolving. New teaching methodologies, advancements, social changes demand teachers constant update, designing more engaging and relevant Physical Education programs. This is why future Physical Education teachers have reported the need for educators to engaged in ongoing training.

Therefore, it is recognized that continuous education can have a positive impact on the improvement of pedagogical practices and, consequently, enhance the quality of Physical Education teaching (Junior & Tassoni, 2013). From this perspective, education training assumes a position of "incomplete," as the process is multifaceted, plural, has a beginning but never an end, is inconclusive, and self-formative (d'Ávila & Veiga, 2014). As so, future teachers "learn gradually" and emphasize the importance of renewing specific knowledge and skills.

There is no doubt that continuous professional development in Physical Education is fundamental to raise the quality of education that students receive. By actively engage in continuous learning, future Physical Education teachers reinforce the possibility to enhance their skills, adapt to changes in the educational landscape, and ultimately provide a more enriching and impactful experience for their students. As the field of education continues to evolve, the commitment to lifelong learning and professional growth will be predominant in cultivating future generations of active and critic individuals.

Reflective Teaching in Physical Education Curricular Programs

In the landscape of education, the emphasis on practical skills and theoretical knowledge has never been more crucial. In the field of Physical Education, the development of effective teaching methodologies that enhance student engagement, learning outcomes, and overall well-being is fundamental. While varying pedagogical techniques is an essential component, reflective practice has emerged as a vital process that educators can harness to cultivate a dynamic, responsive, and ultimately successful Physical Education.

The movement of reflective practices has been a theme currently portrayed and is essential when it comes to addressing teacher professional development (Martínez & Collado, 2019). Despite the complexity linked to reflective practices, teachers must be able to reflect on their own processes, methods, and teaching content with the aim of planning and promoting effective and relevant lessons. Reflective practices are also an integral part of the process of evaluating one's own teaching performance and preparation, student outcomes, as well as the ability to promote social interaction and self-realization in students (Thorsen & DeVore, 2013).

Understanding reflective practice as a strengthening element of the profession and as an element of professional development, it is intended that teachers take an active voice in education and in continuous training linked to practice. Reflective practice is, therefore, a form of knowledge (Schön, 1988) that not only allows teachers evolution but also of the teaching profession.

Throughout teaching professionalism classes, future Physical Education teachers were presented with questions that stimulated critical thinking about their own practice and the teaching-learning process. The initial questions, somewhat unsettling and disconcerting in their eyes, allowed them to reinterpret the role of reflection over time, recognizing its value in the teaching profession.

> *"In this way, I also understood that the reflective capacity is not just a characteristic of a good teacher, but a necessary condition for the full exercise of the profession."*
>
> *"In this profession, there is no place for closed minds, nor for narrow fields of vision..."*
>
> *"There are no correct or incorrect ways of teaching. There are, rather, strategies appropriate to each context, regardless of its type. The teacher must be an autonomous critic."*

However, at the very beginning of this mater's program future physical education teachers revealed to have different conception that, as seen above, changed throughout the semester.

> *"I had a misconception in which I believed I knew everything about this profession, and I would not give due interest to the opinions of people already in the field of education..."*
>
> *"The impact that reflective habits have on a teacher's ability to constantly improve and refine their practice was a concept that was not in my ideology of 'being a teacher.'"*
>
> *"Finally, another process that I consider relevant and fundamental for evolving as a professional is the process of reflection, which initially was not even something I questioned, and which has since made complete sense."*

FADEUP future teachers assume that reflective practice is not merely an additional component of Physical Education programs; it is a foundational process that contributes to the overall effectiveness of teaching and learning. By embracing a culture of reflection, educators can continually adapt their practices to meet the diverse needs of their students, promote lifelong healthy habits, and empower future generations through critical thinking. As the field of Physical Education continues to evolve, the integration of reflective practice will be crucial in shaping dynamic, responsive, and inclusive educational environments that foster both student success and educator growth.

Through commitment to reflective practices, Physical Education can transcend its traditional boundaries, becoming a comprehensive and transformative aspect of holistic education.

Conclusion and Implications

The engagement with critical thinking and reflection throughout the semester led students to think, feel and act differently through teaching processes, but also to understand the need to be career-long learners. As so, future teachers mentioned they are still discovering the new world of the teaching profession. There are multiple challenges, which is why it was reported the need to keep up-to-date and in constant renewal of knowledge. In this way, it is

recognized that continuous training can have a positive impact on improving pedagogical practices and thereby adding quality to Physical Education teaching (Junior & Tassoni, 2013).

At the beginning of initial teacher education, future Physical Education teachers are not aware of the demands and complexity of the profession. This point of view follows Perrenoud (2001) perspective, who attests that teaching professionalism is complex, so the teaching professionals need to develop the ability to adapt to the complexity of each situation and systematically seek new solutions through reflection.

Moreover, the need to integrate praxis is highlighted (reflected and theorized practice), facing theory and practice as complementary concepts. Therefore, it is crucial that the future Physical Education teacher know how to justify professional attitudes and decisions based on scientific knowledge and not only through experience.

Future teachers were able to reflect on an ethical dimension, going beyond the initial conception they had that favored traditional teaching, strongly marked by transmission and execution. As so, reflexive practice is recognized as a path to achieve knowledge, but also as a path to refocus the attention to students' voices, thoughts and needs, instead of possessing and applying fragmented techniques capable of assisting in instruction and controlling behavior (Larrivee, 2000).

In order to make a difference in Physical Education, reflection in initial teacher education triggers conscious, systematic, deliberate decision-making which allows teachers to review their own practices in a cyclical way, aiming to achieve high quality standards in Physical Education teaching.

For this reason, the curriculum of initial teacher education must be a context concerned with the development of professionals with creative thinking, who recognize the practical and social meaning of the profession, that place the student at the center of learning. In this sense, this work reinforces the need of reflection, which has a positive and beneficial impact on raising awareness of what being a physical education teacher demands and consequently on learning new content. In the process of becoming teachers, the need for initial training to value continuous critical reflection, both individual and collaborative, is highlighted, so that it is incorporated as an integral part of daily professional practice.

However, as every study, we have to address some limitations. The education and past experiences of each student was not analyzed, which could affect the nature and depth of reflections. Also, the final reflections were part of the final evaluation, which can lead to biased responses, as students could write what they thought to be the correct answer, or what the teacher was expecting to read.

Acknowledgements

This research was funded by the Portuguese Foundation for Science and Technology (FCT), grant number 2023.05395.BD. The authors have no conflict of interest to declare.

References

Altet, M. (2001). As competências do professor profissional: entre conhecimentos, esquemas de ação e adaptação, saber analisar. *Formando professores profissionais: Quais estratégias*, 23-35.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*, *9*(2), 27-40.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.

Crawford, S., O'Reilly, R., & Luttrell, S. (2012). Assessing the effects of integrating the reflective framework for teaching in physical education (RFTPE) on the teaching and learning of undergraduate sport studies and physical education students. *Reflective Practice*, *13*(1), 115-129.

d'Ávila, C. M., & Veiga, I. P. (2014). *Profissão docente: novos sentidos, novas perspectivas*. Papirus Editora.

Grimen, H. (2008). Profesjon og kunnskap. I (s. 71–86). *Oslo: Universitetsforl., cop*.

Guba, E. G., & Lincoln, Y. S. (1981). *Effective evaluation: Improving the usefulness of evaluation results through responsive and naturalistic approaches*. Jossey-Bass.

Jay, J. K., & Johnson, K. L. (2002). Capturing complexity: A typology of reflective practice for teacher education. *Teaching and teacher education*, *18*(1), 73-85.

Joffe, H. (2012). Thematic analysis. *Qualitative research methods in mental health and psychotherapy: A guide for students and practitioners*, *1*, 210-223.

Junior, N. B., & Tassoni, E. C. M. (2013). A educação física, o docente e a escola: concepções e práticas pedagógicas. *Revista Brasileira de Educação Física e Esporte*, *27*, 467-483.

Kripka, R., Scheller, M., & Bonotto, D. L. (2015). Pesquisa Documental: considerações sobre conceitos e características na Pesquisa Qualitativa. *CIAIQ2015*, *2*.

Larrivee, B. (2000). Transforming teaching practice: Becoming the critically reflective teacher. *Reflective Practice*, *1*(3), 293-307.

Larrivee, B. (2008). Meeting the challenge of preparing reflective practitioners. *The New Educator*, *4*(2), 87-106.

Lima, F. D. C., de Oliveira, A. C. L., Araújo, T. S., & Miranda, G. J. (2015). O choque com a realidade: dormi contador e acordei professor. *REICE. Revista Iberoamericana sobre Calidad, Eficacia y Cambio en Educación*, *13*(1), 49-67.

Lizana, A., & García, A. B. (2022). El estudio de la práctica reflexiva y la labor tutorial en el proceso de formación docente. *Revista electrónica interuniversitaria de formación del profesorado*, *25*(2), 93-112.

Marshall, T. (2019). The concept of reflection: a systematic review and thematic synthesis across professional contexts. *Reflective Practice*, *20*(3), 396-415.

Martínez, M., & Collado, P. (2019). Pensadero de maestros: Una dinámica docente de práctica reflexiva. *Profesorado. Revista de Currículum y Formación de Profesorado*.

Minott, M. (2019). Reflective teaching, inclusive teaching and the teacher's tasks in the inclusive classroom: A literary investigation. *British Journal of Special Education*, *46*(2), 226-238.

Morgan, P. J., & Hansen, V. (2008). The relationship between PE biographies and PE teaching practices of classroom teachers. *Sport, Education and Society*, *13*(4), 373-391.

Perrenoud, P. (2001). Dez novas competências para uma nova profissão. *Pátio: Revista Pedagógica*, *5*(17), 8-12.

Quennerstedt, M. (2019). Physical education and the art of teaching: Transformative learning and teaching in physical education and sports pedagogy. *Sport, Education and Society*.

Schön, D. A. (1988). El profesional reflexivo: como piensan los profesionales cuando actúan. *Barcelona: Editorial Paidós*.

Stake, R. (1995). *Case study research*. Springer.

Standal, Ø. F., Moen, K. M., & Moe, V. F. (2014). Theory and practice in the context of practicum: The perspectives of Norwegian physical education student teachers. *European Physical Education Review*, *20*(2), 165-178.

Strauss, A., & Corbin, J. (1998). Basics of qualitative research techniques.

Thorsen, C. A., & DeVore, S. (2013). Analyzing reflection on/for action: A new approach. *Reflective Practice*, *14*(1), 88-103.

Winterstein, P. (1995). A dicotomia teoria-prática na Educação Física. *ANAIS III Semana de Educação Física-Universidade São Judas Tadeu. São Paulo*, 38-45.

Zeichner, K. (1986). The practicum as an occasion for learning to teach. *South Pacific Journal of Teacher Education*, *14*(2), 11-27.

Zeichner, K. M. (1983). Alternative paradigms of teacher education. *Journal of teacher education*, *34*(3), 3-9.

Zeichner, K. M., & Liston, D. P. (2013). *Reflective teaching: An introduction*. Routledge.

Contact email: anarita.agueda@gmail.com

Shaping Epistemological Profiles: School Placement Communities' Impact on Preservice Teachers' Personal Discovery and Knowledge Evolution

Margarida Barros, University of Porto, Portugal
Isabel Mesquita, University of Porto, Portugal
Paula Queirós, University of Porto, Portugal

The European Conference on Education 2024
Official Conference Proceedings

Abstract
In educational literature, collaborative contexts have been highlighted as effective teacher development promoters. Especially in initial teacher education (ITE), the role of communities of practice gains prominence during school placement. Given the relevance of preservice teachers' (PSTs) beliefs in their professional growth, this work aimed to understand these communities' value in developing epistemological systems. Eleven PSTs of an ITE in Physical Education were intentionally chosen for this study. Data collection took place during the school placement year. Three focus group moments and reflexive logs were explored. Data analysis was carried out through the procedure presented by Charmaz (2006) based on theoretical and deep coding, where emerging themes were identified. The study has shown that: a) the cooperant teacher was a catalyst for PSTs' personal discovery about their role as teachers, and b) the communities of practice enhanced the understanding of knowledge as evolving and connected. The engagement with guided discovery, experimentation, empowerment, and knowledge construction through different voices of the community led the PSTs to understand the nature of knowledge as mutable and knowledge development as a collaborative effort. Since communities of practice during the school placement represented availing epistemology, it is possible to understand that these contexts enable PSTs to perceive knowledge in a complex manner, rejecting absolutist thoughts. This rejection of absolutist thoughts is a crucial aspect of the learning process, as it allows for a more open-minded and dynamic understanding of knowledge. Similar practices can enhance PSTs' knowledge, ITE reconfiguration, and teacher training policies.

Keywords: Epistemological System, Initial Teacher Education, School Placement, Communities of Practice

iafor
The International Academic Forum
www.iafor.org

Introduction

Preservice teachers (PSTs) must develop a thorough understanding of their epistemological beliefs (EB) during initial teacher education (ITE), as these beliefs influence how they assimilate new knowledge (Brownlee et al., 2001).

As Perry (1970) explained, EB are individuals' beliefs about the nature of knowledge and the processes of knowing. Various models have been proposed to explain EB, such as developmental models (King & Kitchener, 1994; Kuhn et al., 2000), the EB system (Schommer-Aikins, 2004), and personal epistemology (Hofer & Pintrich, 1997, 2002). Given the specificity, developmental nature, and research context, the personal epistemology model (Hofer & Pintrich, 1997, 2002) is the theoretical framework for this study.

EB serves as a filter for new knowledge, and research indicates that sophisticated EB are more effective lenses for education (Neber & Schommer-Aikins, 2002). However, the role of ITE in fostering a reflective and critical attitude necessary for the evolution of EB has yet to be explored.

A collaborative approach can enhance the understanding of EB. By engaging with professional communities, PSTs can reflect on their beliefs, connect theory to practice, and develop their professional identity (Valério et al., 2023). These interactions allow PSTs to examine and refine their views on knowledge and learning, thus improving their EB (Güven et al., 2014).

Collaboration in schools is essential for teachers' professional development (Ostovar-Nameghi & Sheikhahmadi, 2016). According to Patton et al. (2005), PSTs and their mentors and colleagues form a community where PSTs play significant roles. These communities help develop teachers' pedagogical identities, alter their positionalities, and negotiate culture and beliefs (Luguetti et al., 2019). While research has highlighted the benefits of these communities, more is needed to know about how they enhance the development of sophisticated EB in physical education teacher education (PETE).

The school placement phase in PETE presents challenges that require vulnerability, stepping out of comfort zones, and consistently reassessing beliefs (MacPhail, 2011). Therefore, this study aims to understand the value of internship communities for developing PSTs epistemological systems during a PETE program's second year (school placement year).

Context of the Study

In the context of this study, several important features shape the school placement environment. PSTs are encouraged to engage in deep group reflection about their teaching practices and learning experiences. This emphasis on profound understanding pushes them to critically assess their approaches, encouraging them to delve into the underlying principles and theories rather than merely addressing superficial issues.

A vital component of this environment is the role of the cooperative teacher, who provides essential guidance and challenges PSTs to refine their pedagogical strategies. This mentorship is crucial for developing effective teaching practices. Additionally, PSTs are stimulated to organise and structure their teaching practices, promoting independence and critical thinking in their professional growth.

Collaboration within the internship team and discussions with peers also play a significant role in the learning process. These interactions facilitate group reflection and the exchange of diverse perspectives, which enrich PSTs' understanding and practice.

The ITE program fosters a collaborative learning environment where PSTs are encouraged to integrate new knowledge and refine their ideas continuously. This iterative process of reflection and dialogue contributes to substantially reconstructing their pedagogical beliefs and practices.

Methodology

Participants

The participants were 11 PSTs (6 males and five females) in their second year of the ITE program explored in this work. The intentional choice of participants was privileged for a deeper understanding of the analysed cases and considering the research questions(Patton, 2015). For this reason, PSTs were selected for convenience and criteria from previous research on EB, such as gender (Adamakis, 2018; Kulinna et al., 2010) and sports experience (Yildizer, 2020).

All the participants are enrolling in this ITE program as full-time students (school year 2022/2023), and all completed the first year.

Data Collection

Focus group interviews were carried out three times and in groups of 3 or 4 participants, totalling nine focus group interviews lasting approximately 90 minutes. These moments were defined considering critical moments of the school placement year: the beginning, middle, and end of the school year. Semi-structured scripts allowed the discussion to stimulate relevant thoughts and questions to access EB. During the focus group interview sessions, the interviewer created an environment to share experiences and opinions that generated reflection and discussion on the thoughts and practices of the participants (Jones et al., 2012).

A detailed analysis of the reflections logs (RL) made during the school placement year of the PETE program was also carried out. This method constitutes a source through which the researcher can extract evidence that substantiates the participants' statements and monitors the evolution of their thoughts. In addition, it is a data source that reflects the participants' thoughts in a context without interference from the formal moment of collection. The individual reflections of each participant were analysed in 3 moments, and they were related to post-practice feelings, difficulties, adaptions and connection with the PE school context, cooperative teacher and colleagues.

Data Analysis

The data analysis process involved verbatim transcription of focus groups and multiple readings of the transcripts and documents. According to Charmaz (2006), critical points in the data were identified through coding, then grouped into concepts to organise the information, and finally, similar concepts were categorised to develop themes. The analysis process employed a deductive approach, allowing themes to emerge from the data. An interpretive stance meant the possibility of developing ideas about what the documents could

describe and considering the relationships between these experiences, giving them meaning alongside the existing literature (Braun & Clarke, 2006). Themes were subsequently analysed through the lens of Hofer & Pintrich's (1997) theoretical framework and provided insights into participants' EB concerning the dimension of the source of knowledge.

Trustworthiness was guaranteed through data triangulation, participants check, and peer debriefing (Creswell, 2013).

Findings and Discussion

Cooperant Teacher as a Catalyst for PSTs Personal Discovery

The cooperative teacher was one of the major catalysts for the EB development in PSTs. Throughout the school placement, they were able to guide, question, and challenge professional development, enhancing the alteration of ideas and conceptions of future teachers.

> “Not in an obvious way, but through the entire process of questioning and all the guided teaching he does with us, he caused me to have an immense change in my way of thinking about physical education.” (Alice, FG)

> "He does not give us the answers to the problems. He makes us think about them until we find a solution. That helped me to think and reflect on things." (Anna, FG)

PSTs understood these contexts of reflection and challenge presented by the cooperative teacher as ways to question and alter their understandings. This openness to evolving in practice as teachers and believing there are various ways to approach PE reveals the strengthening of more sophisticated EBs. As Nieves et al. (2021) concluded, PSTs reported that the collaborative approaches changed their beliefs regarding PE and contributed to values and life skills development.

Additionally, the way PSTs built their professional identity reveals a negotiation between their previous beliefs and the new understandings coming from the cooperative teacher.

> "He doesn't give you the final product all at once; he encourages you to get there yourself, and that helped me to build my vision of what it means to be a teacher." (William, RL)

> “I continue to maintain my values for physical education. He just added to them." (Lucas, FG)

It was assumed that constructing knowledge in PE and teaching PE derives from various sources and internal discussions about them. Nurturing this social sharing environment in the profession, particularly with the cooperative teacher, is imperative for negotiating the challenges of professional construction and learning (Tannehill & MacPhail, 2017).

The Community Role in Understanding Knowledge As Evolving

Together with the cooperative teacher, the internship colleagues, and the other PE teachers, they formed a community of practice. This group's reflective collaboration and discussions

added value to developing sophisticated EB by opening PSTs' minds to perspectives on PE and teaching.

> “Group reflection complemented my individual reflection. Understanding whether my way of seeing things was correct or if the way others see things is different and more advantageous for me.” (James, FG)

This context had a noteworthy impact on the perception of individual actions during the lessons PSTS taught. As the internship colleagues and the cooperative teacher attended the PE classes, the subsequent discussion touched on critical points of the PSTs' actions and led them to reflect on things they had not considered.

> “I learn more about the mistakes I make in class regarding content and how I deliver the content because if it is just self-reflection, I can see what the students missed, but I cannot notice all my own mistakes." (Sofia, FG)

> "Reflection was important, especially in a group. It helped me to become aware of things that I would not have noticed on my own." (Natalia, FG)

Seeing things differently, assuming multiple truths, and being active in understanding mistakes are characteristics of sophisticated EB that were developed in this context. This result aligns with other contexts that have also noted that teachers in communities demonstrated changes in attitudes and beliefs (Oliver et al., 2017).

Respect and trust within the community impacted the restructuring of subsequent practices, leading to the adaptation of planning, attitudes, and interventions for PSTs.

> "Regardless of whether we agreed or not, we explained to each other why we did things. Our core discussions were productive for the lessons because we observed the classes, talked, and adapted things.” (Henry, FG)

> “That helped me to think and reflect on things. We are all in different realities, and that sometimes leads to the development of different ways of dealing with the problems that arise in practice.” (Clara, FG)

The engagement with guided discovery, experimentation, empowerment, and knowledge construction through different voices of the community led the PSTs to understand the nature of knowledge as mutable and knowledge development as a collaborative effort. Since communities of practice during the school placement represented the development of more sophisticated epistemology, it is possible to understand that these contexts enable PSTs to perceive knowledge in a complex manner, rejecting absolutist thoughts. Support within these communities is essential because learning and change happen through conversations and discussions about challenges and complex cases, which catalyses the epistemological development of PSTs (Patton & Parker, 2017).

Conclusion and Implications

The support from internship colleagues and cooperative teachers in discussions, challenges, and idea sharing catalysed sophisticated EBs in PSTs. These results have implications for ITE programmes beyond PE.

Similar practices can enhance PSTs' knowledge, curricular reconfiguration, and teacher training policies. Teacher education programmes should reconsider the role of school placements and communities of practice in shaping PSTs' epistemological profiles. Emphasising collaborative learning environments and mentorship is crucial for professional development.

Strategies should be developed to help PSTs navigate diverse perspectives on knowledge within educational contexts. The findings advocate for policy changes supporting collaborative learning and reflective practices in teacher education programmes. Policymakers should facilitate partnerships between schools and universities to strengthen school placements' impact. Additionally, professional development initiatives for cooperative teachers should be proposed to enhance their mentoring and support for PSTs' epistemological development.

In conclusion, the support from internship colleagues and cooperative teachers significantly contributes to sophisticated EBs in PSTs. Integrating collaborative and reflective practices into teacher education, reshaping policies, and providing professional development for cooperative teachers are vital for enhancing PSTs' professional growth and epistemological awareness, ultimately improving teacher education.

Future Research

It is essential to acknowledge that EB and the school placement experience can differ significantly across countries due to diverse teaching methods and educational settings. Hence, it is crucial to explore these factors in various contexts.

Moreover, an expanding body of experimental research demonstrates the beneficial effects of interventions on modifying EB dimensions (Güven et al., 2014). Nevertheless, additional empirical studies employing various methodologies are required to understand the circumstances under which EB changes occur thoroughly. Investigating the role of epistemic reflexivity in initiating these changes and its subsequent impact on teaching practices is also essential.

Acknowledgements

This work was supported by the Portuguese Foundation for Science and Technology (FCT), grant number 2021.04842.BD. The authors have no conflict of interest to declare.

References

Adamakis, M. (2018). Physical Education students' beliefs in four important curricular outcomes: Results from three Greek Faculties. *Journal of Physical Education and Sport*, *18*, 1001-1007. https://doi.org/10.7752/jpes.2018.s2148

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Brownlee, J., Purdie, N., & Boulton-Lewis, G. (2001). Changing Epistemological Beliefs in Pre-service Teacher Education Students. *Teaching in Higher Education*, *6*(2), 247-268. https://doi.org/10.1080/13562510120045221

Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis.* Sage.

Creswell, J. (2013). Qualitative Inquiry & Research Design: Choosing Among Five Approaches. *SAGE Publications*, *11*.

Güven, G., Sülün, Y., & Çam, A. (2014). The examination of elementary preservice teachers' reflective diaries and epistemological beliefs in science laboratory. *Teaching in Higher Education*, *19*(8), 895-907. https://doi.org/10.1080/13562517.2014.934350

Hofer, B., & Pintrich, P. (1997). The Development of Epistemological Theories: Beliefs About Knowledge and Knowing and Their Relation to Learning. *Review of Educational Research*, *67(1)*, 88–140. https://doi.org/10.3102/00346543067001088

Hofer, B., & Pintrich, P. (2002). *Personal epistemology. The psychology of beliefs about knowledge and knowing.* . Lawrence Erlbaum Associates Publishers.

Jones, R., Morgan, K., & Harris, K. (2012). Developing coaching pedagogy: Seeking a better integration of theory and practice. *Sport*, *Education and Society Vol. 17*, 313-329. https://doi.org/10.1080/13573322.2011.608936

King, P., & Kitchener, K. (1994). *Developing reflective judgment: Understanding and promoting intellectual growth and critical thinking in adolescents and adults*. Jossey-Bass Publishers.

Kuhn, D., Cheney, R., & Weinstock, M. (2000). The Development of Epistemological Understanding. *Cognitive Development*, *15*, 309-328. https://doi.org/10.1016/S0885-2014(00)00030-7

Kulinna, P. H., Brusseau, T., Ferry, M., & Cothran, D. (2010). Preservice Teachers' Belief Systems Toward Curricular Outcomes for Physical Education. *Research Quarterly for Exercise and Sport*, *81*(2), 189-198. https://doi.org/10.1080/02701367.2010.10599666

Luguetti, C., Kirk, D., & Oliver, K. L. (2019). Towards a pedagogy of love: exploring pre-service teachers' and youth's experiences of an activist sport pedagogical model. *Physical Education and Sport Pedagogy*, *24*(6), 629-646. https://doi.org/10.1080/17408989.2019.1663499

MacPhail, A. (2011). Professional learning as a physical education teacher educator. *Physical Education and Sport Pedagogy*, *16*(4), 435-451. https://doi.org/10.1080/17408989.2011.582485

Neber, H., & Schommer-Aikins, M. (2002). Self-regulated Science Learning with Highly Gifted Students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies*, *13*(1), 59-74. https://doi.org/10.1080/13598130220132316

Nieves, A. M., Oliver, L. E., & Vargas, A. (2021). Preservice Physical Education Teachers' Experiences Implementing the Teaching Personal and Social Responsibility Model. *The Physical Educator*, *78*. https://doi.org/10.18666/TPE-2021-V78-I2-10394

Oliver, K., Luguetti, C., Aranda, R., Nuñez Enriquez, O., & Rodriguez, A.-A. (2017). 'Where do I go from here?': learning to become activist teachers through a community of practice. *Physical Education and Sport Pedagogy*, *23*, 1-16. https://doi.org/10.1080/17408989.2017.1350263

Ostovar-Nameghi, S., & Sheikhahmadi, M. (2016). From Teacher Isolation to Teacher Collaboration: Theoretical Perspectives and Empirical Findings. *English Language Teaching*, *9*, 197. https://doi.org/10.5539/elt.v9n5p197

Patton, K., & Parker, M. (2017). Teacher education communities of practice: More than a culture of collaboration. *Teaching and Teacher Education*, *67*, 351-360. https://doi.org/https://doi.org/10.1016/j.tate.2017.06.013

Patton, M. Q. (2015). *Qualitative Research and Evaluation Methods* (3rd ed.). Sage Publications.

Perry, W. (1970). *Forms of Intellectual and Ethical Development in the College Years*. Holt, Rinehart & Winston.

Schommer-Aikins, M. (2004). Explaining the Epistemological Belief System: Introducing the Embedded Systemic Model and Coordinated Research Approach. *Educational Psychologist*, *39*, 19-29. https://doi.org/10.1207/s15326985ep3901_3

Tannehill, D., & MacPhail, A. (2017). Teacher empowerment through engagement in a learning community in Ireland: working across disadvantaged schools. *Professional Development in Education*, *43*(3), 334-352. https://doi.org/10.1080/19415257.2016.1183508

Valério, C., Farias, C., & Isabel, M. (2023). Challenges in creating value in the pre-service teachers' journey from learning to implementing student-centred approaches: an ethnographic study along a two-year PETE. *Sport, Education and Society*, 1-15. https://doi.org/10.1080/13573322.2023.2207581

Yildizer, G. (2020). Epistemological Belief Differences between Prospective Physical Education Teachers and Coaches with and without Coaching Experience. *Journal of Teaching, Research, and Media in Kinesiology*, *6*, 1-6.

Contact email: margaridasfbarros@gmail.com

Does Financial Support Matter? Scholarships and Study Abroad Preferences for First Year University Students in Japan

Daniel James, Hiroshima Shudo University, Japan

The European Conference on Education 2024
Official Conference Proceedings

Abstract
This paper looks at differences in study abroad programme preferences collected from online questionnaires taken by two cohorts of first year Japanese university students (2023: n107 and 2024: n99). The rationale for the research was to determine whether students' preferences i.e. languages, destinations, programme length and type would be affected by changes to funding amounts and methods. The 3 main findings of the research showed that first, popularity in 'inner circle' English speaking countries as well as in China and South Korea continued together with more interest in France, Spain, Mexico and the Philippines. Second, short- and medium-term programmes i.e. less than six months in duration were more popular than long-term programmes i.e. those six months or longer. Third, there was a slight increase in interest in exchange programmes. While recognising the limitations of the data, only first year students from one university and carried out over a two-year period, the insight into the preferences of the students revealed that the changes in financial support could be seen to affect the destination chosen as well as the length and type of programme. Expanded research including older students' preferences, questionnaires at different times of the students' university experience as well as follow-up interviews with students who did and did not participate on study abroad programmes are necessary to gain a more holistic picture of the determining factors in Japanese students' decision to study abroad.

Keywords: Japanese University Students, Study Aboard, Scholarships

iafor
The International Academic Forum
www.iafor.org

Introduction

In March 2023, the Japanese Prime Minister, Fumio Kishida, as part of the plans promulgated by the Council of the Creation on Future Education, declared that (aside from attracting 400,000 international students to Japan), the Government of Japan (GOJ) was setting a target of 500,000 Japanese students studying aboard by 2033 (Cabinet Secretariat, 2023). This target represents an over two-fold increase in the number of Japanese students sent abroad in 2019 which was 219,000 (British Council, 2023). This target has been called "ambitious" by some critics (Nash, 2023) and while a discussion of the attainability of 2033 target falls outside of the remit of this paper, it is pertinent to note that between 2023 and 2024, the number of Japanese studying abroad doubled and this was widely reported and commented upon by British Council (2024), Icef-monitor (2024) and Nash (2024). This importance of study abroad programmes (SAP) occurs not only at the national government level but also at the university level. It is common for Japanese universities to promote and utilise their partnerships with overseas universities to appeal to both potential students as well as the domestic and international community to enhance its appeal and to prove that it is active on an international scale. It is on this institution level that this paper focusses as it describes the changes made to the scholarship system offered by a medium-sized private university in Japan and the preferences shown by two cohorts of its first-year students in data collected in 2023 and 2024. This paper will now turn to a description of the institution in question and the reasoning behind the scholarship system change.

Institution in Question and Scholarship Systems: Old, New and Reasoning Behind Change

Institution in Question

The data was collected from first year students at a medium sized private university in western Japan. The university student enrolment averages around 6,200 students over four-year cohorts with each year group representing 25% of the total student body. The university has 32 partner universities in 15 countries and regions with Taiwan being considered as a region rather than a country following the GOJ's maintenance of non-governmental, working level relations with Taiwan (Wikipedia, 2024). As the time of writing, in terms of 'outbound' SAPs, the university offered exchange programmes for either 6 or 12 months with 12 countries and programmes called 'seminars' offered at time-lengths: short term 1-10 weeks, medium term 3-6 months and long term 1 year. Differences between the exchange and the seminar programmes include:

1. on exchange programmes there is usually one or two places available per year with each institution
2. exchange programme participants must achieve a required level of the target language in order to be able to apply for the process (e.g. on TOEFL or IELTS for English or TOPIK for Korean) and in some cases a certain level of GPA from their home institution
3. exchange programme participants not only study the main language of the host institution but can also choose to study 'regular' classes in the target language
4. exchange programme participants are exempt from paying the host institution tuition fees as they paid the equivalent tuition at the home institution
5. 'seminar' programme participants overall do not have to achieve a pre-determined level of the target languages, although in some cases, a recommended level of ability is sometimes specified

6. ‘seminar’ programme participants classes are mainly language skill based although some seminars offer ‘experiential’ options such volunteer work in local schools, food banks and or senior citizen homes
7. also, these participants are required to pay both sets of tuition at the home and the host institution.

Therefore, it can be said that while exchange programme participants have the benefits of only paying one set of tuition, the required level of language ability is higher whereas seminar participants do not have that expectation, however, these latter students or the family are required to pay both sets of tuition. The reasoning for this is that for students to remain registered at their home institution then it is required of them to pay their tuition fees to maintain their ‘seki’ or registered place. For seminar students who take part in SAPs of over 3 months or more, this can be a considerable financial burden and off-putting for students who are considering studying abroad.

In terms of participants in both sets of programmes, the total number of students represented approximately 2-3% of the total student body in the period up to the COVID-19 pandemic but in 2020 there were no students sent aboard. While the SAP system reopened after 2021, the numbers of student participants has not reached half of the peak figures pre-2020 and have been between 0.7 and 1.1% of the total student body. The figures for the last 10 years are displayed in the Table 1 below.

Academic Year[1]	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Total number of students	229	133	205	200	212	199	0	46	97	84	55[2]

Table 1: Total Number of Participants in Study Aboard Programmes

As can be seen the drop in participants was a concern for the institution and this along other reasons will be detailed below as explanations for the changes in the scholarship system.

Scholarship Systems: Old, New and Reasoning Behind Change

The institution in question had always awarded a non-return scholarship to participants in SAPs but had based its old system upon destination and length of time with fixed weekly, monthly, half-year and yearly amounts. However, as the costs of programmes rose especially those in the USA, the UK and New Zealand due to additional medical insurance and/or increased accommodations fees, it was felt that this was a deterrent to more students applying for exchange and long-term seminar programs. Additionally, the lingering effects of the COVID-19 pandemic i.e. reticence to travel or study aboard, seemed to be lasting longer than expected. Thus, it was decided to redesign the SAP scholarship system to increase the number of participants. It was recognised that the after-effects of the COVID-19 pandemic were unlikely to dissipate quickly and while it was hoped that the levels of student participation in SAPs would approach those of pre-COVID-19 i.e. 3%, it was acknowledged that this was a longer-term goal.

[1] The Japanese academic year runs from April to end of March the following year. i.e. Academic year 2024 is from April 1st, 2024 to March 31st, 2025.
[2] This only represents the number of students up who went abroad up to August 2024. This number is expected to increase with the spring (February/March 2025) programmes.

The new scholarship system was based on an incentive principle in that the higher the level of the individual student's language ability (based on an officially recognised test score or number of foreign language credits earned at university) then the higher the amount awarded to them on a weekly basis. This amount was further delineated by the geographical area and the length of the programme.

The two scholarship systems are shown below in Table 2.

Old ~2023	Exchange programme				6 months		12 months	
					100,000		200,000	
	Seminars	3 months+ All areas 30,000 per month						
		≤3 months			Asia 50,000		Aus / NZ / USA / Europe 100,000	
New 2024~		Stage	1	2	3	4	5	6
	All seminars & exchange programs	USA/UK/CAN/ GER/FRA/SPA	10,000	12,000	14,000	16,000	18,000	20,000
		AUS/NZ/CZE/ KOR/VTN/PHI	6,000	8,000	10,000	12,000	14,000	16,000
		MEX/CHI/ TWN	4,000	6,000	8,000	10,000	12,000	14,000
	Seminars	All areas ≤ 3 Months	All 1st years 50,000 (or more if their 'stage' is higher)					

Table 2: Old and New Scholarship Systems

As noted above there was a shift away from fixed amounts based on area and length of programme to a system of weekly amounts that vary between individual students. However, it was recognised that such a system might disadvantage first-year students as they might not have the foreign language ability of older or more experienced students and hence the level of officially recognised qualifications. Additionally, they would not have high number of foreign language credits due to their relatively short time studying at university. To compensate for this and to widen the appeal and hence the participation rate in studying abroad, a one-off fixed amount offered to all first-year participants in short-run programmes i.e. less than 3 months, might increase and heighten participation at an early stage in their time at university.

The system was also changed to encourage students to continue studying foreign languages post SAP return. As can be seen from the bottom of Table 2, it is possible for students to increase their 'stage' from 1 to 6 during their time at university and therefore, it is possible for students to increase the weekly amount that they could be awarded on a study aboard programme. This could be particularly beneficial to students who may be interested in participating in more than one programme over four years. In light of this, the new system allows for students for participate in more than one programme over their time at university and be awarded a scholarship for each. It is also possible for a student to participate in the same programme more than once and be awarded an increased weekly amount (should their level or 'stage' increase), however, as the kind and number credits concomitant with the programme is fixed and predetermined then those credits can only be awarded once to the student.

From above, it can be seen that the system offered a markedly different way of financial support compared to the previous system and as such it was possible to expect that this would

affect the students' study abroad preferences. Based upon this, research was carried out on two first-year cohorts and the research method is described below.

Research Method

The data was taken from two online questionnaires given in the form of Google Forms (See Appendix A.) in two consecutive years, 2023 and 2024. The questionnaires were made available to the first-year students after pre-entry orientation sessions. There were four sessions in total: one main session given and then one supplementary session given on the same day to those students who missed the main session due to a timetable clash with other orientation sessions. The questionnaire was accessed via a QR code at the end of each session in the same room as the explanation session and was completed by the students on their smart phone or tablets. The number of students who answered the questionnaire was 107 in 2023 and 99 in 2024. For each of the questions about language choice, destination choice, timing choice and programme type and length, the students were allowed to make multiple choices. As the questionnaires were taken before the students had started their studies proper i.e. before any classes or any specific SAP explanations sessions, their answers could only be seen as preferences rather definitive indications. As will be shown in the discussion below, even though the students' faculty and department were parameters asked to be completed, the students' names and student number were not collected and therefore it was not possible to identify the students' identity and remains so. However, it was possible to look at the students' preferences for SAPs in terms of language choice indication, country/region destination indication, timing indication as well as programme length and type. It is these five areas that the discussion now turns.

Discussion

Language Choice Indication

As can be seen from Table 3 below there was no change in both the top three and bottom three languages in terms of popularity. This is in keeping with expectations as English is the usually the first foreign language that Japanese students encounter in education as well as being the one language that is still widely used outside of education and the language that students are required to gain sufficient credits at university to graduate. The fourth and fifth languages swapped over between 2023 and 2024 and this could be attributed to a number of factors: a perceived worsening of relations between Japan and China over this time period as well as the growing appeal of Spanish within Japan that is driven by the continuing popularity of sports connected with Spanish speaking countries as well as the fact that from 2024 it was possible to offer an exchange programme with a Mexican partner university. From this point it is important to consider the countries and regions that the students displayed an interest in.

Language	English	Korean	French	Chinese	Spanish	German	Czech	Vietnamese
2023	94	44	28	27	23	14	1	1
2024	95	34	26	14	21	10	2	1

Table 3: Language Choice Indication

Country/Region Choice Indication

The figures displayed below in Table 4 show three trends:

1. Countries which can be described as Kachuru's 'inner circle' (Kachuru, 1992) remain popular for students. Despite the high costs that can be incurred by studying in these countries they are still the among the most popular places to go to.
2. South Korea and China were the most popular countries in both year groups although the drop in interest in China and increase in interest in Taiwan may be attributed to the reasons described above. However, it should be noted that more countries Asian countries selected in 2024 is in keeping with the findings reported by the British Council (2024) that the number of students interested in studying in Asian countries has already surpassed the pre-COVID-19 levels of 2019 and that an increase in countries such as the Philippines as a destination for studying English.
3. The interest in both Spain and Mexico can be attributed to relatively new establishment of new partners as well as the continuing interest in Spanish speaking culture especially on a sporting level as mentioned in language choice indication.

Apart from interest shown in the Philippines in 2024, it is hard to ascertain whether the change to the scholarship system influenced the students' preferences shown in language choice and destination choice. The timing, programme type and length of programme will be discussed next, and it will be shown that there are some indications that the changes to the financial support system might have affected these preferences.

Country	USA	Australia	Canada	UK	New Zealand
2023	105	52	42	36	33
2024	116	45	40	26	27

Table 4a: Country/Region Choice Indication: English L1 Countries

Country / Region	South Korea	China	Taiwan	Philippines	Mexico
2023	33	11	0	0	0
2024	22	6	5	4	2

Table 4b: Country/Region Choice Indication: Asia & Mexico

Country	France	Spain	Germany	Czech Republic
2023	22	11	16	3
2024	14	13	9	4

Table 4c: Country/Region Choice Indication: Europe

Timing Indication (1st ~ 4th Choice)

From the preferences shown in Table 5 below, three patterns can be seen. First, there is a slight increase in the number of students who would consider joining an SAP in their first year. This might be attributed to the fixed amount payment offered to all first years who take part on SAPs of less than 3 months. Second, most students would consider participating in their second year or third years which is in common with the findings of Potter and Potter (2020) which shows that most Japanese students choose these middle two years to avoid the pressures and conflicting timetables of studying abroad and looking for a job. Third, there is a distinct drop in the number of students who either consider an SAP in their fourth year or are

not sure when they would go. As noted directly above, the fourth year is seen as the time for looking for a job within Japan and the recruitment period is comparatively fixed and there is perceived concern of missing out on the chances of finding a job if a student participates in an SAP in their fourth year. Additionally, the drop of 22 students from 2023 to 2024 who expressed 'I don't know' as an option can be seen as result of the potential increased financial support during their time at university and that students want to maximise their chances of receiving that additional funding. This is also borne out by the choices in the programme types and length of programmes.

Timing 'Year'	1st	2nd	3rd	4th	I don't know
2023	37	76	52	9	25
2024	40	77	43	3	3

Table 5: Timing Indication (1st ~ 4th Choice)

Programme Type

There was a drop of 3 students who showed an interest in seminars between 2023 and 2024 whereas there was an increase of 7 students who showed an interest in exchange programmes over the same period. It can be surmised that these two patterns are related to financial issues. As noted above for students who take part in seminars, it is necessary for them to pay both the tuition at the host institution and the home institution in order that the student can retain their 'seki' or registered place. This means that for some students and their families, in addition to the approximately ¥1,000,000 home institution tuition, the SAP fee ranging from ¥250,000 for a 2-week programme to ¥4,000,000 for a year long programme needs to be paid. The financial burden of this is undeniable. In light of this, with the increased funding potentially available on the new scholarship scheme, some students might have thought the attractiveness of exchange programmes i.e. only having to pay the tuition of the home institution, was a greater incentive to aim for the exchange programmes. However, as noted above, participation in exchange programmes requires attainment of a pre-determined level or mark on an officially recognised language test and might be beyond the language ability of some students who therefore choose shorter seminars which overall do not have a minimum level of language ability laid down as a pre-requisite. It is to these seminars that the discussion now turns.

Type	Seminar	Exchange	I don't know
2023	77	39	17
2024	74	46	11

Table 6: Programme Type

Programme Length

From Table 7 below it can be seen that the combined numbers of students who showed an interest in short- and medium-term programmes (2023: 95 and 2024:106) slightly increased. This may have been due to a combination of factors. The offer a fixed amount to all first years who participate in programmes of 3 months or less as well as potential to gain a larger per week amount and therefore total amount of scholarship for longer programmes. There was also a concomitant drop in the interest in long term programmes. As has been discussed earlier these programmes tend to be in English speaking countries in which post COVID-19 tuition and accommodation costs have risen sharply. Similarly, programmes that last for

nearly one year can be extremely expensive and, in some cases, the total costs can be 4-5 times the cost of year's tuition at the home institution. It can be reasonably interpreted that in the light of this knowledge, students are more likely to choose short- and medium-term seminar programmes and exchange programmes which can both maximise the amounts they can be awarded as well as lessen the costs to be burdened as much as possible.

Length	Short (2 weeks~ 3 months)	Medium (3~6 months)	Long (6 months+)	I don't know
2023	46	49	36	16
2024	55	51	33	5

Table 7: Programme Length

It can be seen from the result and the discussion above that there were some distinct changes and patterns in the students' preferences over the two years in focus and given that the only large-scale changes to the parameters to the overall study aboard system was that of the scholarship system and therefore it might be reasonably assumed that the changes to financial support affect students' SAP preferences. However, it must be noted that the data is limited in that it only focusses on the preferences of first year students from one university and at the very start of their time at university. In this way, the data and analysis offer a snapshot of the students' preferences at a particular time but remains important in what it reveals. To ascertain whether the influence of changes to financial support continues to a have a similar effect over time then further investigation is necessary. This could include but not be limited to: similar questionnaires for 2025 and 2026 cohorts, follow-up questionnaires for 2023 and 2024 cohorts to investigate if their preferences have changed over time, follow-up questionnaires or interviews for students who did and did not take part in SAPs to determine what were the most influential factors in finalizing their decisions. Porter and Porter (2020) have shown that Japanese students' decisions to participate in SAP if often affected by other factors as well as financial issues such as lack of confidence in lingual abilities, a desire and feeling of responsibility to fulfil university sport or club activities, the relatively inflexible nature of the recruitment system in which time spent abroad might harm employment chances and finally, an unwillingness to spend time away from their family. All these factors should be taken into consideration for any further research and investigation.

Conclusion

Despite the limitations of the data and consequent findings, its relevance should not be overlooked. Changes in financial support, its availability and the method in which it is awarded seems to have less influence on destination choice and language studied but more influence on some parameters such as timing, programme type and length of programme. As indicated above the potential remains for more longitudinal investigation and a wider focus to consider other extraneous factors such as family and university sport or club pressures as well as employment concerns. The Government of Japan's declared target of 500,000 students studying aboard must be considered in context of not only students' language and other academic abilities and financial resources but also in the larger field of familial, peer and university pressures as well as university student recruitment schedules and employment chances immediately before and after graduation and in the long run, perhaps as long as the graduate is employed.

Appendix A

Questionnaire 2023 and 2024

1. Student Number
2. Cohort (Year)
3. Faculty / Department
4. Gender
5. Which languages are you interested in? (Choose up to 5)
6. Which countries/areas are you interested in going to? (Choose up to 9)
7. When do you want to study abroad? (1st/2nd/3rd/4th Year) (Choose up to 4)
8. For how long do you want to go for? (Choose up to 3)
9. What kind of programme are you interested in-seminar or exchange or I don't know? (Choose up to 3)
10. Please share your impressions of the explanation session today?

References

British Council (2023, June 19). Japan aims to increase number of students abroad https://opportunities-insight.britishcouncil.org/news/news/japan-aims-increase-number-of-students-abroad

British Council (2024, July 3). Japanese student numbers abroad recovered steadily. https://opportunities-insight.britishcouncil.org/news/news/japanese-students-uk-universities-surge-2022

Cabinet Secretariat. (2023, April 27). Japan-Mobility and Internationalisation: Re-engaging and Accelerating Initiative for future generations (J-MIRAI) Outline. https://www.cas.go.jp/jp/seisaku/kyouikumirai/pdf/230427outline.pdf

Icef-monitor. (2024, May 22). Survey of Japanese agents indicates significant recovery in outbound student numbers for 2023. https://monitor.icef.com/2024/05/survey-of-japanese-agents-indicates-significant-recovery-in-outbound-student-numbers-for-2023/

Japan-Taiwan Relations. (2024, July 31). In Wikipedia. https://en.wikipedia.org/wiki/Japan–Taiwan_relations#:~:text=After%20the%20Japan–China%20Joint,working%2Dlevel%20relations%20with%20Taiwan.

Kachru, B. (1992). World Englishes: approaches, issues and resources. Language Teaching, 25.1, 1-14. https://doi.org/10.1017/S0261444800006583

Nash, P. (2024, May 23). Japanese study abroad doubles in one year. The PIE. https://thepienews.com/japan-study-abroad-doubles-jaos-survey/

Porter, P & Porter, N. (2020). Japanese college students ’study abroad decisions: Perspectives of Japanese study abroad administrators. *The International Education Journal: Comparative Perspectives Vol. 19, No 2, 2020*. https://files.eric.ed.gov/fulltext/EJ1293135.pdf

Contact email: james@shudo-u.ac.jp

An Education Platform for Observing the Group Swimming of Steelhead, a Migratory Salmonid Species Vulnerable to Climate Change

Claire H. Shin, St. Bernard's Academy, United States

The European Conference on Education 2024
Official Conference Proceedings

Abstract
A migratory trout steelhead is an economically important cold water species whose habitat is shrinking due to environmental and climate changes. Recently, research on species conservation through aquaculture has sparked interest in group swimming in artificial environments. In this study, based on universally accessible two-dimensional image processing, we present a statistical framework of the effects of air sparging on group swimming and interaction of steelhead juveniles in a small aquaculture environment over time. The cross-correlation-based framework showed that steelhead learned to school in larger groups as time went by. The air sparger attracts fishes as oxygen suppler, but at the same time, it exists as a spatial barrier to interaction when juveniles are young. However, as growing older, they overcome this barrier and begin to interact with each other. These results indicate the importance of proper sparger design in helping steelhead learn to shoal in aquaria before release.

Keywords: Steelhead, Aquaculture, Shoaling, Juvenile, Statistical Framework

iafor
The International Academic Forum
www.iafor.org

Introduction

Steelhead is an anadromous fish that migrate between the ocean and rivers. This cold-water species has seen its habitat shrink due to water pollution and rising ocean temperatures – it particularly works as an indicator of the effects of recent global warming (Wade, 2013; Winfree, 1998). Furthermore, climate change and overfishing are putting pressure on conservation efforts. Understanding fish ecology is the first step to conserve species, and their swimming patterns are a crucial part to consider, as well as feeding and breeding. Especially, group swimming, a group behavior characterized by schooling and shoaling, is a common behavioral pattern in many fishes (Fréon, 2000). Fish benefit from group swimming for reproduction, protection from predators, and other survival benefits (Partridge, 1982; Pitcher, 1982). In this sense, the study of steelhead swimming patterns is an important part of their ecology, which shows why it is currently being studied. Usually, fish learn to swim in groups as juveniles, influenced by the behavior of other fish around them. This process results in a collective swimming behavior. Steelheads also seem to go through a juvenile period when they prepare to learn this group pattern. As an anadromous fish, trout swimming patterns in dynamic fluid environments during the juvenile stage have been a topic of interest to several researchers (Liao, 2003; Harvey, 2022).

In response to the decline of steelhead habitat and populations, commercial steelhead culture, often through aquaculture at hatcheries, has been increasingly practiced in recent years. In particular, due to the nature of aquaculture, juvenile steelheads are often raised. However, unlike the natural environment, aquaculture is carried out in an artificial environment and a relatively narrow environment. For example, dissolved oxygen is a significant factor for fish, so in aquaculture, an air sparging module is used in a small cage space to supply the necessary oxygen to them. This environment provides the juveniles with stimuli different from their natural environment, which affects their ecology. For instance, studies have shown that hatchery-raised steelhead differ in 723 genes from wild ones and have a lower reproductive success rate when they return to the river (Araki, 2007; Christie, 2016). It is already known that the environment affects fish shoaling, including hatchery group size and familiarity. In fact, compared to a wild population of rainbowfish, captive-reared ones showed a lower shoaling preference for familiar individuals (Kydd, 2009). Therefore, as steelhead aquaculture increases in the future, studying the behavioral patterns of steelhead juveniles in artificial environments will be an important research topic, both economically and in terms of managing their adaptation in the wild when released. Yet, this research is still in its infancy and not many studies have been conducted.

A variety of complex sensors and analytical equipment are used to study fish behavior. Even so, two-dimensional images are the easiest to obtain and provide a wealth of data, and 2D image analysis is crucial to the study of fish in aquarium culture. However, there is a limitation that fish kinetics information is limited compared to three-dimensional information, and various methods for image analysis are needed. Therefore, this study presented a rationale and statistical framework to analyze behavioral patterns based on 2D images of steelhead fry in a small aquaculture. Observations on the grouping and shoaling of juvenile steelhead around the air sparging module were conducted, and statistical analysis was performed to understand the group behavior patterns of juveniles as they grow over time.

Materials and Methods

Design of the Aquarium for Steelhead

The small aquarium was made of glass. The length, width, and height were 20, 10, and 12 inches, respectively. The bubble sparger was placed in the center of the water bath, as described in Figure 1.

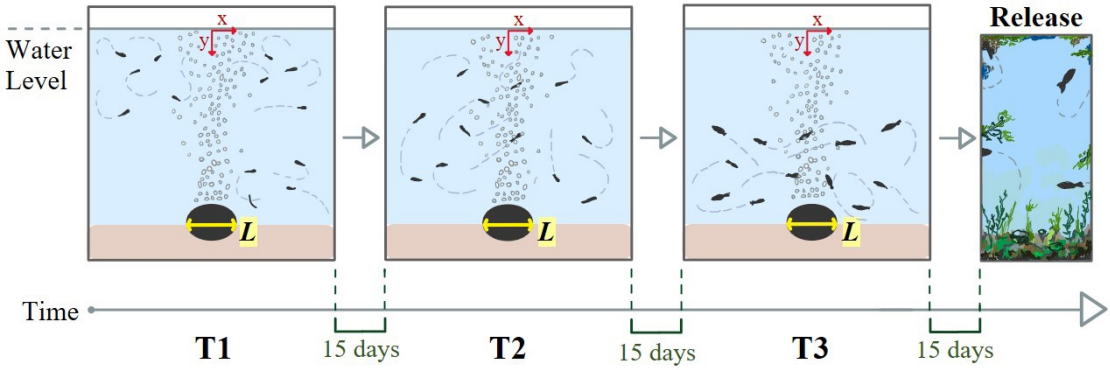


Figure 1: Construction of a Small Aquarium System for Juvenile Steelheads.

Capture of the Steelhead Motion

Steelhead fry movements were videotaped 45, 30, and 15 days prior to release. Filming was conducted from the same point at the front of the small aquarium. The free software, 'Video to GIF converter' supported by ezgif.com was used to extract time-serial images every 0.5 seconds.

Identification of Time-Dependent Position of Steelhead

The image was observed with 'ALSee image viewer' (ESTsoft Corp., Korea), and the center point of the bubbling sparger was set as the reference point of the horizontal axis, and the water surface was set as the reference point of the vertical axis. (Figure 1). The movement of each fish was tracked by the position of the fish's mouth over time. The position of each point was identified using the coordinates of the image consisting of 1280x720 pixels. To compare fish positions from different images, all position information was expressed as a dimensionless number. The method is shown in Eqn. 1. As shown in Figure 1, the horizontal length of the bubble sparger was set as the characteristic length (L), and all (x, y) positions from the reference point (0,0) of the fish were divided by L.

$$\text{Dimensionless } (X, Y) = (x/L, y/L) \quad (1)$$

Identification of Movement Direction of Steelheads With Respect to Time

The movement direction of the fish was calculated using the position coordinates between two consecutive times t2 and t1. As shown in Figure 1, when the (x, y)=(0,0) reference point was set (Bubble sparger center, water surface), the sign [position (t2)-position (t1)] was used to determine whether the fish's movement direction was in the direction of the bubbling sparger or not. Since the movement of the fish is captured every 0.5 seconds, the number of movement directions calculated by the above method can be summed to find the time when the fish is facing the opposite direction of the bubbling sparger. A t-test with a 95%

confidence level was performed to determine whether there was a significance of preference for these two directions.

K-means Clustering

When the locations of the fish over time are plotted as a scatter plot of the dimensionless (x,y) coordinates of the image, the locations of the fish can show groupings. MATLAB's k-means clustering function was used to calculate the centroid of each of these groups.

Correlation Analysis

Pearson coefficient was used to determine the linear correlation between the swimming position tracks of two fish over the same time period (Eqn. 2).

$$\rho = \frac{\sum_{i=1}^{N}(X_i-\bar{X})(Y_i-\bar{Y})}{(\mathrm{N}-1)\sigma_X\sigma_Y} \tag{2}$$

where X, Y are the location coordinates of each fish, $\bar{X}$, $\bar{Y}$ are the means, and σ is the variance. In addition, cross-correlation was used to determine if the time-varying swimming movements of the two fish over the same time period were linearly correlated with a constant time lag (Eqn. 3).

$$\rho = \frac{\sum_{t=1}^{T-k}(X_t-\bar{X})(Y_{t+k}-\bar{Y})}{\mathrm{N}\,\sigma_X\sigma_Y} \tag{3}$$

Results

Statistical Framework to Assess Preference for Bubbling Area and Quantify Shoaling Behavior

In order to make a comparative analysis of time-dependent fish behavior, it was necessary to make the position of the fish in the image a dimensionless parameter. To do this, the horizontal and vertical distance of each fish's mouth from the reference point in Figure 1 was divided by the horizontal length of the bubbling sparger, L. Eventually, all positions become dimensionless parameters, and the position information of the images at three different times could be compared with each other. The orientation of the fish to the bubbling area was determined by a vector equal to the difference between the positions at two consecutive times. If the direction of the vector is toward the bubbling area, it is defined as a preference. Shoaling behavior was defined as whether the swimming path of one leader fish is followed by another fish within at most 2s time lag. For this purpose, a cross-correlation analysis was performed to check if there was a positive correlation between leader and follower fishes in both horizontal and vertical directions within at most 2s.

Validation of the Efficacy of the Suggested Statistical Framework Using the Well-Known Shoaling Behavior of Steelhead-Feeding

When feeding, fish interact with other individuals (Holbrook, 1992). In order to validate the efficacy of the suggested statistical framework for assessing shoaling performance of steelhead, the proposed statistical framework was applied to the shoaling behavior at T3 time, which was certainly observed when fishes were feeding. It has been observed that when a

fish travels to the surface of the water to feed, another fish follows its path. Following the statistical framework, several pairs of fishes showed positive cross-correlations in both horizontal and vertical directions within at most 2s (Figure 2). The result implies that the statistical framework is suitable for assessing whether steelhead shoaling is occurring.

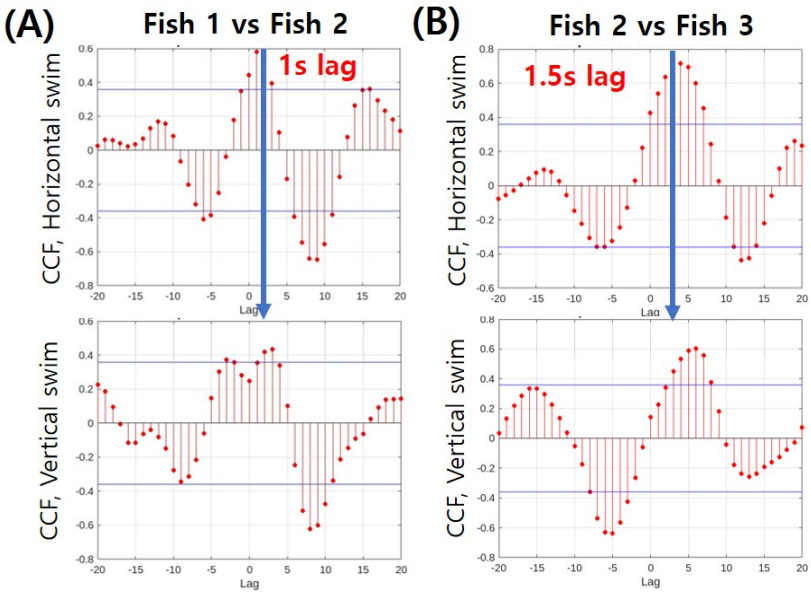


Figure 2: Validation of the Proposed Statistical Framework Through Cross-Correlation Analysis of Shoaling Behavior of Feeding Juvenile Steelheads.

Comparative Analysis of Group Behavior Patterns Over Time in the Aquarium

Figure 3(A) shows a scatter plot of the horizontal and vertical positions that each fish moved every 0.5 seconds. As shown in the results, the living space is organized into three groups. The size of the groups is such that most of them live close to the water surface and only a few are observed at depth. Even at the water surface, different groups form on both sides, starting from the bubbling area in the middle of the aquarium. The peculiarity is that fishes move mainly within their own group, with little interaction between them. Figure 3(B) shows the results of K-means clustering on the movements of all the fishes. The result shows the centroid of each group.

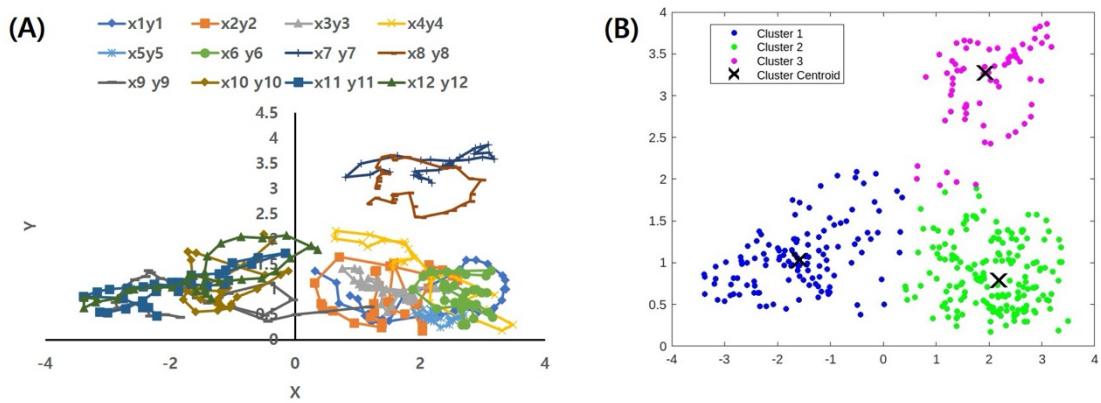


Figure 3: Scatter Plot and K-means Clustering of Horizontal and Vertical Swimming Positions of Juvenile Steelhead at Time T1. (A) Scatter Plot, (B) K-means Clustering.

Figure 4(A) shows a scatter plot of the horizontal and vertical positions that each fish moved every 0.5 seconds at T2, 15 days after T1. Compared to T1, the behavioral radius of the fishes increased with the number of fishes moving vertically from the water surface to deeper water. In addition, few fish crossed the bubbling area in T1, but some fish crossed it in T2. Therefore, although almost isolated groups were clearly distinguished in T1, the horizontal and vertical activity area became wider in T2, and the isolated group with centroid was not clear, even though 2 centroids were pointed out (Figure 4[A], 4[B]).

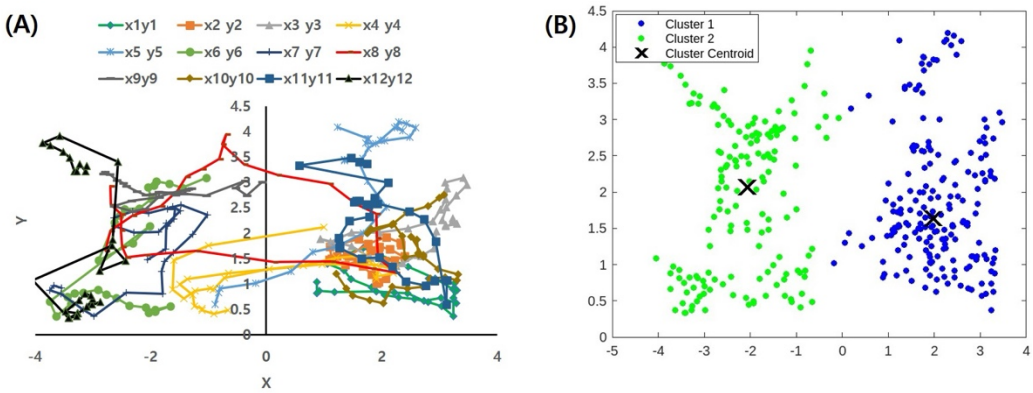


Figure 4: Scatter Plot and K-means Clustering of Horizontal and Vertical Swimming Positions of Juvenile Steelhead at Time T2. (A) Scatter Plot, (B) K-means Clustering.

The number of individuals crossing the bubbling area was higher than those at T2, and beyond the behavior of going deeper on the water surface in T2, almost all of the individuals were living at a significantly deeper depth compared to T1. As a result, home ranges became more similar and concentrated, as evidenced by the convergence into two groups with two centroids (Figure 5[A], 5[B]).

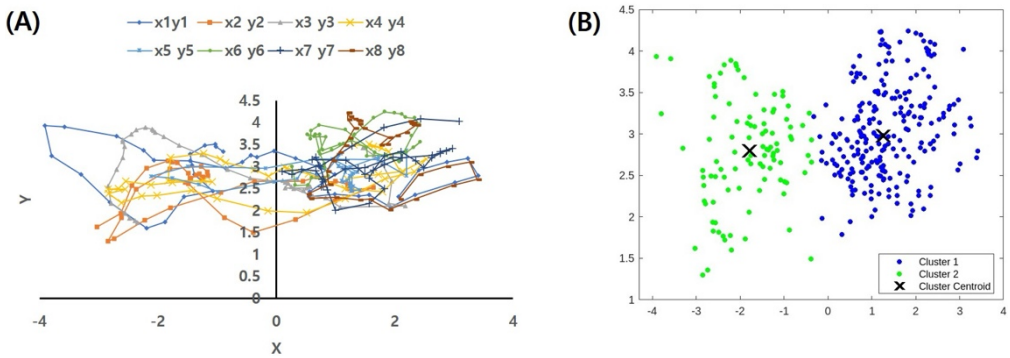


Figure 5: Scatter Plot and K-means Clustering of Horizontal and Vertical Swimming Positions of Juvenile Steelhead at Time T3. (A) Scatter Plot, (B) K-means Clustering.

Comparative Analyses of Distance Traveled and Movement to the Bubbling Area

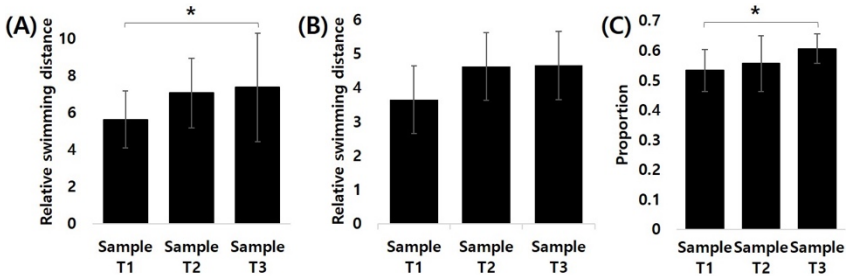


Figure 6: Horizontal and Vertical Swimming Distances and Proportion of Swimming Toward the Bubbling Area of Steelhead According to the Culture Time. (A) Horizontal Distance, (B) Vertical Distance, (C) Proportion of Swimming Toward the Bubbling Area.

As shown in Figure 6(A) and 6(B), horizontal and vertical swimming distances were compared during the observed time to determine the activity of the fishes. As a result, there was no significant difference in vertical swimming distance between T1, T2, and T3. On the other hand, the difference in horizontal swimming distance was significant for T1 and T3 and not significant for T2 and T3. In addition, the swimming preference ratio of T1, T2, and T3 fishes to the bubbling area is shown in Figure 6(C). The t-test showed a difference in preference between T1 and T3 at the 95% confidence level, but not significant between T2 and T3. These results indicate that there is no significant difference in the activity of T2 and T3 fish and their preference to swim to the bubbling area.

Comparative Analyses of Interactions of Fishes in a Group

A Spearman correlation analysis between fishes within each of the T1, T2, and T3 groups showed that although there were significant cases of correlation, the frequency was very low (data not shown). This suggests that even when fish are in the same group, they have individual swimming paths that make it difficult to find similarities in their movements at the same time.

	T1	T2	T3
Fishes crossing over the bubbling area (Number of positive cross-correlation within at least 2 second/Number of events)	-	4/20	7/25
Fishes not crossing over the bubbling area (Number of positive cross-correlation within at least 2 second/Number of events)	4/22	0/16	1/3

Table 1. Proportion of Fishes Expressing Shoaling Behavior According to Crossing Over the Bubbling Area.

On the other hand, when cross-correlation was examined for positive correlation cases in both horizontal and vertical directions within a maximum of 2 second lag (Table 1), 4 cases were found in T1 out of a total of 22 cases (Figure 7).

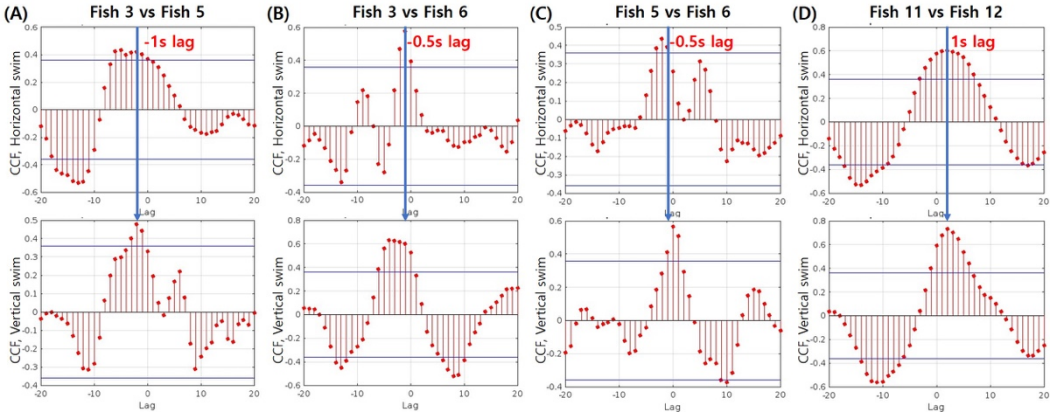


Figure 7: Cross-Correlation Analysis of Steelhead at Time T1. Positive Correlations Were Only Selected for Both Horizontal and Vertical Swimming Directions Within at Most 2 S Time Lag.

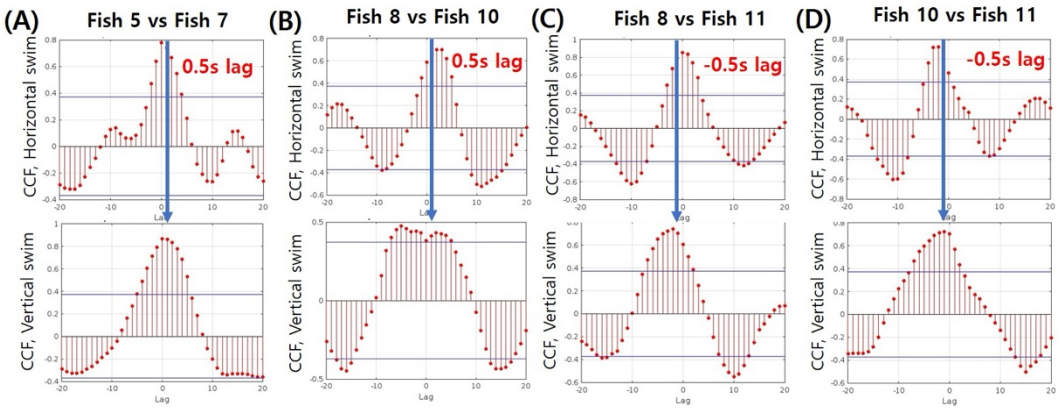


Figure 8: Cross-Correlation Analysis of Steelhead at Time T2. Positive Correlations Were Only Selected for Both Horizontal and Vertical Swimming Directions Within at Most 2 S Time Lag.

In T2, 4 cases were observed in which 3 fishes crossing the bubbling area showed positive correlation with other fishes, and 1 case was found for non-crossing fishes, out of a total number of 46 cases (Figure 8).

Finally, in T3, out of a total of 28 cases, there were 7 cases where the 5 crossing fishes made a correlation with another fish and 1 case where the non-crossing fish did (Figure 9). These results demonstrate that when crossing fish move in T2 and T3, their swimming paths are often positively correlated with the swimming paths of other fishes within a time lag of up to 2 seconds.

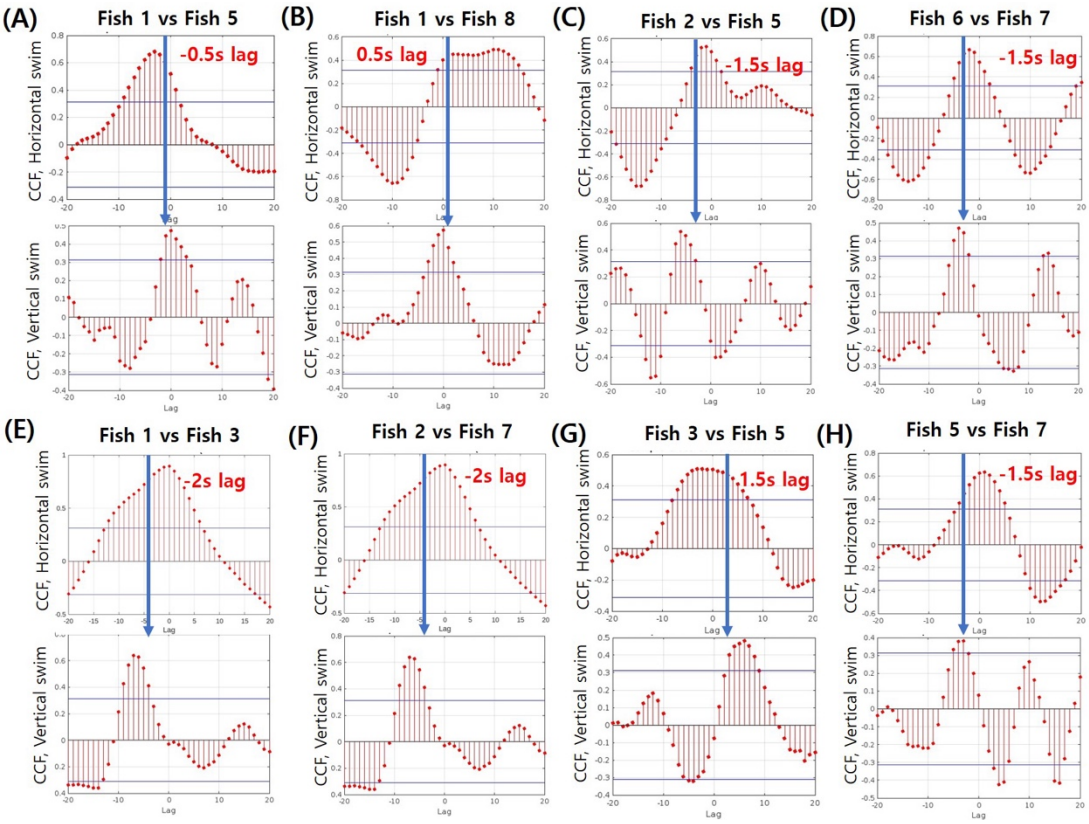


Figure 9: Cross-Correlation Analysis of Juvenile Steelhead at Time T3. Positive Correlations Were Only Selected for Both Horizontal and Vertical Swimming Directions Within at Most 2 Second Time Lag.

Discussion

As steelhead matured over time, they moved deeper in the water column, spent more time in the bubbling area behaviorally, and had a larger horizontal home range as they crossed the bubbling area. In terms of correlations with each fish, they are almost reconstructed as a single group, and as shown by the high similarity of the cross-correlation, there is a tendency for the time-series paths to be more similar, which means that as they move in the horizontal direction, there is a greater tendency for the other fish to follow the movements of one fish over time. However, this is a result. It's interesting to discuss what might have caused these results.

Assuming that the individual potentials for shoaling of T1, T2, and T3 fish are similar, the first effect of population density differences as the fish grow and their living space changes for physical reasons, such as gravity, can be considered. As the fish grows, the gravitational force becomes higher due to the increased mass, and it will eventually form a stable area deeper in the water column to the point where it equilibrates with the buoyancy force. At T1 time, the cross-correlation of swimming paths between fishes was about 18.2%, as the fishes mainly lived in a localized space close to the water surface and separated by a bubbling barrier. In T3, localized non-crossing fishes were also found to be cross-correlated, but there was no cross-correlation of non-crossing fishes in T2. In T2, as shown in Figure 2, the swimming distance in the vertical direction of the fishes is relatively long, which reduces the localization level of the living space. Therefore, it can be assumed that this population density affects the cross-correlation of swimming path. Familiarity is widely recognized as a reason for fish's shoaling preference (Sikkel, 2010; Thünken, 2016). Therefore, we can infer

that shoaling in the isolated T1 in this experiment is a result of high familiarity and high fish density in a small space. However, unlike T1, there are many crossing fish in T3. And the behavioral patterns of these crossing fish may have affected the shoaling. Therefore, the cross-correlation of swimming paths in T1 and T3 cannot be explained by population density alone.

If so, it is worth examining the stark differences in the behavior of fish at T1 and T3. As shown in Figure 4, the proportion of both swimming toward the bubbling area increased at T3 compared to those at T1. In addition, the distance between the centroids of the two groups under the water surface at T3 was closer than the distance between the centroids of the two groups near the water surface at T1. This means that the fish at T3 spent more time near the bubbling area. In T1, the fishes were closer to the water surface. For this reason, the fish at T1 did not need to be near the bubbling area to get oxygen, which is one of the most important factors for fish, since they had plenty of opportunities to get it near the water surface. However, as they grew and lived deeper in the water, the oxygen concentration would decrease as they moved further away from the bubbling area, so the steelhead would need more oxygen at T3 than at T1. The difference in behavior is crossing the bubbling area. This crossing increases the horizontal activity radius of each fish. This is evidenced by the increased horizontal swim path compared to those at T1, as shown in Figure 5. Eventually, the interaction between the two groups, which were divided into left and right sides centered on the bubbling area, became active. The larger fish have more time to feel each other's presence near the high oxygen concentration near the bubbling area, and this behavior can be assumed to be the cause of the synchronization. In other words, the difference between T1 and T2 is that one fish encounters the behavior of another fish more frequently and the behavioral radius is larger, and it can be inferred that the individuals have more time and space to be influenced by each other's behavior and follow the pattern. Of course, it depends on the fish, but it is known that fishes have a strong preference for larger groups (Varmaa, 2020). It can be inferred that the increase in shoaling as the three isolated groups in T1 became one group while crossing at T3 is due to the preference for shoaling in larger groups.

The assertion that the increased horizontal swimming path through crossing increases the cross-correlation proportion is starkly demonstrated in T2. While no cross-correlation was found for the non-crossing fishes, the three crossing fishes exhibited cross-correlation despite the lower population density. These results at T2 demonstrate that not only population density, but also the opportunity to interact temporally and spatially as the swimming path of fishes increases in the horizontal direction, are important factors for steelhead shoaling. This assertion is supported by findings from other groups. According to the attraction rule theory, fishes become attracted to randomly chosen other fishes and eventually merge into larger groups as the time they continue this behavior increases (Hinz, 2017). This supports the argument that the increased horizontal swimming distance while crossing the bubbling area, as shown in our results, increases the opportunity for fishes to interact with each other, which may increase the influence on group swimming.

Conclusion

This study is a statistical analysis of how an air sparging module affects group swimming of Steelhead juveniles in a small cage. Observations were conducted at 15-day intervals for 45 days. Initially, the surface-dwelling juveniles showed cross-correlation in their swimming paths in localized high population density spaces, but failed to interact with each other by crossing the air sparging area. However, over time, as fishes moved deeper in the water

column and lived closer to the bubbling area, they developed shoaling tendencies by crossing the bubbling area, increasing their interaction and horizontal swimming distance. In conclusion, we can say that horizontal swimming path distance plays as important a role in steelhead shoaling in small aquaculture as population density. From this, it can be inferred that it is possible to improve the problems of hatchery steelhead related to shoaling by designing the air sparging module for oxygen supply, which is most important for fishes, to favor the swimming shoaling of steelhead juveniles.

References

Araki H., Cooper B., & Blouin M. S. (2007). Genetic Effects of Captive Breeding Cause a Rapid, Cumulative Fitness Decline in the Wild. *Science*, 318, 100-103.

Christie M. R., Marine M. L., Fox S. E., French R. A., & Blouin M.S. (2016). A single generation of domestication heritably alters the expression of hundreds of genes. *Nature Communications*, 7, 10676.

Fréon P., & Dagorn L. (2000). Review of fish associative behaviour: Toward a generalisation of the meeting point hypothesis. *Reviews in Fish Biology and Fisheries*, 10, 183–207.

Harvey S. T., Muhawenimana V., Müller S., Wilson CAME., & Denissenko P. (2022). An inertial mechanism behind dynamic station holding by fish swinging in a vortex street. *Scientific Reports*, 12, 12660.

Hinz R. C., & de Polavieja G. G. (2017). Ontogeny of collective behavior reveals a simple attraction rule. PNAS, 114(9), 2295–2300.

Holbrook S. J., & Schmitt R. J. (1992). Causes and consequences of dietary specializations in surfperches: patch choice and intraspecific competition. *Ecology*, 73, 402–412.

Kydd E., & Brown C. (2009). Loss of shoaling preference for familiar individuals in captive-reared crimson spotted rainbowfish Melanotaenia duboulayi. *Journal of Fish Biology*, 74(10), 2187-2195.

Liao J. C., Beal D. N., Lauder G. V., & Triantafyllou M. S. (2003). The Kármán gait: novel body kinematics of rainbow trout swimming in a vortex street. *Journal of Experimental Biology*, 206, 1059-1073.

Partridge B. L. (1982). The structure and function of fish schools. *Scientific American*, 246, 114–123.

Pitcher T. J., Magurran A. E., & Winfield I.J. (1982). Fish in larger schools find food faster. *Behavioral Ecology and Sociobiology*, 10, 149–151.

Sikkel P. C., & Fuller C. A. (2010). Shoaling preference and evidence for maintenance of sibling groups by juvenile black perch Embiotoca jacksoni. *Journal of Fish Biology*, 76, 1671–1681.

Thünken T., Hesse S., Bakker T. C. M., & Baldauf S. A. (2016). Benefits of kin shoaling in a cichlid fish: familiar and related juveniles show better growth. *Behavioral Ecology*, 27(2), 419–425.

Varmaa V., Singha A., Vijayana J., & Binoya V. V. (2020). Social decision making is influenced by size of shoal but not boldness, sociability or familiarity in Deccan mahseer (Tor khudree). *Marine and Freshwater Behaviour and Physiology*, 53, 231–250.

Wade A. T., Beechie T. J., Fleishman E., Mantua N. J., Wu H., Kimball J. S., Stoms D. M., & Stanford J. A. (2013). Steelhead vulnerability to climate change in the Pacific Northwest. *Journal of Applied Ecology*, 50, 1093-1104.

Winfree R. A., Kindschi G. A., & Shaw H. T. (1998). Elevated Water Temperature, Crowding, and Food Deprivation Accelerate Fin Erosion in Juvenile Steelhead. *The Progressive Fish-Culturist*, 60, 192-199.

Contact email: claireshin.college@gmail.com

Students' Visual Attention Distribution on Multilingual Educational Slides – An Eye-Tracking Study

Laksmira K. Adhani, Kyushu University, Japan
Gerard B. Remijn, Kyushu University, Japan

The European Conference on Education 2024
Official Conference Proceedings

Abstract
Internationalization policies at higher educational institutions in non-English speaking countries have led to an increase in multilingual programs for (international) students. Teaching in such programs often requires the use of multiple languages on educational slides (e.g., PowerPoint), with the same information in English and the local language(s). However, having multiple languages on educational slides can lead to text crowding and processing overload. To investigate how students perceive multilingual slides, we performed two experiments with Indonesian and Japanese students, who use English as their second language. They were asked to evaluate slides which contained text in three languages (English, Japanese, and Bahasa Indonesia), within two layouts (separated-block and mixed). While doing so, their visual attention distribution on the slides was assessed with eye tracking, and their comprehension of the contents was tested. The eye-tracking results showed that the students dwelled their eye gaze longer on the texts in their native language (either Bahasa Indonesia or Japanese) if the slides had a separated-block layout, i.e., when the same information was grouped according to language. For slides with a mixed layout, in which the same information was given line-by-line in a different language, the students dwelled mainly on the text in their non-native language(s). Furthermore, these mixed-layout slides were evaluated as more complex/distracting and required more mental processing effort than slides with a separated-block layout. Nevertheless, the students' content comprehension was significantly better for mixed-layout slides, implying that the mixed layout can be more effective in multilingual education.

Keywords: Learning, Multilingual Slides, Visual Attention Distribution, Internationalization

iafor
The International Academic Forum
www.iafor.org

Introduction

Internationalization has become a key policy at higher educational institutions, leading to a rapid increase in the number of international education programs. Education in such programs often involves providing the same content in multiple languages, mostly in slide presentations (e.g., PowerPoint). Presenting multilingual slides can be challenging, although many (commercial) resources have been developed to assist multilingual education, e.g., related to translation and presentation (Boichura & Lopatina, 2023; Degani & Goldberg, 2019; Steigerwald et al., 2022). Important aspects in the design of (multilingual) education slides are the amount of information that is presented on a slide, the organization of the content, the typeface, and the layout (Durso et al., 2011; Kahraman et al., 2011; Marchack, 2002; Paul & Seniuk-Cicek, 2022; White, 2018). Typical slide layouts are similar to those used for commercial purposes such as in road signs or advertisements (Bhatia & Ritchie, 2013; Qiu et al., 2018; Sebba, 2013). One is a *separated-block* layout, and the other is a *mixed* layout. Slides with the separated-block layout have the same information grouped according to language, while slides with the mixed layout have the same information in a single block consisting of alternating lines for each language.

There are few investigations on how multilingual slides are processed by students. Related research has been performed using video with subtitles, which investigated content processing during video learning (Baranowska, 2020; García, 2017) and assessment of the learners' visual attention distribution in the subtitle areas, by using eye tracking (Kruger et al., 2014; Liao et al., 2020; Negi & Mitra, 2022; Perego et al., 2010). The present study therefore used similar methods to investigate the following research questions.

a) How do students evaluate the multilingual educational slides with the separated-block and the mixed layout?
b) Does students' visual attention distribution differ between multilingual educational slides with a separated-block and a mixed layout, and does it differ per student group (Indonesian and Japanese)?
c) Does content comprehension differ between slides with a separated-block and a mixed layout?

Method

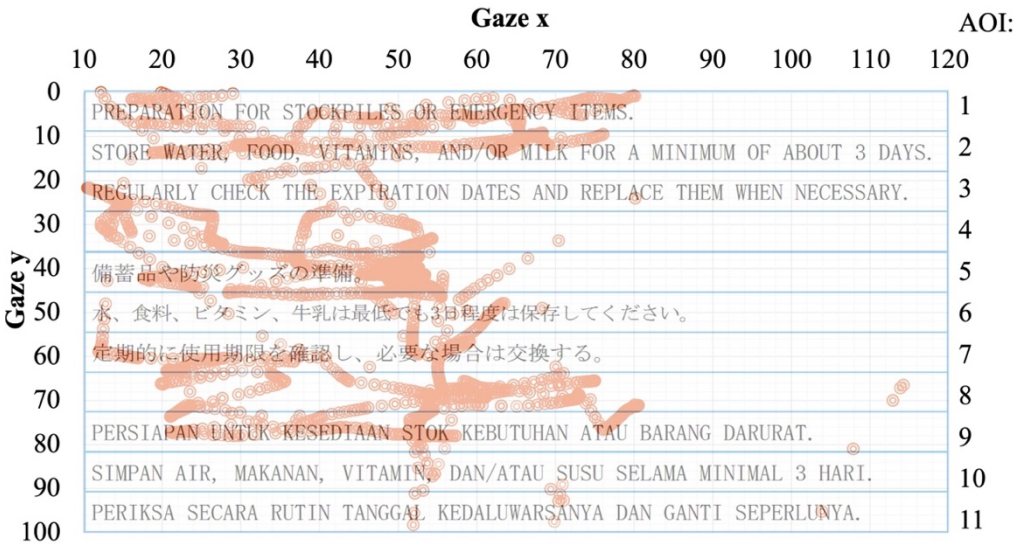
In order to answer these questions, we designed the multilingual slides in a 3 × 2 factorial design with two factors. The first factor was language, set in three levels consisting of English, Bahasa Indonesia, and Japanese. The second factor was the layout, which could either be separated-block or mixed. In each slide, there were 11 lines of information, 9 with text and 2 without text. Each of these lines was determined as an Area of Interest (AOI) to assess the participant's visual attention distribution by measuring the amount of eye-gaze dwell time on the AOIs. A group of Indonesian students and Japanese students, with English as their second language (L2), was assigned to watch the multilingual slides, evaluate, and perform a comprehension quiz. In Experiment 1, Indonesian students (n= 18) received the slides with the separated-block layout, and Japanese students (n= 18) received the slides with the mixed layout in session one, and vice versa in session two. In Experiment 2, the groups had an equal number of participants according to the language background. One group of 10 Indonesian students and 10 Japanese students viewed slides in the separated-block layout, while the other group of 10 Indonesian students and 10 Japanese students viewed slides in a mixed layout. Details of the methods can be found in Adhani and Remijn (2024).

Results and Conclusion

The evaluation scores in both Experiments 1 and 2 showed for the first time that multilingual slides with the mixed layout, in which the same information was given line-by-line according to language, were evaluated as significantly more complex/distracting, crowded, and required more mental processing effort, as compared to the slides with the separated-block layout. Both Indonesian students and Japanese students (N=36 in Experiment 1 and N=40 in Experiment 2) had the same opinion towards this. In addition, according to the language preference scores in Experiment 2, both Indonesian and Japanese students self-reported that they mostly read the text in their native language (L1) rather than the text in a non-native language(s), including English (L2), when they watched slides with a separated-block layout. In the mixed layout, however, their preferences were more varied, and significant differences were not found.

By using eye-tracking, the students' self-reported preferences could be confirmed. An example of obtained gaze patterns is shown in Figure 1. In Experiment 1, the visual attention distribution on slides with a separated-block layout revealed that they focused more on the AOIs in their first language. This means that 18 Indonesian students predominantly viewed the text in Bahasa Indonesia, while 18 Japanese students mainly viewed the text in Japanese. This result was also similar to that of Experiment 2 for slides with a separated-block layout. Students (N=40) gazed at texts in their L1 (either Bahasa Indonesia or Japanese) for a significantly longer dwell time than at texts in their non-native language(s), including English. However, the results for slides with a mixed layout showed that the participants gazed longer at the text in their non-native language(s), including English, than at the text in their L1. This was significant in Experiment 1, but not significant in Experiment 2. Regardless of this, the comprehension scores obtained in Experiment 2 for slides with a mixed layout were significantly higher than those for slides with a separated-block layout (see Adhani & Remijn, 2024).

A. Gaze patterns of a participant looking at multilingual slides with a separated-block layout



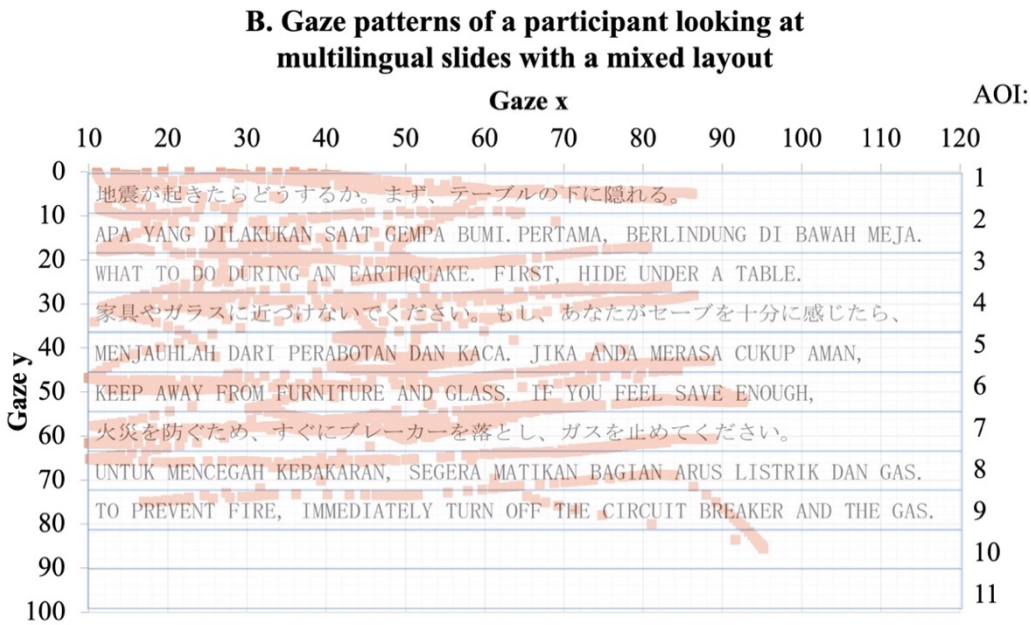


Figure 1. Results of Experiment 1. Examples of a gaze pattern (in orange) on a multilingual slide with a separated-block layout (A) and a mixed layout (B).

The main conclusion of this research is that although the slides with a mixed layout were evaluated as significantly more complex/distracting, crowded, and required more mental processing, this slide layout promoted content comprehension significantly better compared to the slides with a separated-block layout. The relatively better comprehension for multilingual slides with a mixed layout relates to comprehension results obtained after viewers watched multilingual video subtitles (Baranowska, 2020; García, 2017; Kruger et al., 2014; Liao et al., 2020; Negi & Mitra, 2022; Perego et al., 2010). For example, in García's study (2017), students had better test scores for content with bilingual subtitles since they could, arguably, switch between L1 and L2 subtitles and confirm whether they understood the content. Liao et al.'s (2020) study also performed a recall test after the viewers had finished watching video subtitles. In a video with bilingual subtitles, the participants could compare the English words with the L1 to gain their L2 (English). In a similar vein, when using slides with a mixed layout in the present study, by doing this L1–L2 switching students could have been able to compare the languages in adjacent lines and use their language knowledge to confirm the content.

This study has several limitations. First, the multilingual slides were presented within a short duration of 10 seconds for each slide, while the texts were displayed without animation, in black-on-white, without pictures, without formulas or flow charts, and all the slide presentations did not include narration by an instructor. Next, the topics and the quiz questions used (see Adhani & Remijn, 2024) would benefit rote learning, and this does not dovetail with typical learning in higher education. Further investigations are needed to test how the text layout of multilingual educational slides affects learning in the presence of other realistic audiovisual sources. The main practical implication of the present study is that the use of multilingual slides in a mixed, line-by-line layout according to language supports content memorization. Although visually crowded, teachers or instructors can use more than one language on their slides while presenting their materials to students, if necessary.

Acknowledgements

The authors want to express a thank you to all the Indonesian and Japanese participants at Kyushu University who were involved in both experiments. Thank you to Kazuo Ueda, Hiroshige Takeuchi, and Emi Hasuo for their valuable comments on this study.

Funding

This research was supported by a grant from the Japan Science and Technology Agency (JST) Next Generation Researcher Challenging Research Program JPMJSP2136.

References

Adhani, L. K, & Remijn, G. B. (2024). Students' evaluations of multilingual educational slides and their visual attention distribution on slides with different layouts. *Journal of Education and Learning*, 13(3), 1-16. Published online March 14, 2024. DOI:10.5539/jel.v13n3p1

Baranowska, K. (2020). Learning most with least effort: Subtitles and cognitive load. *Journal of English Language Teaching* (ELT), 74(2), 105–115. https://doi.org/10.1093/elt/ccz060

Bhatia, T. K., & Ritchie, W. C. (2013). *The Handbook of Bilingualism and Multilingualism*. Wiley-Blackwell.

Boichura, M., & Lopatina, D. (2023). Web application for organizing bilingual presentations. *Modeling Control and Information Technologies*, (6), 166–167. https://doi.org/10.31713/mcit.2023.050

Degani, T., & Goldberg, M. (2019). How individual differences affect learning of translation-ambiguous vocabulary. *Language Learning*, 69(3), 600–651. https://doi.org/10.1111/lang.12344

Durso, F. T., Pop, V. L., Burnett, J. S., & Stearman, E. J. (2011). Evidence-based human factors guidelines for PowerPoint presentations. *Ergonomics in Design: The Quarterly of Human Factors Applications*, 19(3), 4–8. https://doi.org/10.1177/1064804611416583

García, B. (2017). Bilingual subtitles for second-language acquisition and application to Engineering Education as learning pills. *Computer Applications in Engineering Education*, 25(3), 468–479. https://doi.org/10.1002/cae.21814

Kahraman, S., Çevik, C., & Kodan, H. (2011). Investigation of university students' attitude toward the use of PowerPoint according to some variables. *Procedia Computer Science*, 3, 1341–1347. https://doi.org/10.1016/j.procs.2011.01.013

Kruger, J.-L., Hefer, E., Matthew, G. (2014). Attention distribution and cognitive load in a subtitled Academic lecture: L1 vs. L2. *Journal of Eye Movement Research*, 7(5). https://doi.org/10.16910/jemr.7.5.4

Liao, S., Kruger, J, and Doherty, S. (2020). The impact of monolingual and bilingual subtitles on visual attention, cognitive load, and comprehension. *The Journal of Specialised Translation*, 33, 70-98.

Marchack, C. B. (2002). Guidelines for digital scientific presentations. *Journal of Prosthetic Dentistry*, 88(6), 649-653.

Negi, S., & Mitra, R. (2022). Native language subtitling of educational videos: A multimodal analysis with eye tracking, EEG and Self-reports. *British Journal of Educational Technology*, 53(6), 1793–1816. https://doi.org/10.1111/bjet.13214

Paul, J., & Seniuk-Cicek, J. (2022). Cognitive science of powerpoint part II: The Power of Attention. *Proceedings of the Canadian Engineering Education Association* (CEEA). https://doi.org/10.24908/pceea.vi.15834

Perego, E., Del Missier, F., Porta, M., & Mosconi, M. (2010). The cognitive effectiveness of subtitle processing. *Media Psychology*, 13(3), 243–272. https://doi.org/10.1080/15213269.2010.502873

Qiu, Q., Watanabe, S., & Omura, K. (2018). Affective font selection: The hybrid of Japanese and Latin typefaces. *International Journal of Affective Engineering*, 17(2), 89–98. https://doi.org/10.5057/ijae.ijae-d-17-00008

Sebba, M. (2012). Multilingualism in written discourse: An approach to the analysis of multilingual texts. *International Journal of Bilingualism*, 17(1), 97–118. https://doi.org/10.1177/1367006912438301

Steigerwald, E., Ramírez-Castañeda, V., Brandt, D. Y., Báldi, A., Shapiro, J. T., Bowker, L., & Tarvin, R. D. (2022). Overcoming language barriers in academia: Machine translation tools and a vision for a multilingual future. *BioScience,* 72(10), 988–998. https://doi.org/10.1093/biosci/biac062

White, P. (2018). The classical commentary in renaissance France: Bilingual, mixed-language, and translated editions. *Renaissance and Reformation / Renaissance et Réforme*, 41(2), 7–36. https://doi.org/10.33137/rr.v41i2.29832

Contact email: adhani.laksmira.521@s.kyushu-u.ac.jp

The Societal Impact of Universities: A Qualitative Evaluation of an Education Innovation

Lorenzo Duchi, ErasmusX - Erasmus University Rotterdam, Netherlands
Canan Mesutoglu, Erasmus University Rotterdam, Netherlands

The European Conference on Education 2024
Official Conference Proceedings

Abstract
With the urgency to respond to the rapid changes undergoing in the world, it is becoming more pivotal than ever for universities to connect and actively engage with society to tackle our current global challenges. In the Netherlands, this shift towards contributing to a positive societal impact has permeated across higher education institutions. Numerous projects have emerged with an explicit focus on bringing real-life problems into the classroom to foster multidisciplinary collaboration and interactions across different stakeholders and the community at large. The literature presents multiple conceptualizations to describe the societal impact of universities, ranging from the social responsibility of universities to university-community partnerships. Nevertheless, little is still known about the impacts that such projects might have on the students, the teachers, and the community. Therefore, this research aims at exploring the effects of an education innovation, called HEF House, at the Erasmus University Rotterdam. We conducted interviews and focus groups with students, teachers, and the local partners across three different cases happening within this project. We discovered many different changes that the HEF House is stimulating, changes in terms of knowledge acquired, skills developed, attitudes and values shifted, new relationships forged and ways of doing. We also learned about potential causes of such changes. They ranged from developing experiential learning experiences and combining different institutions and disciplines to co-creating with the different actors involved and reflecting together throughout the whole process. Implications on the relevance and value of (evaluating) such education innovations will be explored in more depth.

Keywords*:* HEF House, Higher Education, Social Impact, Education Innovation

iafor
The International Academic Forum
www.iafor.org

Introduction

The urgency to respond to complex societal challenges is increasingly recognized, with regards to, for example, digitalization, sustainability, or the general well-being of individuals. Confronted by these societal challenges, updated pedagogical perspectives are offered that can address complex thinking and the learning processes during active involvement with society (Staley, 2019; Wessels et al., 2024). Also stressed in European strategy documents (e.g., European Commission, 2022) is the engagement of government and stakeholders with universities through social engagement and innovation. These observations are reflected in the increasing number of higher education programs and courses that put an explicit focus on close collaborations with actors in society. Universities play an important role in providing knowledge in order to build human capital as well as to contribute to social, economic, and cultural development (Sterling, 2021).

The community engagement efforts can be collectively grounded on the importance of creating social impact. In their conceptualization of social responsibility of universities, Godonoga and Sporn (2023) explained the two-way exchange between universities and stakeholders and defined impact as: "…the effects and value that higher education institutes add to their external environments" (p. 451). Although the multiple conceptualizations, e.g. socially responsible universities or university-community partnerships, demonstrate the merit of higher education in driving innovation in today's knowledge economy, the social impact of universities remains vague (Carl & Menter, 2021). In comparison to studies on the *drivers* and *processes* of universities' socially oriented activities, *impacts* of these activities is unexplored to a greater extent (Bayuo et al., 2020). This research aims to contribute to the impact studies and to further define the social responsibility of universities.

The conceptualization of social responsibility by Godonoga and Sporn (2023) covers the relation between the university and the society through the institution's responsibility, service, engagement, mission, and impact. Impact explicitly defines the more tangible effects. Education and transfer are university activities whereby these effects might be achieved (Carl & Menter, 2021; Jorge & Peña, 2020). Living lab-based educational innovations are examples of such activities (Rogers et al., 2023). For our research, we adopt Fourati-Jamoussi et al. (2019, p. 571)'s broad definition for educational innovation: "novel practices, tools or technologies used in curricula, course materials and pedagogy". Utilizing societal challenges as the driver of higher education innovations is a common current practice across disciplines e.g., engineering, environmental, health sciences, as well as social sciences (Nowell et al., 2020).

Although a clear tendency in creating impact through education innovations is evident, organizations face challenges in identifying a social impact assessment tool or a technique that fit their vision and needs (e.g., Gerke et al., 2023; Kah & Akenroye, 2020). Yet, there have been several efforts to monitor and evaluate the impact of university innovations on the actors involved, the processes whereby impact is achieved, and the circumstances that play a role. Notable helpful tools include the knowledge exchange framework (Johnson, 2022) and the research excellence framework (Kelly & McNicoll, 2011). The 'impact evaluation framework' developed by Edwards and Meagher (2020) highlights the types of impacts and the actors involved together with the relations between impact and its potential underlying mechanisms. Multiple factors were developed and positioned within three core evaluation questions: what changed, how these changes took place, and what the lessons learnt are. Combining their first two questions, Edwards and Meagher (2020) highlight the importance of finding qualitative

indicators of the learning and change processes contrary to a check of results against large-scale objectives. This exploratory lens can uncover how learning and change take place and inform the effective practices to engage participants in the learning process (Heikkinen & Isomöttönen, 2015).

Prior research indicates that engaging participants in learning and change processes during open-ended social experiences is not straightforward (e.g., Vogler et al., 2018). Many factors such as the problem at hand and participant characteristics and experiences play a role in the learning experiences (Heikkinen & Isomöttönen, 2015; MacLeod & Van der Veen, 2020). Yet, identifying what kinds of learning mechanisms emerge is critical in developing pedagogies to facilitate learning and change in collaborative projects (Vuojärvi et al., 2022). The previously identified learning mechanisms in similar higher education contexts can be reduced to three categories. The first category concerns mechanisms at the individual level: for example, self-directed learning and gaining agency, and recognizing expertise and lack thereof. Next, the second category specifically stresses collaborations and interdisciplinarity, such as coordinating actions at the team level, connecting and integrating expertise, creating shared understandings and hybrid practices, and solving conflicts (e.g., Fortuin et al., 2024; Heikkinen & Isomöttönen, 2015; Hero & Lindfors, 2019; Schaffer et al., 2012; Van der Wee et al., 2024; Vuojärvi et al., 2022). Finally, a third big category that promotes learning and change can be represented by hands-on experiences, where students are active and construct knowledge in realistic contexts (e.g., Boschman et al., 2019; Khoo et al., 2024). These insights gained from previous studies can apply to our context and shed light on our understanding of the learning and change mechanisms that contributed to the impacts of our education innovation.

ErasmusX, an innovation unit at Erasmus University Rotterdam, developed a project aimed at connecting education with the urban neighborhoods via the HEF House, a building in the south of Rotterdam. This initiative, a collaboration between research, applied, and vocational universities, bridges the gap between academia and the local community, addressing educational and social inequality. Considering the above-mentioned observations, the leading question of this evaluation study was: ‘How does the education innovation, HEF House, impact its participants and the urban community, with which learning and change mechanisms, and under what circumstances?’

Method

This study employed a qualitative case study design involving three in-depth case studies selected based on 'maximum variation', an approach that ensures a comprehensive understanding of the different processes and outcomes within the studied cases (Flyvbjerg, 2006). The first course, ImpactLab, took students from research and applied universities to work together to develop a youth hub within the HEF House. The minor on migration was an interdisciplinary course exploring global migration topics through seminars, lectures, and a buddy program with young refugees. The public health course was a multidisciplinary program focused on maintaining and improving population health through collective measures, with a particular emphasis on addressing health challenges with local organizations. We engaged all relevant actors through semi-structured interviews with students and professionals, and focus groups with coordinators and teachers. Data was collected from ten students and three focus groups distributed across the three cases. Additionally, seven staff members, including social, municipal, and educational partners, were interviewed. The interview protocols were based on Edwards and Meagher (2020)’s impact evaluation framework. Thematic analysis was used to analyze the data with the program Atlas.ti.

Results

1. What Are Learning and Changes That We Have Observed?

Changes in Knowledge

Students have developed a broader, more complex understanding, which extends beyond course topics to include a better understanding of the surrounding neighborhood. Both students and university teachers have gained new insights into the south of Rotterdam, an area they had rarely worked in.

> *Yes, I think most of what I've learned myself is broadening that perspective … because I myself come from the Westland because I could not initially come into contact with it, I mainly walk over the campus or in the business building, so to speak. To see a completely different neighbourhood, which also takes place in Rotterdam. That's been the biggest learning moment for me, so just the experience of sitting in a police station and having conversations there, but also. Of course, in your own hands with those young people that you hear those stories and that you think of "There's more than my own bubble that I live in with guys who are all educated", so to speak. (ImpactLab student 4)*

Changes in Social Relationships

Engaged education has transformed relationships among students, teachers, and the local community. HEF House has facilitated the creation of new social connections among all involved parties.

> *Like I spoke with a lot of students and they said, "Yeah, I had like a lot of prejudice. Uh towards like the status holders. I had like certain assumptions and like everything is just so different now. I really experienced and spoke with the people I had like some assumptions of". So, and yeah, I'm very inspired by the way that the learning, the learning exchanges, yeah, goes like both sides. (Minor on Migration teacher)*

Changes in Mindset and Values

Participants have started to change how they perceive certain phenomena and what they find important. They have learned flexibility and openness, which is especially important when interacting together in this open-ended context. They are recognizing the complexities intrinsic to our society and the importance of other people's perspectives in navigating through this landscape.

> *Also look at the things from their perspective. I think that's also something I really learned. I did my paper like this, smuggling and irregular migrations, and then I would look at the policy in the media. Look at it and how people themselves look at it. But that's such a big difference and I think it's important to also look at things from their perspective and how they see it. And that's personally for me the way how you can help these people and obviously looking at how we want to do it like this and we see them like this. (Minor on Migration student 3)*

Changes in Skills

Students have enhanced their social and learning skills. They know better how to learn, how to communicate and how to collaborate. Working with peers and community stakeholders at HEF House has fostered these skills, highlighting the importance of learning from and with diverse groups.

> *In the beginning, all the students worked more like alongside each other than really with each other. We all had like our own specialties, but we didn't really communicate how we were going to bring it together. So everyone just did their own thing and I thought everything was going fine with the teamwork. And then we had like a presentation for the stakeholders (...). One student from the applied university was really disappointed because he had anticipated a lot more discussions between the stakeholders and us. While I said, well, it went exactly like I had thought it would (...). So yeah, that's one of the moments where I noticed "OK, we need to work on our communicating skills" and that's also what we did afterwards. And also like a common language, because sometimes they were talking about stuff and I had no idea because everybody was doing their own thing (...). So yeah, so after that I think we all learned a little bit how to communicate better. (ImpactLab student 2)*

Changes in Doings

We can see the participants engaging in new activities. Teachers, students, and the locals find themselves in new contexts and start doing things differently. For example, the youths from the neighborhood have started to create new projects and are applying for funding.

> *One of the opportunities I have, I have the possibility to give money to local projects, which we think can help to build society and community building. Uh, in the last five years I have only had two projects applied from youngsters. Since the opening of the HefHouse, I have ten. They have never before applied. (Person from the municipality)*

2. Which Learning and Change Mechanisms Can We Identify?

Co-creation

Students emphasized the importance of peer collaboration and support, teacher guidance, and interactions with local organizations. Students benefited from working with peers and teachers from various disciplines and perspectives to enhance their communication and collaboration skills, change values and mindsets, as well as improve project outcomes. Teachers also valued interactions across different educational institutions and disciplines, recognizing this as essential for local organizations and citizens.

> *Someone from another study also brings perspectives with them. And if you get stuck somewhere, because your knowledge reaches up to that point, then the other person may be able to supplement it and then you can come to a better solution together. I think in that sense it did help that it was a different one. That those people had a different educational background. (Public Health Minor student 2)*

Such experience of partnership is also present in the interactions between the teachers and the employees from the different local organizations. The HEF House is observed to have acted as

a connector, fostering partnerships between the universities and the different local organizations and citizens.

> *Well, I think on our level of organizations, it's very nice here to have the youth hub together with applied and research universities. That to us it's three institutes that we need and sort of need to serve but what HefHouse really gets is that you can only serve when you know what the needs are. So all this is, uh, sort of the change that we need, not talking about people but with the people and get their needs. And then the innovation is how can we as organization create the possibilities and solutions for the needs of the community and that is, sort of crazy enough, innovation. Crazy enough, but yeah, the public debates ... So I asked for seven years, I want a solution for this but now we are here, we are here and you yeah have to be humble enough to go to the key places and people, and if we want to serve you what do you need? (Member of a local organization)*

Engaged Learning

Experiential learning, through hands-on participation, has been embraced. Activities ranged from guest lectures from practitioners to site visits to local organizations. Most notably, students found particularly interesting working together with the citizens in the neighborhood and the local organizations. Teachers also valued this approach, despite occasional struggles, and recognized its benefits for themselves and students.

> *I learned so much about the experiences of refugees, not at the theoretical standpoint, but by talking to them, that was very nice. I had never really interacted with a group of refugees before. So that definitely just added to my learning experience. But also the skills. The activities we did and also the interaction with the status holder definitely helped with not only, you know, the communication skills but also establishing friendships or relationships with status holders so. (...) I can't say a specific moment, but it was just we are not used to you know. In university, we just learn from lectures and we do our readings. So in this course, I think the way it was set up, it really helped us and was an experience that was very new. (Minor on Migration student)*

Local actors stressed the need for reciprocal engagement between education and society. Education should be embedded in society. When that sense of reciprocity is being welcome and embraced, then the learning experience becomes more valuable and relevant for everyone involved.

> *That's how the way to make transformation and I thought ohh my hell. How am I going to do this? Because the Minister or the mayor won't listen to this story. In the meanwhile I met the people in charge of the HefHouse. I told them "in the university, we educate academics". Are you researching for research sake or for your own purpose, or are you researching to make impact and change in society? If you are doing the last, then you should be in society, not in your ivory tower, gold coated with kindred spirit. You should be man enough to go into society and grasp what's happening there and research from there. And they took up this challenge and they came. It was really a struggle. It's still struggle, but they're there. (Member of a local organization)*

Self-Direction

The ability to direct one's own learning experience turns out to be a key mechanism in this learning context. Both teachers and local organizations highlight the importance of giving students and community members control over their experiences. This sense of agency energized students and enhanced their learning journey, fostering skills in communication and collaboration. It is also vital for the local members of society to take charge of their life and their experience.

> *For instance. I think I'm the only one who's happy that [a youth organization], which was selected to hold the youngsters, said: "No, I'm not going to do this job." I was really happy because that means they understand we have to make a transition and we're not gonna make that transition with them. They just want to tell the youngsters "That's the way to do it". No, they know what's the way, but they need a toolbox with tools they can use. Not that you are the guardian of the toolbox. They want their own toolbox. They are the guardian of the toolbox and not you. They tell you what to fill it with, not you. And that's a hard lesson, but I'm really, really excited about this! (Member of a local organization)*

It is not important to only learn by doing or to take actions. It is deemed adamant that one takes a step back and reflect. It is indeed often in this action-reflection cycle that learning becomes meaningful and relevant to all the parties involved, for students, teachers, citizens, and local organizations.

> *You need some sort of. I also have quite strong opinions often, so I have to say that I have that myself. But yes, you really have to try to put that aside. You have to try to take some kind of helicopter view of the situation in order to think okay. Is that, what is what the person is saying now, is that. Can that be or how. You have to learn to be really open, say to other people's opinions and I think I say that, but also in again that delivering, say between the different interests that have taken steps in that. But I can also experience it as a frustrating process. And every once in a while you just have to let go, do something else and then look at the world again the day after for you to have a fresher look, so to speak. (ImpactLab student 6)*

3. Under Which Conditions?

Given the complexity of such processes, not everything went smoothly. Elements of frustrations and disagreements emerged because of the different and misaligned expectations and aspirations of the many parties involved. One can clearly read that in a reflection of the organizers of the HEF House, showcasing the importance of making sure all parties are aligned in terms of expectations and goals.

> *My frustration is mainly about collaboration, you know, collaboration with the youth hub, collaboration with applied universities, and we do work together, but we do not have the same pace and perhaps not always the same objectives or ambitions. I think unwritten, but I don't know in spoken form. I think that what I'm saying now is that they will all agree with that, but in the meantime everyone is stuck in their own organization and system and I find that so frustrating that I still find it difficult to really get things off the ground.*

Therefore, it is vital that the right conditions are put in place for this form of education to work. In our study we noticed at least five important ingredients.

Safety

A sense of safety and trust among the partners involved is necessary so that they can be themselves and express freely.

> *I know for sure that the major step was that we all took a jump into the deep without knowing where we were going and we had the firm belief that that's going to work. The pioneers who took the jump had the firm belief we were going to land, we don't know where we're going to land, but we're going to land. That is the belief the youngsters needed because they also don't know where they're going to. So the collaboration is unique, but it's not the uniqueness of the collaboration and being there together, that makes it work. It's the fact that they treat everybody as equal. Everybody is expert. Never did someone from university say "Oh it is just the youth."No, they are equal partners, even in the name. It's Hogeschool, Erasmus and Feyenoord united. That's what HEF means, that is what the HefHouse is. It's equal. (Member of a local organization)*

Mindsets: Flexibility and Resilience

Given the nature of such processes, it is help that the people involved have a flexible, resilient and open mindset to be able to be adaptable and to navigate through the complexity.

> *Yeah, it was very nice and ohh because I worked with Johanna lots and Mary and Rob from Erasmus University College. And yeah, working together was very natural. I think we all have a bit of the same way of thinking. I think sometimes we can be very like uh last minute sometimes because things change all the time. For example, in the minor, the criteria was that the students speak Dutch, because they teach Dutch to the asylum seekers, right? But then at the kickoff, I saw that like there was a group of like 10 students who were international and didn't speak Dutch. So we had to do a lot of things like last minute, like went all OK, but yeah, it was very nice that. Yeah. That the partners also were very hands on and very flexible. So that's something that was very nice for us. (Member of a local organization)*

Resources: Time and Money

Time and money are needed for such relationships and bonds to be forged. It takes time and resources to be able to initiate such projects.

> *My experience with those kind of processes, if you want to develop it together, you need to spend time to get to know each other. And to build up common ground and you think completely different than I think because you have a different background. That's where we are, but we need to work together. We are just starting (...). 'Cause you need so much time and effort and you must invest time and effort to find a way of working together in an efficient way, in a way that you actually use everyone's input. (ImpactLab teacher)*

> *At least for me it is becoming also clearer the value in interacting with local organizations, but also the difficulty because clearly they often lack resources, the staff,*

the funding and so on. So that's the question that if we want to do education in here we need to ask ourselves seriously. (Public Health Minor teacher)

Governance

Therefore, there needs to be a governance structure supporting these sorts of partnerships and processes. This excerpt from the focus group of the ImpactLab shows how this is the case.

Teacher1: I think we as partners should like have a governance structure like OK, how are we gonna do things and have like a guidance, road map, and in the road map we have like a lot of exploration moments as well but it takes time to create...

Teacher2: We [referring to the educational deans of the different institutions] pinpointed this challenge. And we defined that it is very wise for the different curriculum and institutions to sit together, from high schools and youth hub to research and applied universities. How could it look like if we were working in this area? How could we work together?

Teacher3: But also for me, the most important question would be how can you do this in a sustainable way? Because if this doesn't work out, then in a few years there will be other parties. All the time that you invest, they will do it again.

Teacher's Role

Working in this context is often new and brings about a series of frustrations and emotions. The role of the teachers shifts from transferring knowledge to guiding students through the uncertain and open-ended processes. For this to happen, it was essential for the students to see in the teachers somebody they could reach out to.

And I think because of those questions, the teacher was also there like guiding us, I think we learned how to combine those things and like he also helped us a lot in our co-operation ... because in beginning, there was like tension a little bit because the different stakeholders had different ideas. And they didn't really combine. And I think it also helps us like how to deal with that because it was not really a good. Like they told us to build trust, but we had to like, not tell certain things to certain parties. So for me it was difficult because it felt distrustful to not say it and the teacher like, helped us how to deal with those kinds of things and feelings. So I think that helps a lot and that's what I've learned. (ImpactLab student)

Conclusions

The aim of this study was to reveal the changes our participants experienced through our education innovation, HEF House, and the learning and change mechanisms behind such changes. We also identified conditioning factors that influenced these experiences.

The continuous interactions and collaborations seem to have impacted students, teachers, and local partners in terms of knowledge, behavioral, and affective outcomes (Guo et al., 2020). In similar higher education contexts, acquiring and deepening both course and cross-disciplinary knowledge is a common result (e.g., Hero & Lindfors, 2019; Vuojärvi et al., 2022). Although a change in mindset towards a broader perception of the complex local and global challenges

as a result of forming new social relations resonates well with earlier findings (e.g., Desha et al., 2021), gaining a sophisticated understanding of the city and the neighborhood seems to be a novel outcome. Results of the case study by Mulder-Nijkamp and De Koeijer (2022), where a highly diverse group of stakeholders worked with students on real-world design problems, indicate that participants formed relations with groups they had never interacted before. Their results also suggested that continuing these new interactions even after the project may promote broader problem-context understandings. The development of a flexible and open mindset is consistent with prior research, which also emphasizes changes in similar personal qualities such as gaining persistence, perseverance, tolerating uncertainty, and transitioning from frustration to maturity (Heikkinen & Isomöttönen, 2015; Hero & Lindfors, 2019; Vogler et al., 2018). In terms of a perceived improvement in collaboration and communication, our results confirm the tendency that similar education innovations tend to develop more social and soft skills compared to hard skills (Guo et al., 2020; Hero & Lindfors, 2019; Vogler et al., 2018).

Our findings revealed learning and change mechanisms that explain the participants' positive learning experiences. First, collaborating and co-creating with people across disciplinary backgrounds, perspectives, and from a variety of organizations seemed to have created opportunities to develop collaboration and communication skills and to enhance the quality of the project outcomes. According to Heikkinen and Isomöttönen (2015), the underlying mechanism behind such process lies in having to work outside one's comfort zone, which later evolves into contentment through the application of the gained skills and mindset. This might be relevant to our findings considering the development of skills and changes in mindset observed in this research. Studies also found, for example, group dynamics, resolving of conflicts in unusual situations, and boundary crossing to represent other underlying mechanisms behind such co-creation processes (e.g., Hero & Lindfors, 2019; Minoi et al., 2019; Mulder-Nijkamp & De Koeijer, 2022). The hands-on learning mechanism, which stems mainly from being in the real-world and witnessing and working on authentic and complex interdisciplinary issues, is vital in providing benefits for all participants (e.g., Boschman et al., 2019; Kolb, 1994). Extending on our findings and in relation to the two above-mentioned learning and change mechanisms, collaboratively discovering new ways of doing things to produce new action-oriented knowledge as well as being pro-active in these experiences seem to account for learning gains (Fourtuin et al., 2024; Schaffer et al., 2012; Selhorst-Koekkoek & Rusman, 2023). Being proactive also connects to our third identified mechanism, self-direction. Being able to learn by doing or to take actions is equally valuable as engaging in reflection, which enables one to notice one's own expertise and experiences as well as those of the other people involved (e.g., Heikkinen & Isomöttönen, 2015). Reflection has also frequently been interpreted as a leaning mechanism in interdisciplinary dialogue (Akkerman & Bakker, 2011) by other researchers studying similar education innovations (e.g., Fourtuin et al., 2024; Vuojärvi et al., 2022).

From a practical standpoint, our findings have consequences for future course design. For example, having someone on a tutor role to translate expertise between participants when necessary and to ask critical questions, holding frequent feedback sessions, providing contact between collaborative teams, and aiming for longer project and teacher time are among the suggestions in the literature in line with our findings (Boschman et al., 2019; Hero & Lindfors, 2019; Mulder-Nijkamp & De Koeijer, 2022; Vogler et al., 2018). A sense of safety and support is also crucial for a variety of insights and solutions (Mulder-Nijkamp & De Koeijer, 2022). At the theoretical level, researchers are recommended to empirically test the patterns we identified in their contexts. Also, future researchers should also pay attention to the conditions that can

foster hard skills and advanced cognitive skills, such as critical thinking, problem solving, creativity and innovation, in similar education innovations (Vogler et al., 2018).

Our findings are limited to use of self-reporting approaches and the lack of a more granular analysis on the changes and its mechanisms.

Acknowledgements

We sincerely thank Linda Zuijderwijk for her invaluable support with the study design, data collection, and data analysis.

References

Akkerman, S. F., & Bakker, A. (2011). Boundary crossing and boundary objects. *Review of Educational Research*, *81*(2), 132-169. https://doi.org/10.3102/0034654311404435

Bayuo, B. B., Chaminade, C., & Göransson, B. (2020). Unpacking the role of universities in the emergence, development and impact of social innovations: A systematic review of the literature. *Technological Forecasting and Social Change*. https://doi.org/10.1016/j.techfore.2020.120030

Boschman, L., Whidden, C., & McLester, J. (2019). An Experiential Learning Model: Collaborative student creations of multidisciplinary community classroom experience. *Papers on Postsecondary Learning and Teaching*, *3*, 1–8. https://doi.org/10.11575/pplt.v3i1.53074

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3(*2), 77-101.

Carl, J., & Menter, M. (2021). The social impact of universities: Assessing the effects of the three university missions on social engagement. *Studies in Higher Education*, *46*(5), 965–976.

Desha, C., Caldera, S., & Hutchinson, D. (2021). Exploring the development of context appreciation in coursework that targets problem-solving for sustainable development. *International Journal of Sustainability in Higher Education*, *22*(5), 1186–1224.

Edwards, D. M., & Meagher, L. R. (2020). A framework to evaluate the impacts of research on policy and practice: A forestry pilot study. *Forest Policy and Economics*, *114*. https://doi.org/10.1016/j.forpol.2019.101975

European Commission (2022). *On a European Strategy for universities*. Brussels: European Commission. Retrieved from: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0016

Flyvbjerg, B. (2006). Five misunderstandings about case-study research. *Qualitative inquiry*, *12*(2), 219-245. https://doi.org/10.1177/1077800405284363

Fourati-Jamoussi, F., Dubois, M. J., Agnès, M., Leroux, V., & Sauvée, L. (2019). Sustainable development as a driver for educational innovation in engineering school: The case of UniLaSalle. *European Journal of Engineering Education*, *44*(4), 570–588.

Gerke, D. M., Uude, K., & Kliewe, T. (2023). Co-creation and societal impact: Toward a generic framework for research impact assessment. *Evaluation*, *29*(4), 489–508.

Godonoga, A., & Sporn, B. (2023). The conceptualisation of socially responsible universities in higher education research: A systematic literature review. *Studies in Higher Education*, *48*(3), 445–459.

Guo, P., Saab, N., Post, L. S., & Admiraal, W. (2020). A review of project-based learning in higher education: Student outcomes and measures. *International Journal of Educational Research*, *102*. https://doi.org/10.1016/j.ijer.2020.101586

Heikkinen, J., & Isomöttönen, V. (2015). Learning mechanisms in multidisciplinary teamwork with real customers and open-ended problems. *European Journal of Engineering Education*, *40*(6), 653–670.

Hero, L. M., & Lindfors, E. (2019). Students' learning experience in a multidisciplinary innovation project. *Education and Training*, *61*(4), 500–522.

Johnson, M. T. (2022). The knowledge exchange framework: Understanding parameters and the capacity for transformative engagement. *Studies in Higher Education*, *47*(1), 194–211.

Jorge, L. M., & Peña, A. F. J. (2017). Analysing the literature on university social responsibility: A review of selected higher education journals. *Higher Education Quarterly*, *71*(4), 302–319. https://doi.org/10.1111/hequ.12122

Kah, S., & Akenroye, T. (2020). Evaluation of social impact measurement tools and techniques: A systematic review of the literature. *Social Enterprise Journal*, *16*(4), 381–402.

Kelly, U., & McNicoll, I. (2011). *Through a glass, darkly: Measuring the social value of universities.* National Co-Ordinating Centre for Public Engagement.

Khoo, X., & Sockalingam, N. (2024). Designing multi-disciplinary interactive collaborative learning in healthcare engineering education through academia-industry partnership. In: Auer, M.E., Cukierman, U.R., Vendrell Vidal, E., Tovar Caro, E. (eds.) *Towards a hybrid, flexible and socially engaged higher education.* Switzerland: Springer Nature. https://doi.org/10.1007/978-3-031-53382-2_23

Larrán Jorge, M., & Andrades Peña, F. J. (2017). Analysing the literature on university social responsibility: A review of selected higher education journals. *Higher Education Quarterly*, *71*(4), 302–319.

MacLeod, M., & Van der Veen, J. T. (2020). Scaffolding interdisciplinary project-based learning: a case study. *European Journal of Engineering Education*, *45*(3), 363–377.

Minoi, J. L., Mohamad, F., Arnab, S., Phoa, J., Morini, L., Beaufoy, J., ... & Clarke, S. (2019). A participatory co-creation model to drive community engagement in rural indigenous schools: A case study in Sarawak. *Electronic Journal of e-Learning*, *17*(3), 173–183.

Mulder-Nijkamp, M., & de Koeijer, B. (2022). A sustainable ecosystem: building a learning community to facilitate transdisciplinary collaboration in packaging development. *Design Management Journal*, *17*(1), 19–29.

Nowell, L., Dhingra, S., Andrews, K., Gospodinov, J., Liu, C., & Alix Hayden, K. (2020). Grand challenges as educational innovations in higher education: A scoping review of the literature. *Education Research International*, *2020*(1). https://doi.org/10.1155/2020/6653575

Rogers, S., Jeffery, A., Pringle, J., Law, A., Nobajas, A., Szkornik, K., ... & Hobson, L. (2023). Experiential and authentic learning in a Living Lab: The role of a campus-based Living Lab as a teaching and learning environment. *Journal of Learning Development in Higher Education*, (28).

Schaffer, S. P., Chen, X., Zhu, X., & Oakes, W. C. (2012). Self-efficacy for cross-disciplinary learning in project-based teams. *Journal of Engineering Education*, *101*(1), 82–94.

Selhorst-Koekkoek, M., & Rusman, E. (2023). Multidisciplinary educational design framework to facilitate cross-boundary educational design: closing gaps between disciplines. *International Journal of Mobile and Blended Learning (IJMBL)*, *15*(2), 1–18.

Staley, D. J. (2019). *Alternative universities: Speculative design for innovation in higher education*. John Hopkins Press.

Sterling, S. (2021). Concern, conception, and consequence: Re-thinking the paradigm of higher education in dangerous times. *Frontiers in Sustainability*, *2*. https://doi.org/10.3389/frsus.2021.743806

Van der Wee, M. L., Tassone, V. C., Wals, A. E., & Troxler, P. (2024). Characteristics and challenges of teaching and learning in sustainability-oriented Living Labs within higher education: a literature review. *International Journal of Sustainability in Higher Education*, *25*(9), 255–277.

Vogler, J. S., Thompson, P., Davis, D. W., Mayfield, B. E., Finley, P. M., & Yasseri, D. (2018). The hard work of soft skills: augmenting the project-based learning experience with interdisciplinary teamwork. *Instructional Science*, *46*, 457–488.

Vuojärvi, H., Vartiainen, H., Eriksson, M., Ratinen, I., Saramäki, K., Torssonen, P., ... & Pöllänen, S. (2024). Boundaries and boundary crossing in a multidisciplinary online higher education course on forest bioeconomy. *Teaching in Higher Education*, *29*(5), 1197–1214.

Wessels, K. R., Bakker, C., Wals, A. E., & Lengkeek, G. (2024). Rethinking pedagogy in the face of complex societal challenges: Helpful perspectives for teaching the entangled student. *Pedagogy, Culture & Society*, *32*(3), 759–776.

Contact email: duchi@eur.nl

A Monograph for the Teaching of Geometry and Measurement in Initial Teacher Education in South Africa: Foundation and Intermediate Phases

Rajendran Govender, University of the Western Cape, South Africa
Stanley A Adendorff, University of the Western Cape, South Africa

The European Conference on Education 2024
Official Conference Proceedings

Abstract
When learning Geometry, students may tend to memorise properties, relationships, and formulae and may even attempt to solve problems mechanically. However, Geometry provides students with opportunities to engage with logic and reasoning beyond only symbols, but within spatial contexts as well. There is a tendency that Geometry, as it stands in the curriculum, is interpreted and subsequently taught as a list of separate, unrelated bullet points. Secondly, Geometric elements tend to be memorised according to their appearance, or their definitions are simply memorised without understanding. This qualitative case study underpinned by the Van Hiele theory aimed to explore the "big ideas" that permeate the effective teaching of Geometry, and how these "big ideas" promote an understanding of the connectedness between concepts in Geometry, Measurement, Number, and in the environment. Data were collected from 15 mathematics teacher educators across 10 Higher Education Institutions in South Africa that participated in a Primary Teacher Education project, which focused on developing new teacher graduates' ability to teach Geometry and Measurement. Data was collected via document analysis, questionnaires and focus group interviews. The study found that geometrical properties, measurement, transformations, invariance and visualization are the big ideas that permeates the teaching of geometry and measurement. These "big ideas" has the potential to influence how mathematics teacher educators re-organise and sequence their teaching and learning activities on geometry in pre-service mathematics teacher education curricula in connected ways. Furthermore, pre-service mathematics teachers must consider the 'big ideas' in the design of their lessons for work-integrated learning practices.

Keywords: Big Ideas, Geometrical Properties, Measurement, Transformations, Invariance and Visualization

iafor
The International Academic Forum
www.iafor.org

Introduction

Both teaching and learning experience indicate that Geometry remains a neglected part of Mathematics within the school curriculum. Lappan (1999, p. 1) refers to Geometry as the "forgotten Strand." Singh (2017, p. 633) maintains that Geometry "is often avoided in the syllabus." Piper, Ralaigita, Akach and King (2016) talk of an "insufficient" way in which sub-Saharan countries have been teaching Mathematics in general, and Geometry specifically.

In the absence of the current curriculum pacesetters, Geometry was often relegated to being taught during part of the last school term each year. It might have been that privilege was afforded to numbers and operations, because of a conception that numbers are synonymous with Mathematics, or because teachers did not feel comfortable teaching Geometry. We suspect that it was, and still is, the latter (Lappan, 1999).

This study does not intend to propose Geometry (identified as Space and Shape, and Measurement in the General Education and Training Band of South African schooling) to be more important than Numbers, although it does seem to be the stepchild of school mathematics. It can be argued, however, that these two fields of knowledge, *numbers* and *space* form the foundational structure of Mathematics as it ought to be taught in schools. Liping Ma captures the essence of school mathematics with her statement: *"Mathematics is an area of science that concerns spatial and numeric relationships in which reasoning is based on these relationships"* (Ma, 1999).

Geometry was a voluntary content area in the senior certificate examinations (Grade 12) for six years in South Africa between 2006 and 2012 (Ubah & Bansilal, 2019). This, in itself, could have been an admission or recognition that Geometry was not being taught adequately, and hence would impact negatively on senior certificate throughput statistics.

The PrimTED Project's Geometry and Measurement Working Group motivates the national and strategic importance of the proposed project by noting that:

> *"As evident across various sets of benchmarking tests and published literature, there seems to be challenge with the development of sound conceptual and procedural understanding of salient aspects of shape, space and measurement across primary years. Furthermore, the experience that education lecturers have at teaching aspects related to shape, shape and measurement at both under-graduate and postgraduate level has shown that even experienced teachers (who are well trained) have a backlog in their space, shape and measurement content knowledge as well as their pedagogical and curriculum specific knowledge of space, shape and measurement."* (Teaching & Learning Development Capacity Improvement Programme, Primary Teacher Education Project, Working Group 3 Brief, 2016)

This observation ties in with the motivation to research the causes of the "backlogs" in teachers' geometry content (van Putten, et al., 2010; citing Bowie, 2009) and pedagogical knowledge, and attempts to address this by exploring "big ideas" as a possible point of departure to develop the type of spatial reasoning required for effective engagement with Geometry at FET and tertiary education levels.

The mathematics content is developed for pre-service teachers who should essentially be prepared for Intermediate Phase teaching according to the requirements set out in MRTEQ (Minimum Requirements for Teacher Education Qualifications, 2019). "MRTEQ provides a basis for the construction of core curricula Initial Teacher Education (ITE) as well as for Continuing Professional Development (CPD) Programmes that accredited institutions must use in order to develop programmes leading to teacher education qualifications." (DHET, 2011, p. 6).

Initial meetings of the PrimTED Working Group 3 (Geometry and Measurement) decided that "big ideas" in teaching Geometry needed to be identified in order to focus the development of pre-service teacher training materials. Initially, consensus, between those at the initial forum did not exist as to what these "big ideas" needed to be. Suggestions included visualization, invariance, the Van Hiele Levels, and spatial reasoning as "big ideas" as well. It was argued that *spatial reasoning* should be a central idea in the teaching of Geometry at primary school level. Counter arguments reasoned that *spatial reasoning* was too broad an idea and might not incorporate geometric concepts as proposed within school mathematics. Subsequent discussion settled on *properties* in Geometry as being an important concept to consider, given especially that the manner in which the South African schools' curriculum was structured leaned towards the identification, comparison and description of objects and shapes. The identification, comparison and description of objects and shapes can be regarded as early engagement with properties in Geometry. Hence, *properties* became an initial "big idea" to be considered to guide the development of teaching materials for pre-service teachers.

It was at the point when thinking about how properties of geometric elements could be compared, either directly or indirectly, or eventually quantified, that the importance of *measurement* in the context of properties became apparent. Measurement already exists as a strand in mathematics within the South African schools' curriculum, and it was reasoned that *measurement*, as a proposed "big idea" would provide an opportunity to stress its interconnectedness with *properties as* related to the teaching of Geometry.

Armed with the innate ability (Feiberger, 2006; Palmer, 2011) to recognise sameness and difference in terms of form and size, considering position, perspective or orientation, accentuated to a level of mathematical accuracy by aspects of measurement, the idea of *transformations* became regarded as an additional "big idea" through the realization of invariance.

These "big ideas" provided three focal points on the Geometry content, and thus clear topics on which the sub-groups with the PrimTED Working Group 3 could work. The structure which was developed illustrated the interrelationships between the big ideas, and clarified that all three big ideas, as identified were interdependent. In other words, it was difficult to speak about any one "big idea" in the absence of any of the other two.

Cognizance had to be given to those core knowledges, such as knowledge of *position*, *direction* and *distance,* which learners possess prior to commencing school, in other words, prior to any exposure to an organized collection of content knowledge (the curriculum). This is particularly evident when consulting examples of curricula from several countries, where early concepts are based on innate knowledge, individual, pre-formalized schooling experience, and the observed environment (Izard, et al., 2011). Thus, *foundational knowledge*

was acknowledged as a building block for the three "big ideas" of *properties*, *measurement*, and *transformations*.

Moreover, the resolution to distill the Geometry content within these three identified "big ideas" allowed for the maintenance of a big picture of Geometry initially, and then Mathematics as part of the broader perspective.

Rationale

In the face of a highly specific curriculum policy statement (CAPS), with its range of equally specific, tightly aligned teaching and learning resources, demonstrating an apparent lack of trust in teacher capacity, backed by the demands of numerous education departmental officials, in many geographic areas it seems that South African teachers have responded quite typically. Teachers, guided by bureaucratic structure and constant monitoring, obediently implement the curriculum, following the aligned textbooks and workbooks to the 'T'. This together with the pressures of classroom management and administrative tasks, may be transforming our South African teachers into *curriculum deliverers* rather than what they are supposed to be.

Boaler makes the point of how interconnected mathematical concepts are, unified by "a few really big and important ideas," but in contrast to what learners think that mathematics is, namely "a lot of different rules and methods" (Boaler, 2019).

It was this concern, highlighted in the previous paragraph and with the intent to encourage and maintain a broad perspective in the teaching of Geometry that the "big ideas" were envisaged. It is further argued that a focus on "big ideas" in teaching mathematics deepens teachers' subject knowledge and has the potential to promote or advance the development of relevant pedagogies, thereby emphasizing mathematical inter-connections (Barclay & Barnes, 2013).

To support this, wide research (Chi et al. 1982, p. 51) supports this argument in many other fields, with researchers consistently finding that experts, as opposed to novices, who operate off highly developed knowledge structures, which are more often than not organized around central concepts, or "big ideas" (Niemi et al., 2006).

Generally, then, the notion of "big ideas" stands in contrast to vast, detailed curriculum frameworks such as CAPS, yet provides an opportunity to distill the salient concepts within Geometry to allow for more effective teaching and learning.

Any curriculum structure, guided by carefully considered and selected "big ideas," should create a space for the desired way of thinking when learning Geometry in primary school classrooms, a way of reasoning that would support thinking for solving problems and justifying conjectures at high school level, as well as in tertiary education.

Aside from the issues of curriculum detail, Geometry in itself tends towards the presence and perhaps maintained, or even growing reliance of visual prompts and diagrammatic representations. And so, it should, as it busies itself with *space*. While diagrammatic prototypes serve their purpose in introducing shapes and objects, and representing relationships, there may exist the peril of engagement with geometric elements (in this case figures and forms) remaining at the most basic levels. That is, that learners may remain at the

level of recognition, commenting or making decisions based on perception. This level being the lowest level as identified in the Van Hiele Levels of spatial reasoning (Mason, 2019).

At primary school level, it appears that Geometry is mainly about simply identifying figures and forms by their appearance, rather than their properties (Greenstein, 2014; Luneta, 2014). Apart from introducing more shapes or objects, no development in thinking about forms or figures is encouraged. Not much, if any spatial reasoning is developed in terms of learning Geometry. It is thus not surprising that learners are unable to make connections and use logic to solve problems that involve spatial aspects. This approach to learning Geometry is, Greenstein maintains, detrimental to young children's development in that their engagement with geometric concepts is not expanded beyond a set of conventional, rigid shapes, these shapes develop into a set of visual prototypes that could rule their thinking throughout their lives (Burger & Shaughnessy, 1986; Clements, 2004; Greenstein, 2014).

While diagrams and concrete objects may be unavoidable in the teaching of Geometry during the earlier years of schooling, the focus on what learners need to know, and more importantly *how they need to reason* when learning Geometry needs to be stressed.

As discussed above, a shift in focus from a broad curriculum focus towards "big ideas" in Geometry should lead to more flexible and generalizable application of knowledge, improved problems-solving and greater sense-making in the learning of Geometry (Niemi, et al., 2006).

Purpose of Study

Properties, as one of the "big ideas," presents an accessible point of departure for learning Geometry at the primary school level, and especially at the Foundation and Intermediate Phase levels. At this level of schooling, learners engage with objects and shapes as they commence a more formal relationship with Mathematics (reference). While objects and shapes – at this level of schooling – are regarded as independent, unrelated elements, learners are quite capable of distinguishing similarities and differences within groups of objects, or groups of shapes. This is in line with how Geometry is presented through the curriculum (CAPS), and thus it seems possible that a focus on *properties* as one of the "big ideas" presents ready access through the curriculum.

Mathematical engagement with the properties related to points, lines, shapes and objects, and how these can be accurately quantified, or transformed, requires more than recognition of prototypes, or memorization of properties, but the employment of spatial reasoning (Luneta, 2014), with visualisation, and the realization of the interconnectedness between these geometric elements.

The intent of this study then, is to describe how an approach, which focusses on spatial reasoning borne out of deep knowledge and understanding of geometric concepts can influence how pre-service teachers regard geometric elements (points, lines, figures and objects) as these are prescribed in the curriculum. The research targets pre-service teachers' spatial awareness, and resultant spatial reasoning, and reasons that this awareness is translated into effective teaching methodology. This logical "regard" for points, lines, figures and objects can be described and explained through the properties of these geometric elements.

If produced guidelines propose properties of shapes and objects, with an intent to promote spatial reasoning within the ambit of these properties, it cannot be guaranteed that readers, and eventual implementers of these texts will interpret these texts as they were intended. In short, interpretations may be superficial, and may result in the texts being memorised – only minimalistic as properties of objects and shapes. Therefore, in addition to highlighting properties in the teaching of objects and shapes, this study will reference *habits of the mind* in terms of how teachers can relate to the aforementioned properties and spatial relationships, as well as how these habits of the mind are initiated and developed from the *core knowledges* which are innate perceptions of our environment.

The question remains as to whether this regard for teaching and learning Geometry presents an effective approach for the development of future teachers.

Theoretical Framework

The theoretical framework underpinning this research consists of an amalgamation of various theories- Van Hiele model (Van de Walle et al, 2013); Realistic Mathematics Education (RME) (Freudenthal, 1991; Gravemeijer, 1994); relational vs instrumental learning (Skemp, 1976) to name but three- to ensure that the framework for geometric mathematics content development for pre-service student teachers is holistic by nature as opposed to viewing it as a set of unrelated and separate components. In addition, the use of various theories should ensure that a diversity of teaching and learning methods and strategies are incorporated to develop, package and present geometric content in ways that are readily accessible to students with diverse needs and competencies.

For the purpose of this paper the focus is mainly on the use and application of the Van Hiele levels of geometric development. The Van Hiele model is considered globally as essential in "designing and developing learning instruction to enhance students' higher order thinking skills in Geometry" (Naufal, Abdullah, Osman, Abu, and Ihsan, 2020; Atebe, and Schäfer, 2011). Likewise, Luneta (2014, p.74) is convinced that an understanding of the Van Hiele levels "enables teachers to identify the general direction of their students' learning and the level at which they are operating geometrically."

The proponents of the Van Hiele theory are husband and wife, Dinah Van Hiele-Geldof and Pierre Van Hiele. This theory is dualistic by nature in the sense that it consists of (1) levels of thinking and (2) phases of learning.

The van Hiele theory comprises five sequential and hierarchical discrete Levels of geometric thought specifically: Visualization, Analysis, Order (Informal Deduction), Deduction, and Rigour (Van Hiele, 1986; Armah and Kissi, 2019). Each of the said Levels defines the thought processes used in particular geometric related contexts. As learners advance from one Level to the next, the object of their geometric thinking changes (Armah and Kissi, 2019). At primary school level, learners will be inclined to transfer upward from level 1 to level 2. For example, at level 1, learners may identify shapes or geometrical objects by appearance only by comparing everyday objects, for example, 'it looks like a table top' or put the shape in a particular grouping or not (Armah & Kissi, 2019). Their language usage is basic (Vojkuvkova, 2012).

At level 2, learners begin analysing and naming properties of geometric shapes, however they may not yet grasp the interrelationship that exist between different categories of shapes such

as rectangles and parallelograms. (Armah & Kissi, 2019). Then in Senior Phase level learners should advance to level 3 where they now have developed the ability to recognise the interrelationship between different types of different shapes for instance that a square as all the properties of a rectangle. Generally learners can come up with "meaningful definitions and give informal arguments to justify their reasoning at this Level" (Armah & Kissi, 2019, p. 3). As indicated earlier in the discussion the focus is on primary school teacher development and training thus the only the first three Van Hiele levels are considered relevant.

Teaching of geometry is structured into five phases of learning (Luneta, 2014), namely: information (familiarising learners with the geometry content and the pre-knowledge tested), directed orientation (learners are guided to uncover connections and identify content focus and engage with content), explication (learners verbalise their understandings of concepts), free orientation (learners complete complex tasks on their own), and integration (learners summarise what has been learned and create overviews of geometric concepts used) (Moru, Malebanye, Morobe, & George, 2021, pp. 20-21; Dongwi, 2014, p. 112).

The Van Hiele theory is not age-dependent. Hence the learners' progression from one level to the next is dependent on the effectiveness of the teaching and content acquisition opportunities that they are exposed to (Luneta, 2014; Robichaux-Davis & Guarino, 2016; Nisawa, 2018).

Objectives of Study

At the outset of this study, after in-depth discussions and planning, particular objectives were identified to ensure that the team remained focused and that the primary research aim was achieved. The said objectives are as follows:

1. To explore the "Big Ideas" for the teaching of Geometry and Measurement.
2. To develop a set of knowledge and practice standards for Geometry and Measurement for FP and IP.
3. To explore what Geometry and Measurement Content Knowledge should be included in mathematics teacher education curricula.
4. To explore what Geometry and Measurement Pedagogical Content Knowledge should be included in mathematics teacher education curricula.

Discussion

The discussion is intimately linked to Figure 1. This particular Figure illustrates how core knowledge and awareness of the natural and human-made environment provide a foundation for the realization of properties of geometric elements.

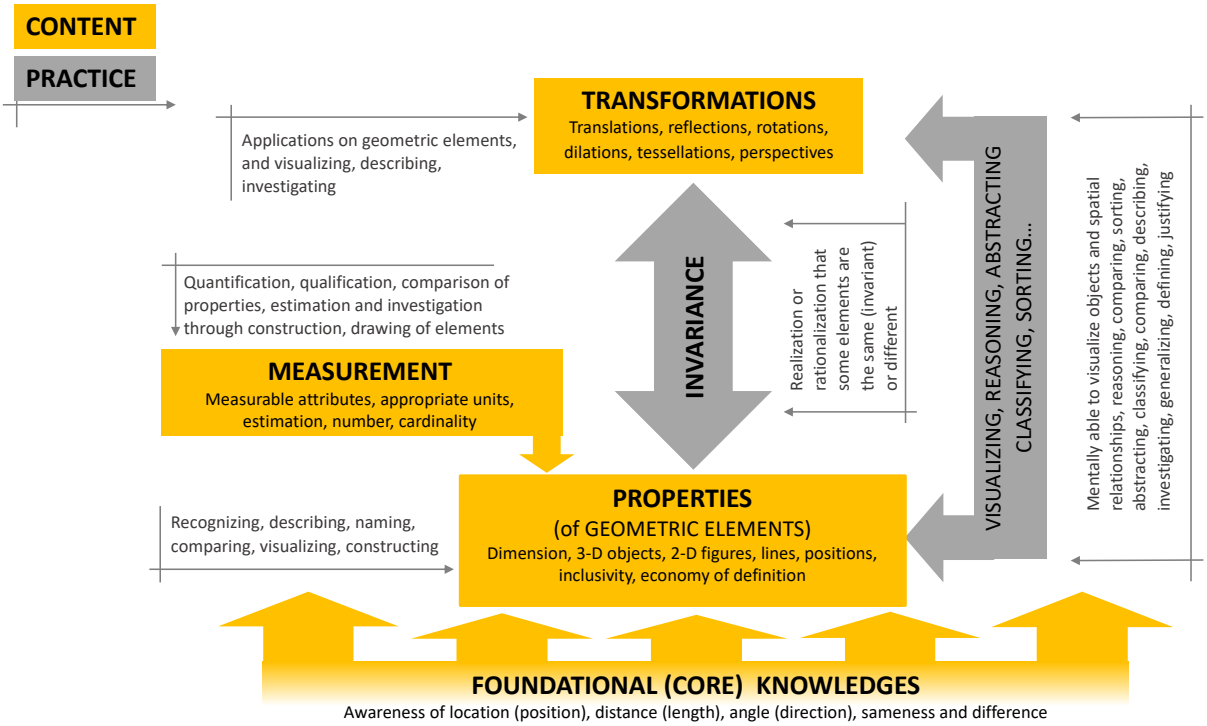


Figure 1: Conceptualising Geometry

Izard, Pica, Spelke, and Dehaene (Izard, et al. 2011)) conducted experiments with participants from an indigene group in the Amazon, the Mundurucu (Feiberger, 2006; Palmer, 2011), as well as adults and age-matched children controls from the United States and France, and younger US children without education in geometry. Their findings are as follows:

> *"The responses of Mundurucu adults and children converged with that of mathematically educated adults and children and revealed an intuitive understanding of essential properties of Euclidean geometry."* (Izard et al., 2011, p. 9786)

> *"In our first task, we found that, in the absence of formal education in geometry, Mundurucu children and adults are able to reason about ideal concepts in accordance with the predictions of Euclidean geometry."*

In short, this research seems to tell us that: "…at all ages, children and adults can use *distance* relationships" and that "adults in both cultures also located a target by analysing two other fundamental properties of Euclidean geometry: *angle* (the information that distinguishes corners of a triangle that differ in size) and *sense* (the information that distinguishes a form from its mirror image)" (Ibid).

The above indicates that distance, angle and sense inform observation and perception of the natural and built environments, providing identification, description, and comparison of the world around us. This is in line with foundational guidelines from curricula, including the South African schools' curriculum, which requires that:

- *Learners describe the position of objects, themselves and others using the appropriate vocabulary.*
- *Learners follow and give directions.*

- *Learners explore properties of 3-d objects and 2-d shapes by sorting, classifying, describing and naming them.*
- *Learners draw shapes and build with objects.*
- *Learners recognise and describe shapes and objects in their environment that resemble mathematical objects and shapes.*

(Curriculum and Assessment Policy Statement, Grades R – 3, 2011, p. 10)

These geometric elements, or rather the *properties* that give them existence, or that they give existence to, form the basis of our engagement with geometry in school mathematics. Without the geometric elements, based on these properties, there would be nothing to discuss, argue, or ponder.

After a brief look into the geometry sections of several national curricula such as Kenya, Namibia, Indonesia, etc., it is clear that there is mention of 2-D shapes and 3-D objects as objects for investigation, or at least for consideration. While some of these curricula mention position and direction, they seldom make it explicit that these include references to 0-D and 1-D. Therefore, as an initial consideration of the concept of dimension, we need to understand what entails and that the 2-D and 3-D specifications exist within a context of all dimensions, which must include 0-D up to 3-D and beyond.

Being able to classify instances within the natural and built environment, whether these exist, or are perceived as 0-; 1-; 2-; and 3-D, sets the tone for classifying all those geometric elements that follow – especially as per school mathematics curricula. Learners use reasoning to classify any of these instances of dimension.

When engaging with 3-D objects, learners should be encouraged to be able use reasoning, applying appropriate criteria, to describe, classify and then name these geometric objects. An inductive approach could be used to allow learners to explore (Singh, 2017) 3-D objects, through comparison and sorting, utilizing one criterion at a time to group the said objects. The intent of such an activity would be to finally realize polyhedrons, and how they may differ from cylinders, cones, hemispheres and spheres. Later, polyhedrons may be sorted according to the number of faces that they have, without considering whether these are prisms or pyramids at that time. Polyhedrons can be sorted into prisms and pyramids as a subsequent activity. This should develop a move away from prototypical regard for some geometric objects. A cube, for instance, is also a hexahedron, and is also cuboid, while at the same time is a square prism as well. Similarly, a pentagon-based (pentagonal) pyramid is also a hexahedron, like the cube, having six faces.

Two-dimensional (2-D) shapes should be treated in the same way, allowing learners to isolate polygons from "the rest." Realizing polygons to be closed, 2-dimensional shapes with only straight sides (line segments) as a point of departure will allow them to classify non-typical shapes as pentagons, hexagons, and so on, thus moving away from the typical regular polygons which represent these shapes on charts in primary school classrooms.

With this focus on properties as a basis for classification, it is hoped that learners will be able to reason through these properties and be able to grasp ideas that require an understanding in terms of inclusivity when regarding geometric object and shapes. Learners will in all likelihood not respond with discomfort and confusion when they are told that all squares are rectangles.

Measurement plays an ongoing and significant role in the identification and definition of geometric objects (Smith & Barrett, 2017), thus constituting the next "big idea" in Geometry as taught in schools. Measurement therefore provides the means for *properties* to be described (Herbst, Gonzalez, & Macke, 2005) at various degrees of accuracy by measurement, by indirect or direct comparison.

It is imperative that the materials that are utilised for the teaching and learning of measurement show the interconnectedness between properties (Smith & Barrett, 2017) to be measured, and the units of measure to be used to qualify or compare those properties across various contexts.

The word "geometry" itself translates into "earth-measure," or measurement of the earth (Shmoop Editorial Team, 2008). Considering that properties, as a geometric gaze, are observed within the natural and built environment which constitute elements of the earth as we know it, we can see that measurement is an integral part of Geometry. In school mathematics, measurement can be defined as *'a number that indicates a comparison between the attribute of an object being measured and the same attribute of a given unit of measure.*' (Van de Walle et al., 2015). Measurement thus serves as a critical link between Geometry and Number, with Geometry dependent on Number in terms of quantification, and Number often dependent on Geometry for context.

Once prototypes of geometric elements have been established, the ability to mentally *visualize* the same, similar, or different objects, and resulting spatial relationships can start to develop. This ability (to visualize) also continues to play an important role in the development of spatial reasoning. Once geometric objects are engaged with, and rationalized, from the point of their properties (importantly), a realization of sameness and difference can be attained. In geometry, the importance of *invariance* becomes evident. Invariance is described as a property of mathematical objects which remain unaltered after certain operations such as certain transformations are applied to such mathematical objects (Zisserman et al.,1995).

Johnston-Wilder and Mason (2005) suggest that *invariance* is a major theme in Geometry: *"In order to see, hear or feel, people need to experience both change and something to contrast with that change, namely, invariance. Consequently, invariance in the midst of change is a central theme in mathematics, and particularly in geometry."* This is true for primary school geometry, where learners will be able to recognise and explain which shapes and objects are the same, and which are different. If there were only one example of any shape, for instance, there would be nothing to compare it with. However, if the same shape was transformed or visualized as transformed, learners would need to be able to distinguish if it was still the same shape or not, as is was, and as it is. Invariance, with regard to the entirety for each of the shapes and objects, therefore, can only be a conception in the presence of transformations, where any transformation is a rigid motion.

Geometric elements at primary school level, if subjected to rigid *transformations*, as mentioned, retain their properties. Of course, these geometric elements can lose some or all of their properties when subjected to transformations. For the purposes of school geometry, transformations generally maintain the properties of geometric elements.

Van De Walle et al. (2013, p. 419) describe transformations as *"changes in position or size of a shape: movements that do not change the size or shape of the objects transformed…"* and

goes on to define these transformations as 'rigid motions' (translation, rotation and reflection).

Quite often, in earlier grades, transformations are treated as arbitrary activities where learner may need to transform a shape (through rigid motions) or identify the transformation that it underwent.

Recognizing and describing changes in location or orientation in terms of: points, lines, shapes or objects are basic activities learners are exposed to in the early grades.

Note that transformations with points are included here. There is a suggestion that if points can be "successfully" transformed, it may be that learners will recognize points (or lines) within shapes and transform any shape according to its points – instead of considering only the shape and trying to transform it as such.

Issues of symmetry need to be included as well, and how symmetry may be evident when performing transformations (Fife, James, & Bauer, 2019). Transformations can result in tessellations and provide excellent application activities for exploring shapes and objects.

Hence, once the three content "big ideas" had been established, underpinned by core knowledge, and held together by conceptions of invariance and the ability to visualize and reason, the way was paved to develop sets of content and practice standards, which are deemed as necessary to develop the requisite levels of spatial reasoning within learners.

Practice Standards for Geometry and Measurement

While some of the standards listed here may be specific to Geometry, most are common across all content areas, and are included in the Mathematical Thinking standards.

- Knowledge of visualizing
- Knowledge of reasoning and justification
- Knowledge of generalizing geometric ideas
- Knowledge of classifying and defining
- Knowledge of investigating invariants
- Analysing and interpreting a figure
- Knowledge of technology
- Mixing deduction with experimentation
- Knowledge of Mathematical Problem Solving
- Dispositions in terms of learning and teaching mathematics

Content Standards

The knowledge standards are derived from three identified "Big ideas" in teaching Geometry and Measurement, underpinned by the core knowledges that are intrinsic to human beings, namely,

- Foundational/Core Knowledges
- Knowledge of Geometry Properties
- Knowledge of Transformations
- Knowledge of Measurement

Foundational Standards

Foundational Standards relate to an awareness of core knowledge which learners possess prior to the commencement of former schooling.

The identified sub-standards are:

- 5.1: An awareness of position (location), distance (length), direction (angle), and "sameness" (invariance)
- 5.2: Ability to describe position relative to other positions or markers
- 5.3 Estimation and comparison of distances and lengths (magnitude)
- 5.4 Ability to indicate direction or describe an angle in terms of directions
- 5.5 Awareness of sameness and difference and similarities
- 5.6 Recognition of invariance after transformations

Content Standards for Geometrical Properties

In Geometry, we may assume that the properties of geometric elements make these elements to be what they are. Similarly, Figura (2007, p. 73) maintains "Geometric properties are those that can be derived from the geometry of a solid body or particle." In other words, if any element should lose, or change any of its properties, it will no longer be what it was. It will not remain invariant; it will be transformed.

This suggests that one of the most important ideas underpinning the teaching and learning of geometry in school mathematics is those *properties* which define geometric elements to be what they are.

Further, properties are most likely to be those attributes which are initially perceived when any geometric element is observed. These involve:

- Understanding dimension;
- Rational classification of 3-dimensional objects according to observed properties;
- Rational classification of 2-dimensional shapes according to observed properties;
- Realisation of inclusivity with regard to objects and shapes; and
- Economy of definitions.

Examples of activities relating to *properties* from the PrimTEd Geometry and Measurement Working Group:

GM 1.6 - Realising That 3-D Objects Can Consist of Flat and/or Curved Surfaces

For 3-D Objects:
Hand out a variety of geometric objects to the students. These should include spheres, hemispheres, cylinders, cones, prisms (cubes, rectangular, square, triangular, hexagonal, pentagonal, octagonal`), pyramids (square-based, triangle-based, hexagon-based, etc.).

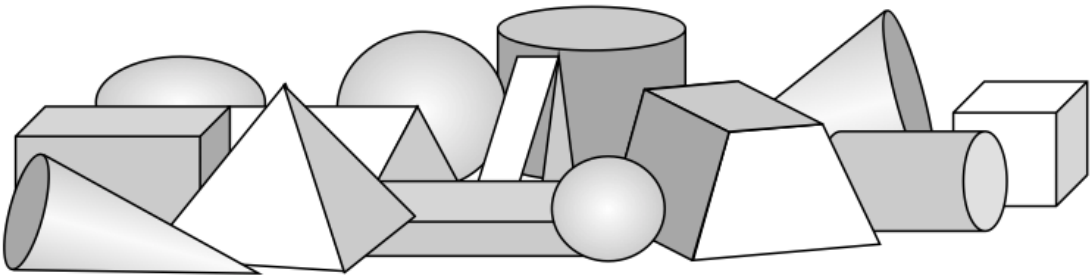


Figure 2: 3-D Objects

Students can be asked to sort these objects into THREE groups. Give reasons why they have grouped them in this way.

Students should be asked to research the Van Hiele Levels and say which level they think that they are operating at in terms of spatial reasoning. It is recommended that students be provided with an accessible text which outlines the Van Hiele Model. In mathematics education, as discussed under the theoretical framework previously, the Van Hiele Model is a theory that describes how students learn geometry.

We have noticed that students tend to sort the objects into “those that look like triangles” or “those that are like circles” or “those that are like blocks.” You may point out to them here that they may be operating at Level 0 of the Van Hiele Model!

The three potential groups that the students sort the objects into are:

- Those with only curved surfaces (spheres, etc.)
- Those with only flat surfaces (polyhedrons)
- Those with curved and flat surfaces (cylinders, cones, hemispheres)

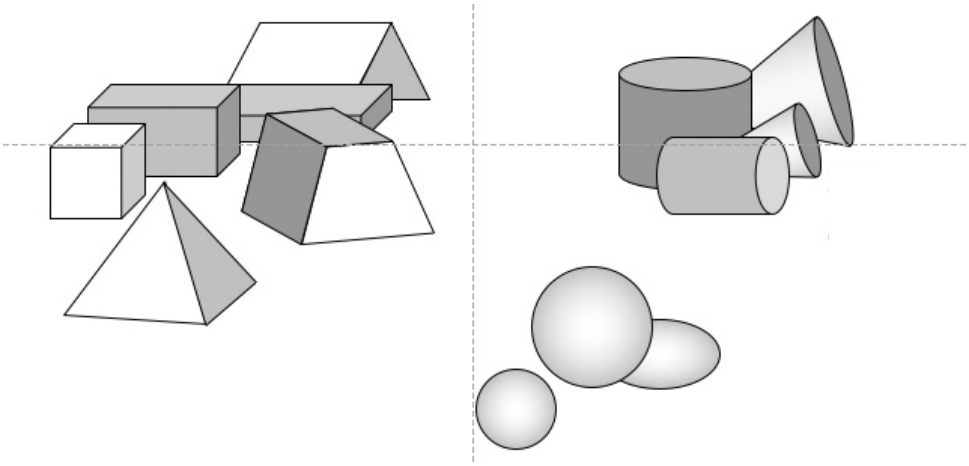


Figure 3: 3-D Objects Grouped Into Three Shapes

Let's take a closer look at those objects which have only flat surfaces.

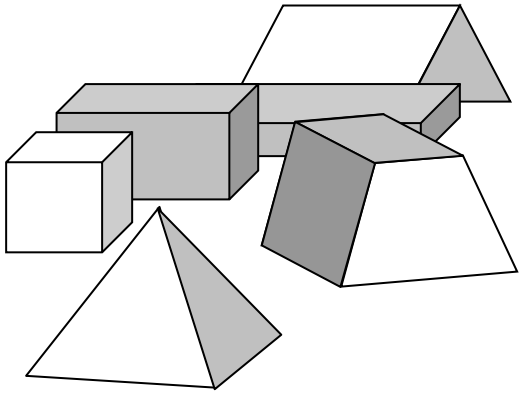


Figure 4: Flat Surfaces 3-D Objects

- These objects are solids, and they can only slide because they have flat faces.
- These are flat-faced solids.
- In Mathematics, flat-faced solids are called *polyhedrons* (or polyhedra).
- "Poly" means *many*, and "hedron" means *faces.*
- Polyhedrons are therefore, 3-dimensional flat-faced solids.

It is very important that the focus remains on the properties, and that all objects have the same property/properties.

For 2-D Shapes:
Hand out a variety of shapes to your students. These should be separate, and printed onto pages so that students can sort, arrange, re-arrange, as they discuss groupings.

To streamline this activity, you can ask learners to remove all shapes that are open, then remove shapes that have curved sides (sides that are not straight).

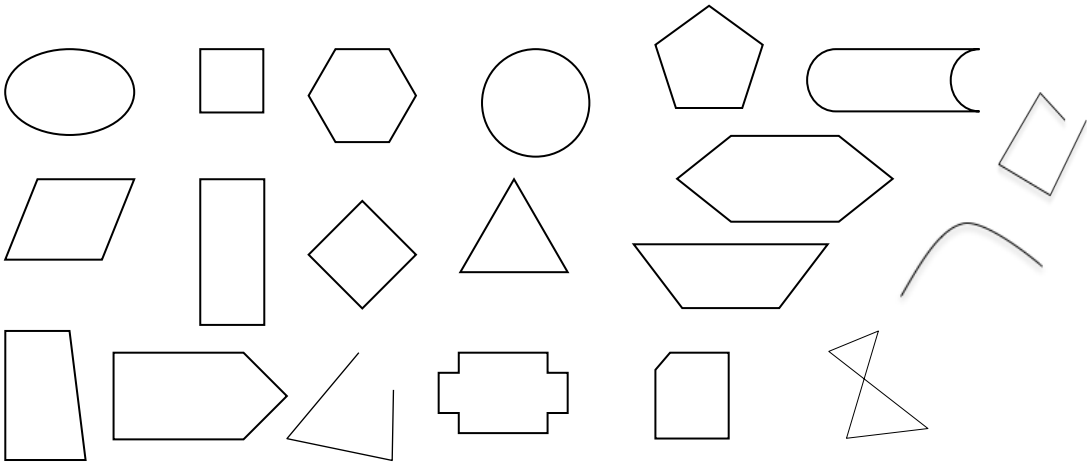


Figure 5: 2-D Shapes

Using the shapes that you've been given, sort them accordingly:

1. Remove all the shapes that are open
2. Now you have only a group of closed shapes
3. Remove all the shapes that have curved or "wavy" sides
4. Now you have a group of closed shapes with only straight sides

This activity will set out to get learners to realise *polygons* as closed, 2-dimensional, straight-sided figures, through a process of sorting.

The facilitator of this activity may wish to allow the learners to sort the provided shapes – with reasons given for every grouping, without providing any guidelines in terms of the properties – allowing learners to "discover" the polygons. Of course, the facilitator will wish to reach a grouping of closed, 2-dimensional, straight-sided figures. While there may be one or two complex polygons among the shapes to be sorted, these should present a challenge in terms of later classification according to the number of corners/sides. The facilitator can explain that complex polygons are conceptions which exist, but will be dealt with during further investigations in mathematics.

Content Standards for Measurement

Emphasizing relations between different applications of measurement (involving length, area, volume, capacity, time, mass, etc.) is critical in developing a robust conception of what measurement is. The identified sub-standards relate to:

- The ability to recognize and isolate the (measurable) attribute of the object being measured
- The ability to select a unit that correlates with the attribute being measured
- Recognizing the cardinality of the units employed
- Realizing that a measure is constituted through iterating the selected unit
- The ability to employ estimation as a means to demonstrate an understanding of units and the measurement process
- Understanding the relation between Number and Measurement

Examples of activities relating to *measurement* from the PrimTEd Geometry and Measurement Working Group:

GM 2.2.1 - Select a Unit That Correlates (Dimensionally) With the Attribute Being Measured

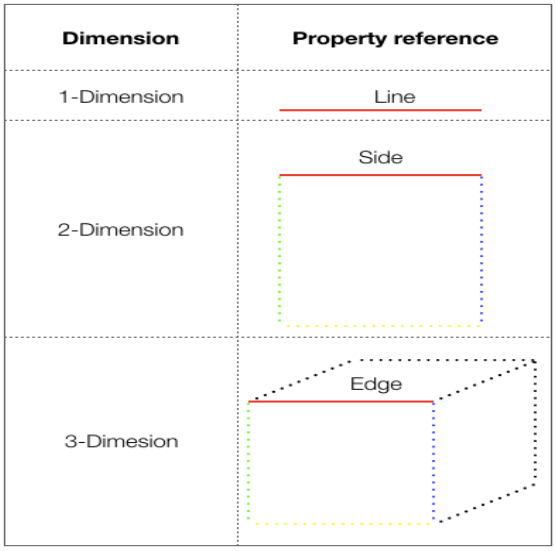


Figure 6: Unit and Their Attribute Measurement

Choose the type of unit you would use to measure (choose from A, B, or C):

Figure 7: Measuring Units

- The size of the floor in your kitchen
- The distance to the office
- The amount of space inside a cupboard

GM 2.3.1 - Recognizing the Cardinality of the Units Employed

GM 2.4.1 - Realizing That a Measure Is Constituted Through Iterating the Selected Unit

- What is the length of the umbrella below?
  Using the counting stick as a unit, measure the approximate length of the umbrella.
  Standardizing the Unit.

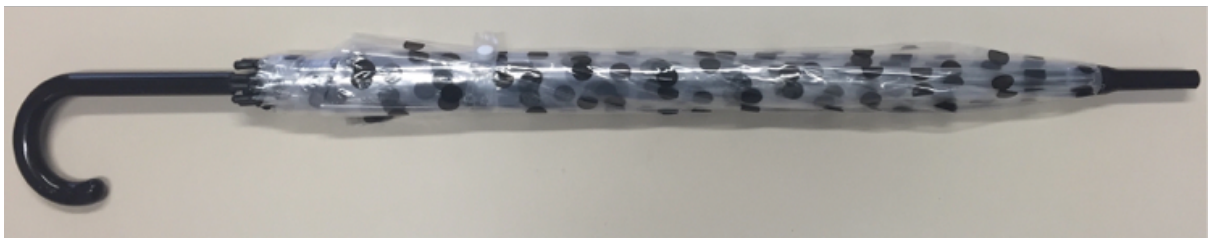


Figure 8: Umbrella

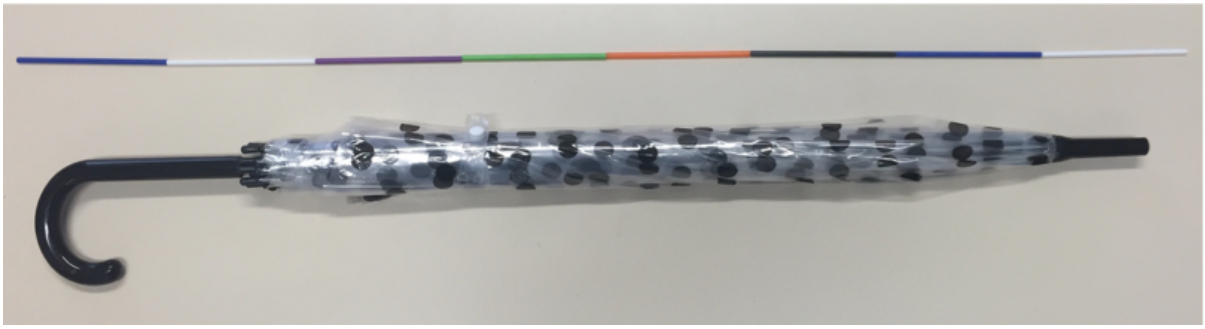


Figure 9: Umbrella and Counting Sticks

The umbrella is approximately 8 counting sticks long.
Using a stack of counting blocks as a unit, measure the approximate length of the umbrella.

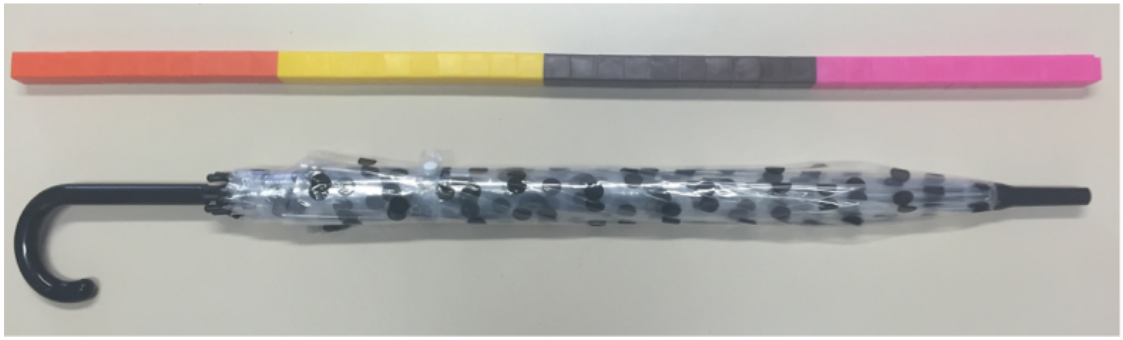


Figure 10: Umbrella and Counting Blocks

- The umbrella is approximately 4 counting block stacks long, which answer is correct?
  8 counting sticks?
  4 counting block stacks?
- How do the sizes of the counting sticks and counting block stacks compare to each other?

Content Standards for Transformations

Knowledge of transformations in Geometry develop the ability to manipulate, visualize, recognize, identify invariance and variance among geometric elements in a variety of orientations and from different perspectives (PrimTed, 2019). The developed sub-standards centre on:

- Understanding and representing translations, reflections, rotations, and dilations of objects in the plane
- Drawing and constructing representations of tessellations of two-dimensional geometric shapes or three-dimensional objects using transformations and a variety of tools
- Comparing geometric patterns (tessellations) that share common characteristics (e.g. form, line, angle, vertex arrangement, space)
- Demonstrating how (elements and principles) can be used to solve specific spatial visual problems
- Planning and producing works of art applying mathematical techniques, and processes with skill, confidence, and sensitivity

Some examples of activities relating to *transformations* from the PrimTEd Geometry and Measurement Working Group are shared below:

GM 3.2.1 - Identify Similarities and Differences Between Geometric Patterns (Tessellations) That Share Common Characteristics (e.g. Form, Line, Symmetry, Angle, and Vertex Arrangement, Space)

GM 3.2.2 - Construct Representations of Transformations of 2-D Geometric Shapes and/or 3-D Objects Using Tessellations

What do you think the formations **4.4.4.4** and **8.8.4** refer to regarding tessellations?

- A particular tessellation (arrangement of shapes) is named by observing a **vertex point** and ascertaining **how many** polygons **touch** the vertex point.
- Conventions are named based on the **type of polygons** that touch the vertex point.
- The convention number represents the **number of sides** of each polygon.

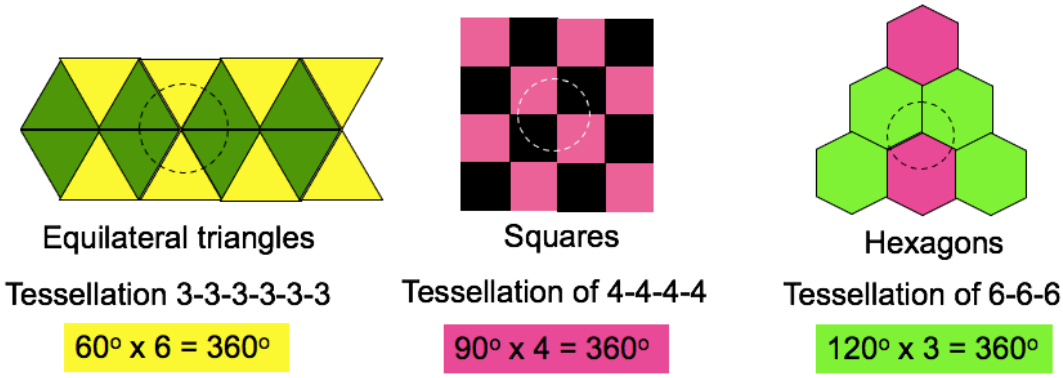


Figure 11: Tessellations of Geometric Shapes

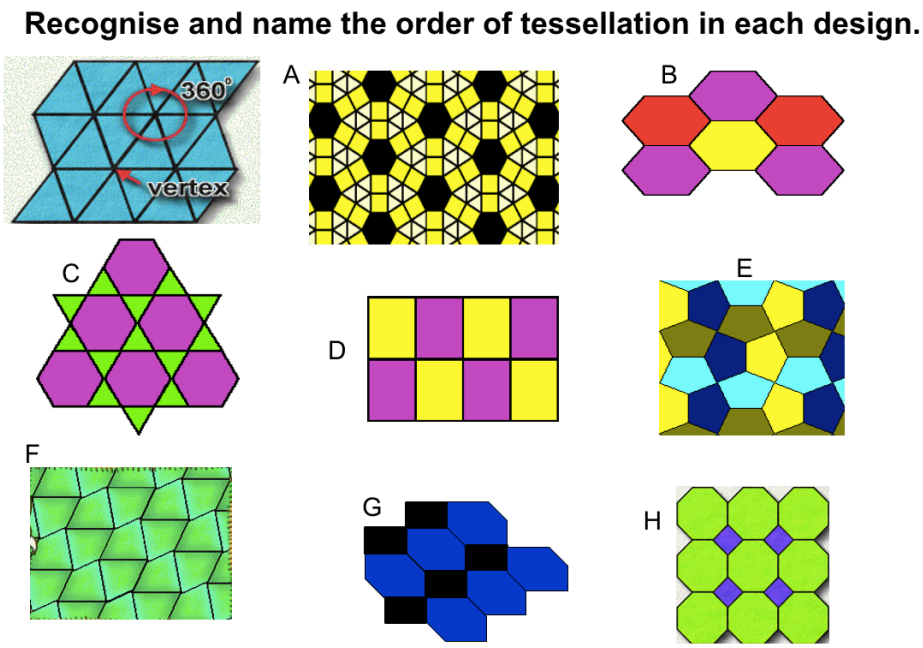


Figure 12: Tessellations Used in Designs

GM 3.3.1 - Use Properties of Objects and Shapes in Relation to the Principles of Transformations to Solve Spatial Problems

1. How many of the small squares (as seen in the figure) would make up the area of the entire tangram?

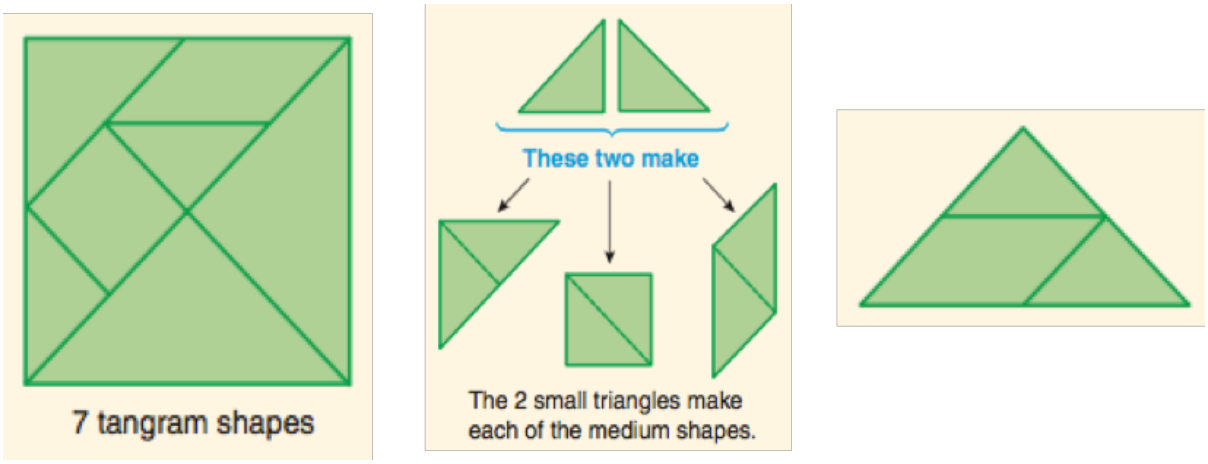


Figure 13: Transformations in Tangram Shape

2. Complete the table below. Discuss your findings in your groups. Write down your main findings.

Regular shape	Name	No of angles	Size of one angle	Sketch the arrangement of angles around a point	Do angles round a vertex-point add up to 360°	Is the angle size a factor of 360°	Does the shape tessellate? YES/NO

Figure 14: Group Activity

3. Study the shaped below. Copy each shape and draw the image of each under a reflection in line *a*

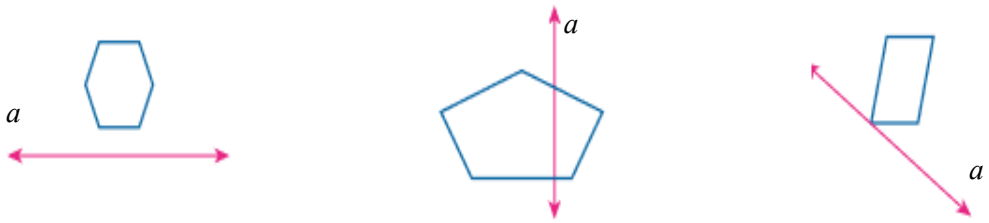


Figure 15: Shapes

Transformation, as reflected by the above activities, is an explicit and deliberate inclusion, seeking to develop a specific concept level as part of the process of developing student-teachers' understanding of geometry. Transformation as a mathematical concept incorporates the development of spatial reasoning as stated previously, which is a cross-cutting concept. Teacher-educators should be mindful when mediating the content with to avoid a blinkered conception of the concept of transformation and its utility in understanding the field of mathematics.

Conclusion and Recommendations

The three content "big ideas" may deviate from other research-based theories. The main reason for the "big ideas," as proposed by this study, to be content-based is that cognizance was taken of the influence of national school curricula as an organizing and guiding factor for pre- and in-service teachers. It was felt that pre-service teachers should be able to recognize what they needed to teach in the schools, and see this reflected in the curriculum, as well as in the salient content that they had covered during their lectures.

The "big ideas" could well have been *invariance* and *visualization* as suggested by members of the working group at initial meetings, which could have privileged the desired *habits of mind* which are so necessary to develop the required dispositions with regard to Geometry.

Acknowledgements

This publication has been developed through the Teaching and Learning Development Capacity Improvement Programme which is being implemented through a partnership between the Department of Higher Education and Training and the European Union.

References

Armah, R. B., & Kissi, P. S. (2019). Use of the Van Hiele theory in investigating teaching strategies used by College of Education geometry tutors. EURASIA Journal of Mathematics, Science and Technology Education, 15(4), em1694.

Atebe, H. U. and Schäfer, *M.* (2011). "The nature of geometry instruction and observed learning-outcomes opportunities in Nigerian and South African high schools," *African Journal of Research in Mathematics. Science and Technology. Education.*, 15(2), 191–204.

Barclay, N.& Barnes, A. (2013). Big mathematical ideas-an idea with primary potential? Mathematics Teaching: *Journal of the Association of Teachers of Mathematics*, 234,19–21.

Boaler, J., Munson, J. and Williams, C. (2019). What is Mathematical Beauty? Teaching through Big Ideas and Connections, Youcubed (online).

Burger, W. F., & Shaughnessy, J. M. (1986). Characterizing the van Hiele levels of development in geometry. Journal for research in mathematics education, 17(1), 31-48.

Chi, M. T. H., Glaser, R., and Rees, E. (1982). Expertise in problem solving. In R. J. Sternberg (Ed.), Advances in the psychology of human intelligence, (Vol. 1). Hillsdale, NJ: Erlbaum. (Curriculum and Assessment Policy Statement, Grade R – 3, Department of Basic Education, Republic of South Africa, 2011)

Clements, D. H. (2004). Geometric and spatial thinking in early childhood education. In D. H. Clements, & J. Sarama (Eds.), Engaging young children in mathematics (pp. 267–297). Mahwah, NJ: Lawrence Erlbaum Associates.

De Cruz, H., and De Smedt, J. (2010). The Innateness Hypothesis and Mathematical Concepts. *Topoi*, 29(1), 3-13.

Department of Higher Education and Training (DHET) (2011). *Revised Policy on the Minimum Requirements for Teacher Education Qualifications (MRTEQ).* Published by the Minister of Higher Education & Training in Government Gazette No 38487 on 19 February 2015.

Dongwi, B. (2014). Using the van Hiele phases of instruction to inform the design and implementation of the circle geometry teaching and learning programme, in Namibia Counts: Mathematics Education Research in Namibia (pp.107-119) CT: Digital Print Solution.

Feiberger, M. (2006). Innate geometry. *plusadmin January 27,* https://plus.maths.org/content/innate-geometry

Fife, J.H., James, K. and Bauer, M. (2019). *A Learning Progression for Geometric Transformations ETS RR–19-01* December 2019. Educational Testing Service, Princeton, NJISSN 2330-8516.

Figura, L.O. (2007). Geometric Properties: Size and Shape. Chapter 3 In: Food Physics. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-540-34194-9_3

Freudenthal, H. (1991). Revisiting mathematics education: China Lectures. Dordrecht,Netherlands: Springer Netherlands. DOI: https://doi.org/10.1007/0-306-47202-3

Gravemeijer, K. (1994). Developing realistic mathematics education. Utrecht, Netherland:CD-Beta-Press. Retrieved from http://www.cdbeta.uu.nl/tdb/fulltext/199503-terwel2.pdf

Greenstein, S. (2014). Making sense of qualitative geometry: The case of Amanda, Journal of Mathematical Behavior 36, pp. 73–94.

Herbst, P., Gonzalez, G. and Macke, M. (2005). How Can Geometry Students Understand What It Means to Define in Mathematics? *The Mathematics Educator*, 15(2), pp. 17-24.

Izard, V., Pica, P. Spelke, E.S. and Dehaene, S. (2011). *Flexible intuitions of Euclidean geometry in an Amazonian indigene group*. Proceedings of the National Academy of Sciences, 108(24), pp.9782-9787, https://doi.org/10.1073/pnas.1016686108

Johnston-Wilder, S., and Mason, J. (2005). Developing Thinking in Geometry. London, California and New Delhi: *SAGE* Publications.

Lappan, R.D. (1999). Along came the sky. Reston, VA: NCTM.

Luneta, K. (2014). Foundation phase teachers' (limited) knowledge of geometry. *South African Journal of Childhood Education*, 4(3),71-86.

Ma, L. (1999). *Knowing and teaching elementary mathematics – teachers' understanding fundamental mathematics in China and the United States*, NY: Routledge.

Mason, M. (2009). "The van Hiele levels of geometric understanding." *Colección Digital Eudoxus* 1.2.

Moru, E. K., Malebanye, M., Morobe, N., & George, M. J. (2021). A Van Hiele Theory Analysis for Teaching Volume of Three-Dimensional Geometric Shapes. *Journal of Research and Advances in Mathematics Education*, 6(1), 17-31.

Naufal, A.M., Abdullah, A.H., Osman, S. Abu, M.S., and Ihsan, H. (2020). Van Hiele Level of Geometric Thinking among Secondary School Students. *International Journal of Recent Technology and Engineering*, 8 (6), pp.478-481.

Niemi, D., Vallone, J., and Vendlinski, T. (2006). *The Power of Big Ideas in Mathematics Education: Development and Pilot Testing of POWERSOURCE Assessments*, CSE Report 697, August 2006.

Nisawa, Y. (2018). Applying van Hiele's levels to basic research on the difficulty factors behind understanding functions. *International Electronic Journal of Mathematics Education*, 13(2), 61-65.

Palmer, A. (2011). "How many sums can I do"?: Performative strategies and diffractive thinking as methodological tools for rethinking mathematical subjectivity. *Reconceptualizing Educational Research Methodology* (RERM), 1(1), 3-18.

Piper, B., Ralaingita, W., Linda Akach, L. and King, S. (2016). Improving procedural and conceptual mathematics outcomes: evidence from a randomised controlled trial in Kenya, *Journal of Development Effectiveness*, 8:3, 404-422, https://doi.org/10.1080/19439342.2016.1149502

Robichaux-Davis, R. R., & Guarino, A. J. (2016). Assessing elementary pre-service teachers' knowledge for teaching geometry. *International Journal of Mathematics and Statistics Invention*, 4(1), 12-20.

Shmoop Editorial Team. (2008). "Geometry Introduction What is Geometry?." *Shmoop University, Inc.* Accessed November 19, 2021. https://www.shmoop.com/geometry-introduction/what-is-geometry.html

Singh, N.K. (2017). Inductive and Deductive Methods in Mathematics Teaching." *International Journal of Engineering Research and Applications* (IJERA), 7(11), pp. 19-22.

Skemp, R. R. (1976). Relational understanding and instrumental understanding. *Mathematics teaching*, 77(1), 20-26.

Smith, J.P. and Barrett, J.E. (2017). *Learning and Teaching Measurement: Coordinating Quantity and Number*, pp. 355 – 385. https://www.researchgate.net/publication/320170942

Teaching & Learning Development Capacity Improvement Programme, Primary Teacher Education Project, Working Group 3 Brief, 2016.

Ubah, I., & Bansilal, S. (2019). The use of semiotic representations in reasoning about similar triangles in Euclidean geometry. *Pythagoras*, *40*(1), a480. https://doi.org/10.4102/pythagoras.v40i1.480.

Van de Walle, J., Karp, K. & Bay-Williams, J. (2013). Elementary and Middle School Mathematics - Teaching Developmentally, Ninth Edition, Global Edition.

Van Hiele, P.M. (1986). Structure & insight: A theory of mathematics education. Netherlands: Academic Press.

Van Putten, S, Howie, S. and Stols, G. (2010). Making Euclidean geometry compulsory: Are we prepared? http://scholar.ufs.ac.za

Vojkuvkova, I. (2012). The van Hiele Model of Geometric Thinking. *WDS'12 Proceedings of Contributed Papers, Part 1*, pp. 72 – 75.

Zisserman, A., Forsyth, D. Mundy, J., Rothwell, C., Liu, J., and Pillow, N. (1995). 3-D object recognition using invariance. *Artificial Intelligence*, 78, pp. 239 – 288.

Contact email: rgovender@uwc.ac.za

Syllabus Review as a Leitmotif to Achieving Educational Objectives: The Case of the Botswana Junior Certificate of Education Syllabus of French

Rodah Sechele-Nthapelelang, University of Botswana, Botswana
Obene Bojosi, University of Botswana, Botswana
Boingotlo Winnie Kaome, University of Botswana, Botswana

The European Conference on Education 2024
Official Conference Proceedings

Abstract
As the world evolves, a lot of transformation equally happens in the teaching domain: educational theories, teaching methods, learning approaches as well as how human beings interact with the world. This forms the basis of reviews that are carried out in recognition of societal advancements as well as to satisfy the need to align to what is emerging. The educational sector, likewise, carries out syllabus reviews amongst many others. Botswana as a case in point depicts systematic syllabus reviews at sustained intervals of 10 years for different teaching subjects. French teaching on the other side, a relatively new teaching subject, has benefited from two syllabus reviews. The two syllabus reviews have differed in target and in achievements, with each review seemingly getting closer to producing satisfying results for all stakeholders: students, teachers and policymakers alike. Data analysed through desktop review and interviewing teachers has provided the basis for this research. Conclusions emanating from this analysis have pointed to the necessity of frequent syllabus reviews towards achieving the desired educational objectives. A correlation between the teaching landscape of French as a Foreign language today, across the globe with the Botswana Junior Certificate of Education Syllabus in French has been established and has made the Botswana syllabus of French at Junior Schools to speak to what prevails at International level.

Keywords: Syllabus Review, French in Botswana, Language Policy, Learner Exit Attributes, Student Performance

iafor
The International Academic Forum
www.iafor.org

Introduction

Skills development in our societies has become the cornerstone through which policymakers and implementers gauge the level of advancement of a society in consonance with the speed at which the world is developing. As much as the intention of most governing bodies is to be at par with the world, this intention is equally guided by country-specific objectives and reporting mechanisms that track progress and inform on the reorganization of strategies. The different forms of reviews constitute part of such strategies which serve a dual purpose at different levels. The education sector, like many others, has instituted syllabus reviews which accords policymakers an opportunity to interrogate teaching objectives and values, and to subsequently reflect on the teaching practices adopted. An examination into the Botswana Education system depicts systematic syllabus reviews carried out at sustained intervals of 10 years. The French language teaching syllabus having been developed first in 2000 has undergone two reviews – in 2010 and the subsequent one giving way to implementation in January 2020. The first year of implementation brought in a ray of light into the French fraternity where student performance had always been at a low rate thereby bringing into question the performance and aptitude of teachers. With the 2023 end of JCE results in French being amongst the highest all over the country, we seek to investigate how a reverse process of reviewing a syllabus can be useful in achieving educational objectives. We will therefore carry out a desktop review to interrogate the guiding principles of the syllabus review in general, the rationale guiding this exercise in question in Botswana, and how implementation concretised the intended objective of the review. We will also interview teachers to get a view of whether teaching in the new syllabus has facilitated knowledge sharing with their students as well as appropriation of learning by students. In conclusion, the paper will open a discussion on whether the revision of the syllabus augers for long-term effects on the language proficiency of learners as well as a good understanding of a foreign language syllabus as well as learning environment.

This research paper constitutes a follow-up of a research question that formed the basis of our last paper entitled "*The Place of French in Botswana's Language in Education Policy: Contradictions and Paradoxes?"*[1] where the possibility of elimination of French in the school curriculum was volatile, justified by low pass rates in French Junior certificate examinations. Recently, there has been a complete shift in the landscape of examination results which led to us interrogating this shift, elucidating factors leading to this kind of shift and guiding policymakers on the best direction to achieving sustainability of positive results.

Aims of Study

The aim of this study is to interrogate whether the two syllabus reviews of the French Junior Certificate education level served a purpose of achieving the educational objectives of the country in terms of skills development, facilitating knowledge sharing with students and achieving long-term effects on the language proficiency of learners. Furthermore, we attempt to understand whether there is evidence of a good understanding of what a foreign language syllabus entails, while taking into consideration what an appropriate learning environment is.

[1] Kaome B., Sechele-Nthapelelang R., & Bojosi O. (2023) The Place of French in Botswana's Language in Education Policy: Contradictions and Paradoxes? ISSN: 2188-1162 The European Conference on Education 2023: Official Conference Proceedings (pp. 1393-1403) https://doi.org/10.22492/issn.2188-1162.2023.111

Methodology

To elucidate the research questions, we carried out desktop reviews on the syllabi from roll-out in 2000 to the most recent review implemented in 2020. We also analysed literature on Education policies in general, and specifically in Botswana. The desktop review alone would not have sufficed for this study in terms of giving a live overview of the perceived impact of the syllabus reviews, hence the need to interview teachers on their experience with the syllabi and their appreciation of their teaching environment as well as their readiness for syllabus review and implementation. The interview was therefore administered on teachers of French in public Junior Secondary Schools, a population totaling about 149. We sampled 20% of the total French teaching population at Junior Secondary Schools. The survey tool was administered online using a stratified probability sampling method and we chose respondents based on age, years of experience, place of work (rural or urban areas). Anonymity was respected in analysis of data collected.

This paper therefore captures this problematic by first appreciating the status quo of French in Botswana, especially the introduction and evolution of this language in schools and through policy decisions. We then explain the key terms and their adopted use in this paper. After bringing to clarity our choices of terms and how we intend using them we will now examine the essence of a syllabus review in general, the purpose intended in carrying out syllabus reviews and trying to find consonance with the syllabus review of the JCE syllabus of French in Botswana. This will lead us to the analysis of the responses by teachers on their perception of the syllabus review and how they have experienced its impact onto their teaching space. We shall conclude by drawing recommendations from the two processes of both desktop review and the survey on teachers' experiences.

Literature Review

A few factors must be taken into consideration as we address this issue of syllabus review of the subject French in Botswana. One key factor is that French is a Foreign language in Botswana, an anglophone country in Southern Africa with a population of 2,346,179[2] as captured in the 2022 population census. The teaching and learning of French in Botswana therefore follow a policy decision to introduce minority languages in schools as well as a third language following the recommendation of the Revised National Education Policy of 1994 (Obene B. Bojosi et. al., 2022). French is a new language in the Botswana education system, by year of introduction as well as by experience with the language. The following captures the chronological order of events leading to the status quo of French at present in the education system:

Timeline on Key Factors on the Teaching of French in Botswana

- 1999: 18 recently graduated BA holders are sent to France to be trained as teachers of French in preparation for the introduction of French in government schools as a pilot project.
- 2000: Introduction of French as a foreign language in 15 Junior secondary schools as a pilot project.
- 2000: Roll-out of the first JCE Teaching Syllabus in French.
- 2003: Roll-out of the first JCE Assessment Syllabus in French.

[2] statsbots.org.bw/sites/default/files/2022 Population and Housing Census Preliminary Results.pdf

- 2008: Signature of a Cooperation Agreement on Education and French Language between the French and Botswana governments. The Botswana government creates the posts of Principal Education Officer training for French, French officer at curriculum and the Botswana Examinations council (Kewagamang and Kaome, 2020).
- 2010: Roll out of the first Revised JCE Teaching Syllabus in French.
- 2013: Roll-out of the first Revised JCE Assessment Syllabus in French.
- July 2013: Publication of an Audit Report on French Teaching in Botswana Secondary Education (reference).
- 2015: Renewal of commitments of the Cooperation Agreement between the governments of France and Botswana (Senat & Australe 2016).
- Currently 39 public junior schools and 7 senior secondary schools teach French (Bojosi O. B, Sechele-Nthapelelang R and Kaome B. W, 2022).
- 2020: Roll-out of the second Revised JCE Teaching Syllabus in French.
- 2023: Roll-out of the second Revised JCE Assessment Syllabus in French.

Definition of Key Terms

Curriculum and Syllabus

For Allen (1984), "Curriculum is a very general concept which involves consideration of the whole complex of philosophical, social, and administrative factors which contribute to the planning of an educational program. Syllabus, however, refers to that subpart of curriculum concerned with a specification of what units will be taught (as distinct from how they will be taught, which is a matter for methodology) (p. 61). Richard (2001) on the other hand, defines a syllabus as "a specification of content of a course of instruction which lists what will be taught and tested."

A syllabus is therefore a tool that guides the processes of teaching and learning, making them more effective. It directs the teaching approach the teacher will use and the learning strategies to be employed by the learners and "whether it is intended or not, the quality of the syllabus, is a fairly reliable indicator of the quality of teaching and learning that will take place ..." (Woolock, 2003, p. 9). In summary, we can say a syllabus is the means and forms of application of the curriculum.

Syllabus Review

We will start first with the definition of review before qualifying the kind of review we are focusing on, being the syllabus review. The Online Oxford Dictionary for languages defines a review as "a formal assessment of something with the intention of instituting change if necessary."[3] A syllabus review is therefore an inquiry tool on teaching approaches and practices, to meet country-specific needs, and to consider changes that result in more equitable teaching approaches and practices.[4]

Rationale for Doing a Syllabus Review

A syllabus review is about critically and systematically reflecting on teaching, learning and routine. The main reason for a review is to improve the student learning experience by:

[3] Oxford Languages and Google - English | Oxford Languages (oup.com)
[4] https://www.unco.edu/nhs/stem-inclusive-excellence-collective/pdf/syllabus-review-protocol.pdf

- Identifying specific actions to address gaps within an academic program;
- Increasing discussion and collaboration between stakeholders who play a role in the program;
- Improving teaching and learning practices;
- Providing an opportunity for critical reflection on the programme's curriculum;
- Providing evidence to guide decision-making within the programme.

Syllabus Review in Botswana

As already stated in the definition that a review is an "assessment", it is therefore in order that as we examine the issue of syllabus review, we go back to conditions surrounding the design of the syllabus:

- who carried out the syllabus design/review;
- who was the intended recipient/ beneficiary of the syllabus review;
- at what intervals has the syllabus been reviewed;
- what were the objectives guiding the review; and
- what was the impact of the final product?

The roll-out of the Teaching of French in Botswana as a pilot project points to the insufficiency in skills and specifically experience of stakeholders involved in the design of the first syllabus. The Mission Report of 11 July 2013 by CIEP[5] on French Teaching in Botswana Secondary Education pointed to this insufficiency and produced a recommendation (number 6) which reads:

> "It is recommended that a team of experts in language curriculum design write new curricula. If such a team cannot be found, experienced teachers with a thorough knowledge in methodology of French could be identified and provided with a specific training in curriculum design. Current officers could also be trained to assist in such."[6]

The 3 Botswana Syllabi

Since French was introduced in schools from the pilot project in 2000 to date, there have been three (3) JCE syllabi in place:

1. 2000 JCE syllabus.
2. Revised 2008 syllabus, implemented in 2010.
3. Revised 2020 syllabus.

There is need to note that French was the first foreign language introduced in public schools in Botswana, so the first syllabus of 2000 was the first of its kind, designed within the constraints of what was available in terms of resources, both human, financial as well as material. The 2010 syllabus was the first review carried out on the French syllabus; it had no benchmark in terms of reviewing a foreign language syllabus. This challenge was coupled with the inadequacy of skills in syllabus design and review, and we believe that is the reason there were no significant changes made to the syllabus. The last review giving way to the 2020 syllabus implemented has been the most fruitful so far. Below is a tabular illustration of the syllabi and how each review transformed the focus.

[5] Christian OLLIVIER & Laurent PUREN. (2013) ASSESSMENT MISSION: FRENCH TEACHING IN BOTSWANA SECONDARY EDUCATION. 22 April 2013 to 3 May 2013. Reunion Island, 11 July 2013

[6] Ibid. "CIEP Reunion Mission Report. 2013. Assessment mission: French Teaching in Botswana Secondary Education. 22 April 2013 to 3 May 2013.

Table 1: French Teaching Syllabi and Subsequent Reviews

Component	2000	2010	2020
Objectives	Informed by Vision 2016 aspirations and Threshold level.	Inspired by Vision 2016 aspirations.	Informed by Vision 2036 and the Common European Framework of Reference for Languages (CEFRL).
Syllabus type	Structural, Notional/ Functional	Structural, Notional/Functional	Task based
Methodology	Said to be communicative but scrutiny shows the syllabus is skewed towards the traditional method	Communicative approach	Outcome based learning, which is action-based approach
Assessment aims	- First done in 2003	- First done in 2013 - To ensure proper assessment of all the important skills in the curriculum - To enable both teaching and assessment to cater for all ability levels. - To provide an efficient evaluative mechanism of the curriculum - To encourage an investigative approach to learning - To provide internationally recognised standards. - To enable the students to realise their full potential; - To foster the development of the communication skills; - To reinforce candidates' ability to handle and interact meaningfully with given materials; • - To encourage candidates to apply learned skills to manipulate life	First done in 2023

A comparative analysis of the three syllabi depicts an evolution from a traditional grammar-teaching approach to a communicative and task-based approach, from a syllabus that was simply structured from limited resources and exposure to a syllabus that is aligned to the world trends in teaching and learning, aligned with the CEFL. We can confidently assert that the syllabus reviews were necessary, and every step of the review brought Botswana closer to achieving objectives of teaching French as a Foreign Language as well as closer to aligning with the current teaching and learning approaches in Education.

Findings

In interrogating the participants in our survey, we sought to know how long they had been teaching French, their opinions on how the syllabus impacts teaching and learning, their views on the current syllabus used, if in-service training opportunities are deemed adequate and if they support the current syllabus review intervals. Here is what emerged from the survey.

1. **Teaching experience:** The participants' experience ranges between 11 and 17 years.

2. **The importance of French in Botswana:** On this question, 3 benefits emerge;
   a. French teaching and learning helps in career opportunities.
   b. It promotes better reasoning skills.
   c. It helps connect people.

The career opportunities benefit is the most emphasized.

3. **General appreciation of French teaching in Botswana:** French teachers take a sense of pride in **t**he kind of learners they have produced. Their fulfilment comes from seeing their former students taking part in the economy thanks to their knowledge of the French language. One participant says,

> *"I feel partly fulfilled because of late, I see our former students joining the teaching fraternity, they are taking spaces in all sectors of the economy like the tourism sector, cultural centers and creative arts."*

This is expressed mostly by older teachers whose alumni are already working. Teachers are also fulfilled by producing learners aware of the other's existence, learners with intercultural competence as expressed in the following,

> *"I feel I have opened eyes of learners to a whole different world."*

Frustrations

Teachers mention mainly lack of resources and lack of government support. According to them, lack of authentic materials **like** makes teaching and learning difficult when it should have been easier.

> *"When I started there was a clash between expectation and reality. When I started, I expected TFL to be easier but that was not the case. I expected 13–14-year-olds to be easy to teach but that is not the case. The lack of teaching aids like magazines, authentic tv shows make it difficult."*

The materials said to be lacking are the likes of textbooks, televisions, and radios. One teacher, however, pointed out her frustration towards her colleagues citing that although there were in -service training opportunities to enhance their teaching skills, some teachers do not make effective use of such opportunities.

> *"Teachers are not doing enough to tap on the opportunities of TFL. There are people who do not attend the trainings we are offered online."*

4. Performance over the years: The teachers' responses show that over the years French results have been unsatisfactory.

> *"The performance was very poor with French being amongst the least performing subjects."*

> *"Previously, the old syllabus led to high failure rates, but now students are performing better and understanding the material more effectively."*

Improved results in 2023: All participants mention that in 2023 there has been a significant improvement in French results because of the new syllabus,

> *"In 2023 there was a huge improvement with more than two thirds of schools scoring more than 50%, which is the national target. With this, French was graded no. 5 subject from the bottom 2. The best performing school in French used to be in the 40s but this time around the best got over 70."*

> *"There has been a change last year with the new syllabus."*

Syllabi used: Long service teachers say they have used 3 syllabi while some of them say they have used only 2, expressing that the 2010 syllabus is similar to the 2000 one. So, most teachers here answered by saying they have used 2 syllabi, 2010 and 2020 or simply by saying the old and the new. Currently, all participants indicate they are using the syllabus implemented in 2020 and first assessed in 2023.

5. Syllabus impact on teaching and learning: The participants say they know the impact of syllabus in the process of teaching and learning. For others the syllabus is a tool that guides in the approaches to use but for some, there is a written syllabus and the practiced one which takes into consideration factors on the ground as shown by this respondent,

> *"Ideally, the syllabus must guide teaching and learning but in practice, you would find that the teaching is dependent on the teacher's understanding and availability of resources. The number of students per class can be an impeding factor in implementing new methods of teaching. The excuse that teachers used to give on teaching methods was that the large numbers did not allow them to practice action based or communicative approaches but only the grammar-based method."*

It is indeed true that a well-designed syllabus without the teacher's good interpretation or without the necessary resources would not produce the desired outcome.

Advantages of the new syllabus: the respondents give answers that are the characteristics of an action-based approach:

> *"Assessment can be done during teaching as there is always a production at the end of each teaching sequence."*

> *"It is learner centered."*

> *"It develops the learner's autonomy as they can easily interpret the syllabus themselves. While in the past I could not share the syllabus with my students, this time around I have. The students usually work on their own before class."*

A few participants also mention that the advantage of the new syllabus is that it has a teacher's guide.

> *"For the first time we have lesson plans, and a teacher's guide which suggests teaching aids and how to approach everything."*

Disadvantages: For the disadvantages, the respondents' responses again fall on the characteristics of new teaching approaches.

a. Student-teacher ratio:

Ideally in a foreign language class, effective learning takes place when a teacher has less than 20 students, but that is not the situation in government schools as expressed below;

> *"The current syllabus calls for a fewer number in class which is not doable in most government schools."*

b. Inadequate/lack of new technologies and other resources in schools:

> *"It calls for usage of new technologies but those are not readily available in most government schools."*

> *"Its main disadvantage is that it was implemented without the provision of requisite resources leading to most colleagues taking shortcuts in implementation."*

c. Time consuming:

> *"Action oriented approach needs a lot of time to prepare for classes."*

6. Aptitude to interpret and implement the syllabus: Respondents indicate that they can interpret the syllabus because they were trained before implementation, the syllabus objectives are clear and easy to follow, there is a teacher's guide that makes things easier, they rely on their exposure and experience.

> *"I also tap on my exposure and experience. Like I said the teacher's guide also make things easier."*

> *"Yes, I am able to implement it as it is easy to comprehend and follow."*

7. Teaching method used: Teachers indicate that they use action based or learner centeredness method but there are those who mix depending on the situation like expressed by this respondent:

> *"I use action based but I would say I mix action based and communicative approaches, sometimes traditional depending on the type of students I have and the*

type of objective. You know there are times when the new teaching methods do not work at all and when it is like that, I used the traditional one."

8. Adequacy of in-service training: Respondents have diverging responses here, there are teachers who find the current in-service training to be sufficient.

"Yes, les assises. Every year there is something new on the syllabus."

While the majority think the training provided is inadequate:

"I believe we need more in-service training, and I have attended all that have been provided in the previous years."

9. In-service training relevance to teacher's needs: It is seen as a skill enhancer.

"Usually, it is driven towards our needs that we would have been asked. It improves our service delivery. It keeps refreshing us so that if there are new things we adapt."

10. Stakeholder recommendations integration: The results reveal that some teachers do not know if there is any stakeholder recommendation integration into the syllabus during syllabus design while others say there was never a time that feedback was needed from stakeholders. The results also show that some teachers were consulted before the syllabus design as we got responses like the one below:

"I think with this current syllabus, our views as teachers were taken into consideration. We complained that the 2010 syllabus and the 2013 assessment syllabus were not aligned. Not only that, but the objectives were not suitable for a 21st century learner. The content there, for instance, students could be asked to write a letter to a friend or a relative. That's not relevant today. In this current syllabus, students are required to write emails and SMSs. Here they can relate because it is something they do in real life."

11. Syllabus review frequency: Teachers think that the current practice where the syllabus is reviewed after 10 years is too long and should be shortened. There are those who say it should be reviewed after every 3 years while others say after the 5th national exam following implementation. They think that learners' needs keep changing and it is necessary to keep up.

"I think after the national 5th assessment."

"The syllabus should be reviewed every 3-5 years."

12. Learning outcomes age appropriateness: The teachers find the learning outcomes to be learner appropriate to a larger extent.

"Yes, but there are some objectives that are not age relevant, for instance booking a hotel. In real life we never have a 13 or 15-year-old booking a hotel room."

13. Success stories: Some teachers think there are things to celebrate as one says,

> *"There have been learners who did well in life because of their knowledge of the language."*

14. Teacher proficiency level: Many think teachers have the right language proficiency level to teach but say it is acquired from in-service but not from initial training.

> *"I cannot say the initial training prepared me, but in-service training did."*

15. Syllabus review recommendations: There are instances in the past where the syllabus was not changed although meetings were held. The teachers' desire is for the review to be carried out and implemented.

> *"Syllabus review must be syllabus review, not whereby people just meet but at the end of the day the syllabus in not changed like with the 2010 syllabus. That syllabus is similar to the 2000 one though there were recommendations from teachers that were not taken into consideration."*

16. Integration of stakeholder recommendation: Teachers experessed the need for stakeholder recommendations to be taken on board. The first stakeholder that should be taken into consideration, according to them should be the practising teachers themselves:

> *"The policy makers must visit schools to see how the syllabus is being applied and get reviews on it."*

> *"The syllabus review must be done by practicing teachers as they have on-the-job experience, and they are confronted to the challenges that come with implementation."*

Recommendations

Considering the findings, we recommend continued syllabus reviews of the syllabus at an interval of 5 – 10 years, continued training of teachers to enhance skills-sets in the country for better implementation of the syllabus. In addition, there must be stakeholder consultations that also include the learners themselves. Finally, we recommend that all those who take part in the reviews must be trained accordingly.

Conclusion

After going through the literature, making a comparative analysis of the original syllabus and its reviews as well as on the basis of the responses from teachers, we can conclude that the syllabus review of 2010 has been carried out without much feedback from stakeholders and as such did not give way to a complete transition in the teaching of French as well as in the performance of students at completion of the JCE French syllabus. This was owing to several factors:

a. Mismatch between the teaching and assessment syllabus.
b. Little feedback from stakeholders leading to little input towards the 2010 review, hence no impact of the review.

On the contrary, we realise that the 2020 syllabus review has benefited from 20 years for skills-sets in the country to develop and to interact constructively to produce a syllabus review which has had an impact on the first batch of its output. This also owes to some understanding and evolution of teaching approaches at all levels of instruction in the country making it such that at completion of their teaching degree, teachers are in a better place to understand and implement communicative, action-based approach as well as output-based education.

Appendix

Questionnaire for teachers of French

This questionnaire is strictly confidential. All data collected will be anonymized, and it will be impossible to identify you or your school. Furthermore, the data collected will only be used for research purposes. Please answer all questions in the language of your choice: English or Setswana. If you have any questions regarding this study, please do not hesitate to write to us at the following addresses:

Nthapelelangr@ub.ac.bw
Bojosib@ub.ac.bw
Kaomeb@ub.ac.bw

1. How long have you been teaching French?

_____

2. What is your feeling of the importance of teaching French in Botswana?

_____

3. What is your general appreciation of your teaching of French since you started teaching French? Do you feel fulfilled? Do you feel frustrated?

_____

4. How has been the performance of learners of French over the years?

_____

5. In your teaching journey which syllabus did you use?

_____

6. From your perspective, how is teaching (from teaching methods and approaches to teaching aids as well as evaluation) and learning impacted by the syllabus used?

_____

_____

7. Which syllabus is currently used in your school? (the year of development and implementation)

_____

8. What would you say are the advantages and disadvantages of the syllabus that is currently in place?

9. Are there any measures put in place to provide orientation to newly recruited teachers on syllabus interpretation and usage?

10. Do you feel you have the aptitude to interpret and implement the syllabus currently in use? Elaborate.

11. Which teaching method/ approach do you use in your classrooms?

12. Do you have sufficient resources (as described in the curriculum plan) to implement this curriculum?

13. Do you receive enough in-service training? If yes, how often do you attend?

14. If you answered yes to question 13 above, what is the relevance of the in-service training to your needs and towards the general needs of the teaching of French in Botswana?

15. Are there any measures put in place to ensure that the syllabus is periodically improved based on feedback from stakeholders?

---

16. In your opinion, how often should the syllabus be reviewed and why?

---

17. In your opinion, are the learning outcomes and educational content appropriate for the developmental age of students?

---

18. Since French was introduced in Botswana public schools, what are the success stories related to policy implementation?

---

19. Do you feel there is a skills match between the proficiency level required of a teacher to teach French at junior secondary school level and the actual skills sets that teachers possess?

---

20. Do you think the way the teaching of the French language is implemented in our education system is effective? Is the effort enough?

---

21. What recommendations would you provide to policymakers and implementors on syllabus reviews and roll-out?

Thank you for taking the time to respond to this questionnaire.

Bibliography

Allen, J. P.B. (1984). "*General-Purpose Language Teaching:a Variable Focus Approach*" in Brumfit, C.J. (ed.) General English Syllabus Design. Pergamon Press Ltd. and The British Council.

Bojosi, O.B, Kaome, B.W, Sechele-Nthapelelang R. *Assessing the alignment of the syllabus to the curriculum: The cultural component in Botswana's French junior certificate syllabus*. In Mosenodi Vol 25 No 1 (2022): Mosenodi: International Journal of the Educational Studies. Gaborone, Botswana. Pp 58-72.

Botswana Government. (1994). *The Revised National Policy on Education, March 1994: As Approved by the National Assembly on the 7th of March 1994*: Government Printer, Botswana.

Haworth, Robert H. (2012). *Anarchist pedagogies: collective actions, theories, and critical reflections on education*. PM Press.

Kaome B.W, Sechele-Nthapelelang R, Bojosi O.B, *The Place of French in Botswana's Language in Education Policy: Contradictions and Paradoxes?.* In International Academic Forum (IAFOR): ISSN: 2188-1162, 2023, London, United Kingdom, Pp 1393–1403.

Kewagamang, P., Kaome, B. W. (2020). *Teaching French as a foreign language in Botswana junior secondary schools: progress, challenges, and prospects*. Lonaka, 11 No. 1 2020.

Moroka, N. (2017). *Vision 2036: achieving prosperity for all*. Botswana documents.

Republic of Botswana. (1994). *The revised national policy on education, March 1994: As Approved by the National Assembly on the 7th March 199*4: Government Printers.

Republic of Botswana. (2010). *Three-year junior secondary school syllabus, French*. Government Printers.

Richards, J. C. (2001). *Curriculum development in language teaching*. Cambridge university press.

Sénat, F., & Australe, F. S. G. d. a. F.-A. (2016). *Projet de loi autorisant l'accord-cadre entre le Gouvernement de la République française et le Gouvernement de la République du Botswana sur l'éducation et la langue françai*se. Retrieved June18 2024 from https://www.senat.fr/rap/l09-013/l09-0132.htm

Statistics Botswana (2022). 2022 *Popuplation and Housing Census Premilinary Results V2,* Government Printers.

Woolcock, M. J. (2005). *Constructing a syllabus: A handbook for faculty, teaching assistants and teaching fellows.* Brown University, Harriet W. Sheridan Center for Teaching and Learning.

Contact emails: nthapelelangr@ub.ac.bw
bojosib@ub.ac.bw
kaomeb@ub.ac.bw

© The International Academic Forum 2024
The International Academic Forum (IAFOR)
Sakae 1-16-26-201
Naka Ward, Nagoya, Aichi
Japan 460-0008
www.iafor.org