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The Role of Software in Computer Science Majors' Career Choice

Bernd Neeser, University of Applied Sciences Wuerzburg-Schweinfurt, Germany
Karsten Huffstadt, University of Applied Sciences Wuerzburg-Schweinfurt, Germany

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Abstract

The shortage of highly-skilled ICT (information and communications technology) workers remains a serious and global concern. This paper reports on how to attract more computer science majors to job fields within ICT that are especially critical to economic growth, rather than how to solve the overall shortage. A qualitative preliminary study found that certain software-related aspects might play an important role when picking a job field. In order to generalize and validate these findings an online survey based on the Social Cognitive Career Theory was conducted. The data were analyzed and show that the software used in a prospective job does in fact have a positive influence on computer science majors' career choice when a technical usage of the software is pursued. A direct correlation exists between usage frequency of a software product and the willingness to take on a job in which the software is used. A modern user interface is an advantage when attracting computer science majors to specific job fields but other characteristics such as good functionalities and ease of learning seem to affect career choice much more. Further research will be required to determine which characteristics of a software are decisive.

Keywords: Career Choice, Role of Software, Usage Frequency, UI Design, Computer Science Majors, Information Technology, Career Decision Making, Factors, Influences, ICT Students, Student Attitudes, Survey, Social Cognitive Career Theory, SCCT

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Introduction

Many countries in the world, like Canada, China, Germany, India, Indonesia, Singapore and Thailand, currently face a shortage of highly-skilled workers in the field of information and communications technology (ICT). As digital technologies are further integrated into sectors across our economies, a process commonly known as "digitalization", the demand increases even more. There are several approaches to closing the skill gap in the ICT field, e. g. strengthening lifelong learning, offering work-based learning for students (dual course of studies) and developing gender equality schemes (Goel, 2020). These approaches and related research focus on how to increase the number of skilled workers in the ICT field in general in order to eliminate the shortage on the long run.

The focus of this research project is different in so far as it analyzes computer science majors' motivation to choose one ICT field over another. Understanding the causalities might not solve the overall skill shortage but can help attract more students to ICT fields that are critical to economic growth in the short term. To mention just one example: an aging workforce combined with offshoring in the mid-2000s currently leads to a significant shortage of experienced SAP experts. Skilled experts are crucial for the migration from SAPs enterprise resource planning system "ECC", which is the backbone of many mid- and large-sized companies, to its successor product "S/4HANA" until the end of the vendor's support deadline in 2025 (Prior, 2019).

A qualitative preliminary study conducted by the author suggests that certain software-related aspects may attract computer science majors to specific ICT fields. The purpose of this study is to first validate the correlation between software and career choice in general:
H1. The software that is used in a prospective job has a positive influence on computer science majors' decision to persue a career in the software's ecosystem.

In addition, the study's aim is to validate two generalized key findings of the preliminary study:
H2. The more contact with a software computer science majors have, the more likely they will persue a career in the software's ecosystem in the future.
H3. If a software has a modern user interface, more computer science majors will persue a career in the software's ecosystem.

In order to validate the hypothesis quantitative methods are applied. The research question is:

Do usage frequency and the user interface design of a software positively affect computer science majors' decision to persue a career in the software's ecosystem?

Related Work

Understanding Skill Shortage in ICT at a Granular Level

The shortage of highly-skilled ICT workers and its current and prospective negative impact on economical growth is a key driver for scientific research. A lot of the recent studies aim towards identifying the factors that determine whether or not scholars will pick an ICT-related education or decide to persue careers in information technology. Understanding the decisive factors is crucial for the derivation of appropriate measures to be taken to encourage scholars to start an ICT career in their future lifes. Typical research questions are:

- Who influenced a child's career choice? (Calitz, 2013)
- Did parents and teachers encourage their children to pursue careers in ICT? (Calitz, 2013)
- Which factors have the most influence on a student's choice to pursue ICT-related programs at university or college? (Ron et al, 2010)
- What motivates women (Hyrynsalmi et al, 2020) or minorities (KumarDas et al, 2019) to work in the ICT industry?

All of this research contributes to answering the question: what leads to the approval or rejection of an ICT-career in general? Few studies differentiate between specific working fields within information technology and the distinction is drawn on very abstract levels, e. g. the hierarchy level of the persued job or a generic job title (McKenzie et al, 2017).

Skill-shortage is not equally distributed among different ICT job profiles. In Germany, for example, there is a lack of IT-application consultants, software developers and electrical technicians whereas in Canada job positions for database administrators, IT support specialists, machine learning engineers and data scientists are difficult to fill. These differences illustrate the importance of understanding the shortage of talent at a more detailed level (Goel, 2020).

While some of the skill shortage in jobs related to emerging technologies like artificial intelligence (machine learning engineer, data scientist) can be attributed to the novelty of these job profiles, the explanation does not make sense for traditional jobs including database administrators and IT support specialists. This points to the possibility that additional factors at a granular level might play a role if specific jobs or jobs from a certain working field are rejected.

The qualitative preliminary study was conducted in order to identify those additional factors.

Preliminary Study: Computer Science Majors' Attitude Towards SAP Careers

The qualitative preliminary study investigated computer science majors' attitude towards SAP careers. The study focused exemplarily on the SAP ecosystem, because a broad variety of traditional job profiles is affected by skill shortage in this field, e. g. consultants, developers and project managers (Prior, 2019).

Three individual interviews were conducted with master's degree students of the University of Applied Sciences Wuerzburg-Schweinfurt with the field manual being based on SCCT (see next chapter). The interviews were recorded, transcribed and evaluated. The evaluation resulted in the following two findings that were derived from statements in the interview:

1.   The more contact with SAP systems computer science majors have, the more likely they will persue a SAP career in the future.

A study among American teenage girls has examined how joining a computer science camp and receiving computer related trainings such as programming tutorials raised their motivation for pursuing a computer science related career (Hur et al, 2017). The results indicate a positive correlation between contact with computer science topics in general and the effect on career choice but did not show a direct correlation between the usage of a specific software and the willingness to start a career in the respective software ecosystem.

2.   If SAP systems had a more modern user interface, more computer science majors would persue a SAP career.

According to a current research paper there is still a gap between user expectations and the quality of implementation of ERP user interfaces which correlates negatively with end users acceptance (Lambeck und Leyh, 2016). But the corresponding research neither considers the impact on expert users like computer science majors nor does it analyze if the acceptance issues correlate negatively with career choice.

The two software ecosystem-specific findings form the basis for further research reported in this paper.

Social Cognitive Career Theory

In the preliminary study Lent, Brown, and Hackett's social cognitive career theory (SCCT) (Lent et al, 1994), which has primarily been derived from Bandura's general social cognitive theory (Bandura, 1986), was applied. SCCT also serves as a theoretical model for this paper for the following reasons:
•   Although developed in 1994 the SCCT is still a very prevalent theory and often cited in current academic career choice literature and research papers.
•   Unless many other models such as Holland's Hexagon model (1997), SCCT does not focus on character-related aspects. An analysis of character traits may be helpful for the explanation of career choices on a general level, e. g. "rational thinking people prefer jobs in physics", but is less appropriate for a finer distinction of the motivations to pick specific working fields and jobs within ICT.

SCCT describes how learning experiences, influenced by personal factors (e. g. predispositions) and contextual factors (e. g. constraining or encouraging social support system), affect self-efficacy and outcome expectations. Both impact the formation of career-relevant interests and the setting of goals that eventually trigger career-related actions such as choosing a certain job.

According to SCCT learning experience is gained by:
•   being exposed to activities of career relevance, e. g. an internship (personal experience)
•   observing others or hearing about others performing various occupational tasks (image)

Personal experiences can form outcome expectations indirectly by (1) affecting self-efficacy; (2) the subjective perception of self-efficacy is assessed and leads to an adjustment of the outcome expectations. As an example, imagine a teenager trying to autodidactically learn a computer programming language. The experience of either success or failure (1) suggests whether to persue a job as a computer programmer in the future or not (2).

Personal experiences can also have a direct effect on outcome expectations when they depend on personal preferences rather than on (perceived) capabilities. An unappealing work environment, for instance, might lead to the rejection of a job regardless of the required skills.

The image of a job affects outcome expectations directly. As shown in the findings of Hellberg (2009) when forming output expectations a prospective jobs' image is compared with expectations towards an ideal job. An incongruity leads to a rejection of the prospective job–a corrective effect on outcome expectations.

Although mentioning both types of learning experiences, the image and personal experiences, SCCT does not put emphasis on a distinction. In the context of this research a clear distinction will be necessary because it contributes to a better understanding of whether actual or perceived software-related aspects influence career choice (Fig. 1).
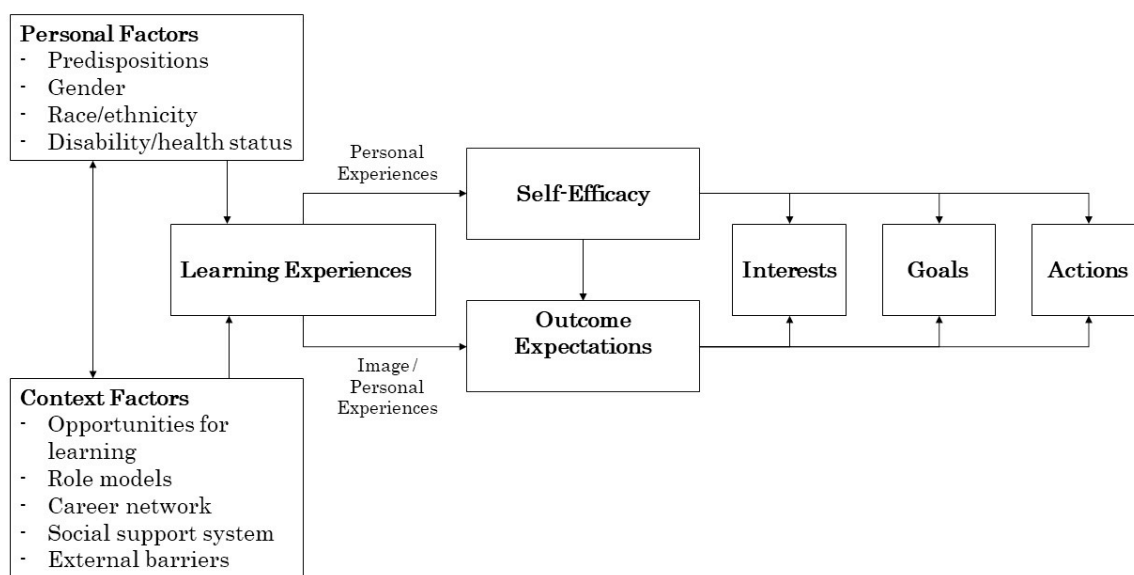
Figure 1: Social cognitive career theory (SCCT): Own representation
based on Lent et al (1994) and Hellberg (2009).

Methods

Research Approach

In the qualitative preliminary study the findings were inductively derived from interviews with computer science majors based on SCCT. This complementary study focuses on a deductive generalization and validation of theses findings. The primary research approach was an online survey which was analysed quantitatively.

Sampling

The responses of the survey were anonymous with a total of n = 51 participants. They can be assigned to three participant groups the study was promoted amongst:
1.　　18 master students of the studying course Information Systems, University of Applied Sciences Wuerzburg-Schweinfurt
2.　　30 bachelor students of the studying course e-Commerce, University of Applied Sciences Wuerzburg-Schweinfurt
3.　　3 students of diverse computer science major studying courses, diverse universities

An ideal sample would exhibit a balanced ratio of different computer science major studying courses. The large number of students in the sample who were enrolled in the studying course e-Commerce is therefore clearly relevant to the discussion that follows as it is an apparent bias. In contrast, the large number of master students in Information Systems can be neglected because students enrolled in the studying course have different backgrounds including educations and careers in informatics, business informatics and e-commerce. The produced bias is therefore low.

As shown in figure 2 the age of the participants shows no gross deviation from the expected Gaussian normal distribution with a mean at the approximate age of 23 (female) and 24 (male). Females were underrepresented in the survey, a fact that can be attributed to a general underrepresentation of females in science and technology (Stoet and Geary, 2018).
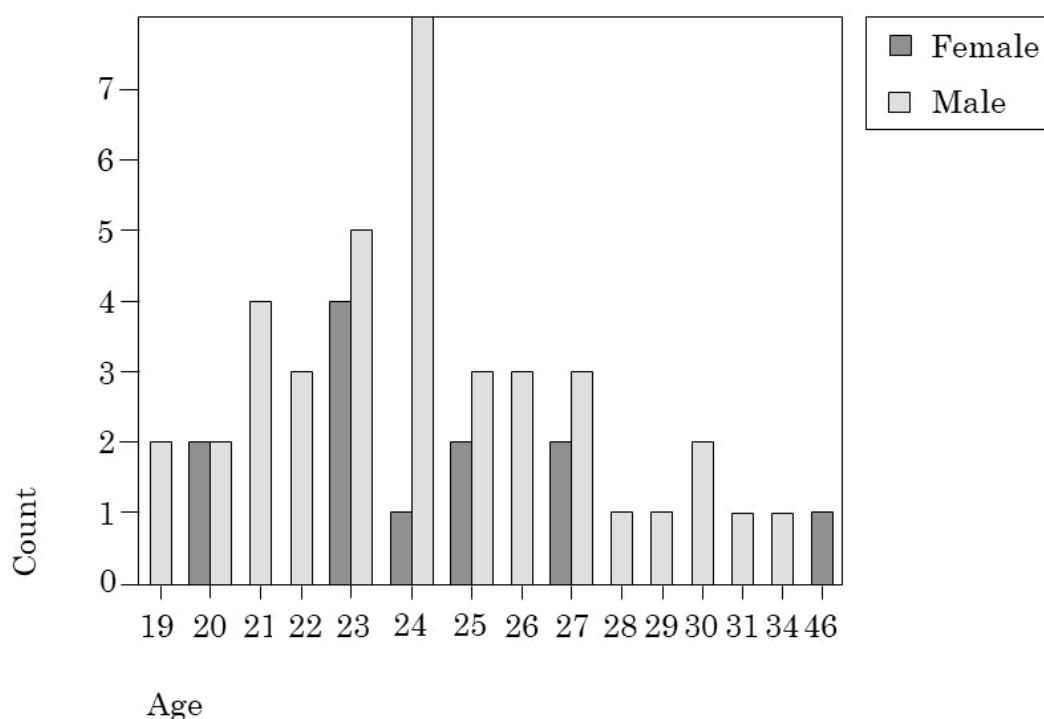
Figure 2: Survey Participant's Age and Gender

Study Design and Measurements

The survey was conducted online using the student's survey platform empirio.de. Participants were invited to take part in the survey via instant messaging (participant group 1) or personally (group 2). Group 3 joined on their own initiative. The data for the survey were collected between November 6, 2020 and November 11, 2020.

The survey's questionnaire was designed in order to directly or indirectly measure variables derived from SCCT and related to the hypothesis respectively.

Participants were first requested to name a software they would favor to use in a prospective job. Naming a specific favored product helped creating a mental picture that participants could refer to when answering subsequent questions.

Both software usage frequency and a modern user interface do not necessarily impact career choices as long as software in general is not considered as a decisive factor in career choice processes. The participants were therefore asked to rank the perceived overall importance of software regarding a prospective job on a Likert scale from 1 (not important) to 5 (very important). The ranking was used as an indirect measure for the variable "influence of a software's perceived importance on career choice". The more important software is ranked, the higher the influence.

The participants were asked to rate the desirability of different ways of using their favored software in a prospective job, e. g. "I could imagine to implement/install the software". For the rating a Likert scale from 1 (disagree) to 5 (strongly agree) was provided. The answers allowed a more detailed analysis of the correlation between favored software usage–which stands for the pursued job field–and the perceived importance of software. The variable "software usage frequency" refers to the favored software product and had to be ranked on a Likert scale ranging from 1 (hardly or never used) to 5 (used very often). The ranking was used to determine the number of personal learning experiences. According to SCCT, learning experiences affect selfefficacy (proficiency in working with the software), the outcome expectation (own proficiency level is [not] appropriate to professionally work with the software) and the goal-setting (choose/reject professions in the software's ecosystem).

In order to measure the influence of a modern user interface the participants were given a set of different reasons why they had chosen their favored software. Besides "modern user interface" alternative options such as "good functionalities and interfaces", "quick and easy to learn" and "software vendor is likeable" were provided. The alternative options were not derived from the preliminary study but only placed for distraction. Each option was to be ranked on a Likert scale between 1 (disagree) to 5 (strongly agree).

An additional filtering question "Have you ever worked with the favored software?" was placed to distinguish between personal learning experiences and the mere image of a software product. If the question was answered with "no" the related record was not considered when calculating the variable "modern user interface's contribution to picking favored software". The filtering ensured that only personal experiences were considered rather than biased rankings based on distorted images participants might have of a software.

Analysis

All analysis were performed using the statistics tool PSPP. For significance evaluation a onesample student's t-test was used with X being the sample mean, μ_0 the population mean, s_D the sample standard deviation and n the number of observations (equal to the number of participants):

$$t = \frac{\bar{X} - \mu_0}{\frac{s_D}{\sqrt{n}}}$$

For correlation tests between ordinal variables the Spearman's correlation coefficient was applied.

Results

Perceived Importance of Software in Career Choice

A well-balanced ratio between participants favored software products to work with in a prospective jobs was found (Figure 3). Three software products were stated more often: Wordpress (17.6 %; n = 9), Linux (13.7 %; n = 7) and SAP (9.8 %; n = 5). Other software product namings were in the lower single-digit percentage range.
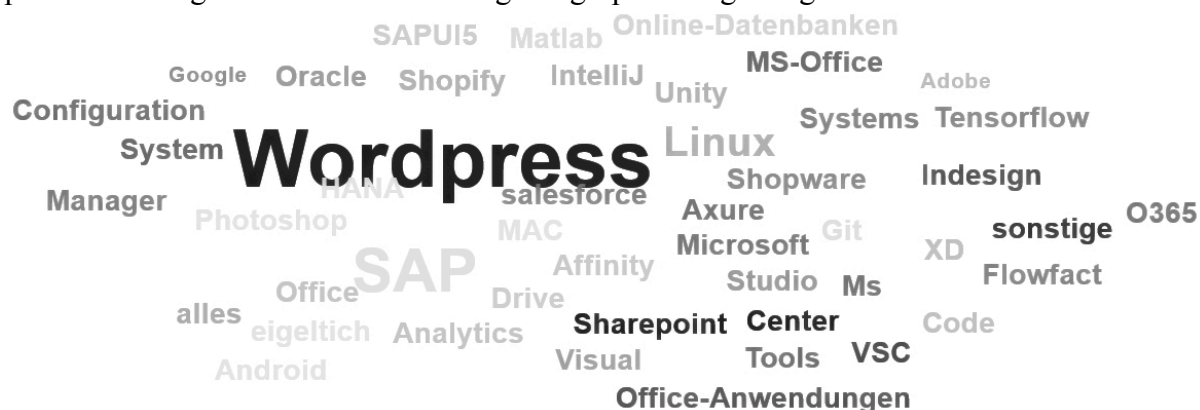
Figure 3: Favored Software Product Computer Science Majors Could
Imagine to Work with in a Prospective Job

The perceived importance of a software to be used in a prospective job was rated with a mean score of X = 3.43 and a standard deviation of s_D = 1.17. The result of the one-sample t-test (μ_0 = 3; n = 51; df = 50) gave a t-value of 2.62, p-value of 0.0058 and significance level at α = 0.010. These results indicate a high statistical significance.

The correlation between the favored usage of software–as an equivalent to the pursued job field–and the perceived importance of software in career choice was measured (Table 1). The results indicate a very weak ("implement/install" and "program") to weak ("administrate/configure" and "support/offer consulting for") positive correlation regarding the more technical usages and a weak negative correlation regarding other ways of usage which includes the use of a software as an end user.

Favored usage: I could imagine to ... a specific software in my job			Correlation between favored usage and perceived importance of software
	Avg. rating[a]	$s_D\pm$	r_s[b]
implement/install	3.76	1.38	0.12
administrate/configure	3.43	1.28	0.34
program	2.75	1.48	0.13
support/offer consulting for	3.25	1.51	0.35
use in another way	4.43	0.81	-0.27

[a] Participant rating from 1 (disagree) to 5 (strongly agree)
[b] Spearman's correlation coefficient

Table 1: Computer Science Majors Favored Software Usage and Correlation between
Favored Usage and Perceived Overall Importance of the Software Used in a Prospective Job

Influence of Software Usage Frequency on Career Choice

The usage frequency of the participant's favored software to be used in a prospective job was rated with a mean score of X = 3.33. The standard deviation was s_D = 1.41 and the result of the one-sample t-test (μ_0 = 3; n = 51; df = 50) gave a t-value of 1.69, p-value of 0.0485 and significance level at α = 0.050. The result indicates a statistical significance.

Influence of Modern User Interface on Career Choice

Participants of the survey were required to rate different reasons for choosing their favored software including "it has a modern user interface" and further options placed for distraction. For every option a one-sample student's t-test was conducted (Table 2).

The analysis was conducted with only n = 44 of the total number of n = 51 records. n = 7 records were discarded in this analysis in order to consider only answers which were based on actual experience with the software.

The t-test indicates a statistical significance for the reason "it has a modern user interface" and a high statistical significance for "it has good functionalities and interfaces", "it is innovative", "it is quick and easy to learn" and "it is easy to find a job in the software's ecosystem".

Favored software: I picked this software product, because ...	Avg. rating[a]	s_D±	t[b]	p[b]	α[c]
it has good functionalities and interfaces	4.27	0.76	11.08	<0.0000	<0.000
it is innovative	3.34	0.96	2.35	0.0117	0.025
it has a modern user interface	3.36	1.26	1.90	0.0324	0.050
the software vendor is likeable	2.77	1.29	-1.18	-0.1217	-0.125
it is quick and easy to learn	3.66	1.24	3.53	0.0005	0.001
it is easy to find a job in the software's ecosystem	3.61	1.06	3.82	0.0002	0.001
of other reasons	3.23	1.26	1.21	0.1163	0.125

[a] Participant rating from 1 (disagree) to 5 (strongly agree)
[b] One-sample t-test conducted with μ_0 = 3, df = 43 and n = 44
n = 7 records of the original n = 51 (cases in which participant has stated to never have personally used the favored software) were discarded in this analysis
[c] Significance level according to t-test

Table 2: Reasons for Picking a Favored Software in the Survey: Computer Science Majors' Ratings and Statistical Significance.

Discussion

Perceived Importance of Software in Career Choice

H1. The software that is used in a prospective job has a positive influence on computer science majors' decision to persue a career in the software's ecosystem.

It was found that computer science majors generally consider the software used in a prospective job as very important in career choice. The null hypothesis is therefore rejected, hypothesis H1 is accepted.

The well-balanced ratio of software stated as favored by the participants shows that the findings are independent of a specific software product. Only software that is very dominant in certain job fields was mentioned more often: Wordpress (web design and development), Linux (server operation) and SAP (business software). The result was to be expected as higher popularity of a software leads to a higher probability the software is mentioned in the survey.

The data suggest that there are differences between the perceived importance depending on the way the software is used. Technical usages such as implementation, administration and programming show a weak correlation with the perceived importance of software whereas "use in another way"–a category that includes rare technical ways of usage but especially the use as an end user–correlates even negatively. This could be a hint that computer science majors consider the software product being less important when they pursue rare technical ways of usage in their job or the use as an end user. Further research will be needed in order to have a distinct result.

The question "Overall, how important do you consider the software to work with in a prospective job?" was placed at the end of the questionnaire. The intention behind it was to first let participants reflect on a variety of aspects of software. All of them could be considered by the participants when answering the final question rather than rating the overall experience based on just one or two aspects that come to their mind quickly when being asked the question at the begin of the survey.

At the same time, answering the question after having already answered a lot of software-related questions before tends to result in a subjective overestimation of the importance of software–an effect commonly known as "priming" (Bargh et al, 1996). Placing the question at the end of the questionnaire is therefore a tradeoff between receiving a well-founded answer biased by priming effects on the one hand and receiving an unthinkingly answer on the other hand. As the biased results show a high significance it can be expected that the unbiased result would still be significant, only to a lower extend.

Influence of Software Usage Frequency on Career Choice

H2. The more contact with a software computer science majors have, the more likely they will persue a career in the software's ecosystem in the future.

The survey has shown that computer science majors favor software in a prospective job that they have frequently used before. Combined with the finding that software plays an important role in career choice (H1) it can be postulated that more contact with a specific software leads to a higher probability that a job in the software's ecosystem will be taken on. The null hypothesis is therefore rejected, hypothesis H2 is accepted.

The credibility of this finding is supported by the fact that only $n = 7$ of a total of $n = 51$ survey participants answered the question "Have you ever worked with the favored software?" with "no". It also appears counterintuitive to consider software in general as very

important in terms of career choice but still choose a job no matter if the software used in the job has ever been tried out before.

There is a lack of information if participant's perception and behaviour are consistent, i. e. if they will actually choose a job depending on their experience with a software product or if this aspect is neglected when making a real decision lateron. A long-term study conducted before and after selecting a job could contribute to a better understanding whether expectations and actions always match.

Influence of Modern User Interface on Career Choice

H3. If a software has a modern user interface, more computer science majors will persue a career in the software's ecosystem.

It can be derived from the data of the survey that participants put significant emphasis on a modern user interface when picking their favorite software used in a prospective job. Considering that software plays an important role in computer science majors career choice (H1) it can be assumed that the modern user interface of a favored software affects career choice as well. The null hypothesis is therefore rejected, hypothesis H3 is accepted.

Obviously, other possible reasons for picking a favorite software, which were only placed in the survey for distraction, seem to play a more significant role than the user interface. While "it has a modern user interface" was rated as being important with a significance level at only $\alpha = 0.050$, "it is innovative" was rated with a higher significance of $\alpha = 0.025$. Other reasons were even highly statistically significant, e. g. "it is quick and easy to learn" and "it is easy to find a job in the software's ecosystem" ($\alpha = 0.001$); "it has good functionalities" ($\alpha < 0.001$).

These findings raise further questions that should be answered by additional research. Especially the fact that many participants gave a high ranking to the reason "it is easy to find a job in the software's ecosystem" seems contradictory. If staff shortage in a specific job was a decisive factor in career choice then the ICT job market should be completely self-regulating.

It also has to be considered that students of the studying course e-Commerce were overrepresented in the study with a total number of $n = 30$–more than half of the participants. Students from design-oriented studying courses might tend to emphasize visual aspects much more than students from other computer science major studying courses. Taking this strong bias into account, a modern user interface could therefore still play a role in career choice but to a lower extend than the data suggest.

Conclusion

This study has shown that software plays an important role in computer science majors' career choice when a technical usage in the job is pursued. Software products are not only the core of everyday business in ICT jobs, they are already very dominant in university education where they have a strong impact on students' learning experiences. These learning experiences form computer science majors' picture of a prospective job where the software is used. It is plausible that the quality of the experiences is a decisive factor when students–later in life–actually choose to take on a job or reject it.

Understanding the importance of software can help employers to prevent ICT shortage in their companies by picking products that are popular among computer science majors and skilled ICT workers. When choosing a software product, companies often focus on the end user acceptance and disregard the needs of qualified staff that is necessary to operate, maintain and program the application. This eventually results in a lack of qualified staff, vacant ICT jobs, long-winded recruiting processes and–in the worst case–the necessity to postpone projects important to growth.

It was found in the study that a high usage frequency of a software will increase computer science majors' willingness to pick a job in the software's ecosystem. In principle, this finding is already well-known as "force of habit" but the knowledge is not yet consequently applied. Some software vendors do already cooperate with universities and offer discounts for their products. But being even more present, e. g. by actively offering more free-of-charge tutorials for students, would further increase the number of learning experiences and as a consequence positively affect career choice.

The data of the study suggest–with a low confidence–that a modern user interface could be an advantage when attracting computer science majors to specific job fields. But other characteristics such as good functionalities and ease of learning seem to have much more impact on career choice. Some further research will be needed in order to validate these findings and understand which characteristics of a software other than the user interface computer science majors put emphasis on.

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Student Engagement in a Digitally Mediated Environment: Attitudes and Experiences of Student Advisers

Maurice Kinsella, University College Dublin, Ireland
Deirdre Moloney, Dublin City University, Ireland
Niamh Nestor, University College Dublin, Ireland
John Wyatt, University College Dublin, Ireland
Joan Connolly, Dublin City University, Ireland

Abstract
Students' healthy engagement with higher education (HE) can make vital contributions to their psychosocial development, educational attainment and future employability. However, it is important to note that how engagement is enabled, experienced, and assessed within Higher Education Institutes (HEIs) is evolving. This shift is evidenced in the growing interconnectivity between HEIs' interpersonal and digital engagement resources. Alongside this, staff and students' reliance on digital mediation, in which digital technologies are used to facilitate and sustain student communications, has grown exponentially across academic, advisory, and administrative domains in the wake of COVID-19. In light of this growing demand for digital mediation and its increased prominence within HE student supports, our project undertakes a qualitative exploration of Student Advisers' experiences working in the interface between interpersonal and digital-engagement resources. We examine their experiences of and attitudes towards student engagement; their insights into the proliferation of digital communications and the challenges and opportunities this has entailed; and how they have sought to ensure service continuity amid such rapid transformations. By deconstructing the dichotomy between digital and interpersonal supports and recontextualising them within Student Advisers' lived experience, we aim to re-evaluate the nature and role of student engagement against the needs currently facing the HE sector. Here, we critique digital mediation's role within, and impact on, HEIs, arguing that digital supports and resources should seek to enhance interpersonal encounters rather than replace them.

Keywords: Student Engagement, Student Advisor, Digital Mediation, Blended Learning, Student Support

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Introduction

Students' engagement with their higher education institution (HEI) is pivotal to their psychosocial development and is predictive of educational attainment (Balwant, 2018; Kahu & Nelson, 2018; Kahu, Stephens, Leach, & Zepke, 2015; Macey & Schneider, 2008) and employability (Ehiyazaryan-White & Barraclough, 2009). Amidst calls to ensure that student engagement is holistic (Pickford, 2016), we witness changes in how it is enabled and experienced across academic, advisory, and administrative domains. Heightened reliance on digitally-mediated student-staff interactions in the wake of COVID-19 reflects the ever-evolving range of 'dynamic capabilities' (Teece, Pisano, & Shuen, 1997) possessed by HEIs. This is attributable, at least in part, to the proliferation and adoption of technological innovations (Karkouti & Bekele, 2019).[1] Thus, alongside the numerous opportunities for educational and social interaction that HEIs provide within their lecture halls, work placements, societies and events, exchanges between staff and students are now enabled digitally.

Against this background, it is important to re-evaluate the nature and role of "student engagement" within HEIs, recontextualising this concept within the domain of students' needs and the broader higher education (HE) sector. In this research project, we undertake a qualitative exploration of Student Advisers' (SAs') experiences and insights into this concept as they have sought to maintain and manage service provision during this time of unprecedented change. Deconstructing the dichotomy between digital and in-person engagement, and reframing these forms of interaction as existing on an interpersonal continuum, we explore the status that digital mediation now holds within the broad ambit of student supports. We examine how SAs have sought to deliver supports, their understanding of the challenges and opportunities underpinning recent HEI changes, and what lessons they have learned in adopting and integrating digital tools into student interactions. Here, SAs' professional and personal experiences can help reveal how students respond to remote and "blended" engagement strategies and how HEIs can build on these recent experiences as they seek to continue innovating student supports and resources following the (anticipated) recommencement of in-person attendance.[2]

Understanding and Fostering Student Engagement

Student engagement is a recurrent theme within contemporary research into the principles and practices underpinning HE. Noted as 'a defining characteristic of high quality teaching and learning' (Ashwin & McVitty, 2015), this concept offers insights into how to promote students' healthy participation in and successful outcomes from their HE experience. Kuh (2001) describes student engagement as 'Participating in educational practices that are strongly associated with high levels of learning and personal development'. Conceptually and experientially, engagement is a dynamic concept, occurring when students are 'understanding the material' and 'incorporating or internalising it in their lives' (NCESS, 1992). It is achieved across numerous domains within students' 'educational interface' (Kahu & Nelson, 2018);

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[1] Teece et al (1997) define dynamic capabilities as 'the ability to integrate, build, and reconfigure internal and external competencies to address the rapidly changing environments'.

[2] This research project is part of the Higher Education Authority (HEA)-funded cross-institutional project between University College Dublin (UCD) and Dublin City University (DCU) "Supporting Student Success: A Collaborative Approach to Enhancing Engagement, Employability and Life Skills". This project aims to align digital and interpersonal resources that will facilitate the provision of personalised interventions for students who may be disengaging from their programme, thus positively influencing their development, progression and retention.

Krause (2011) states that 'learning occurs in a range of settings, both within and beyond the formal curriculum'.

Student engagement is frequently described as being multi-dimensional, comprised of distinct-yet-related capacities that, when positively attended to and expressed, coalesce to create a holistic experience. Drawing on the literature, we present provisional descriptions of five such components of engagement (Blumenfeld et al., 2005; Bowden, Tickle, & Naumann, 2019; Christenson, Reschly, & Wylie, 2012; Eldegwy, Elsharnouby, & Kortam, 2018; Fredricks, Blumenfeld, & Paris, 2004; Fried & Konza, 2013; Kahu et al., 2015; Khademi Ashkzari, Piryaei, & Kamelifar, 2018; Klem & Connell, 2004; K. L. Krause & Coates, 2008; G. Kuh, 2006; Lay-Hwa Bowden, 2013; Mahatmya, Lohman, Matjasko, & Farb, 2012; NCESS, 1992; Nguyen, Cannata, & Miller, 2016; Reeve, 2012, 2013; Reeve & Shin, 2020; Reeve & Tseng, 2011; Reschly & Christenson, 2012; Schaufeli, Salanova, González-romá, & Bakker, 2002; Vivek, Beatty, Dalela, & Morgan, 2014; Wentzel, 2012; Yazzie-Mintz & McCormick, 2012):

i.   Cognitive Engagement: The student's active, attentive, psychological investment in their learning process. This is expressed through self-regulating one's learning and mentally exerting oneself when acquiring, apprehending and comprehending the knowledge and skills necessary to advance subject mastery.

ii.   Behavioural Engagement: The student's active, external participation in their learning and development activities. This is expressed through conducting oneself productively and being an involved member of one's HEI across academic and extracurricular pursuits, alongside performing in academic assessments.

iii.   Affective Engagement: The student's feeling of being personally connected with and emotionally invested in their HE experience. This is expressed through valuing and cultivating the role that one's HEI experience has in one's life, including being enthusiastic and optimistic about its worth and outcomes.

iv.   Social Engagement: The student's feeling of identifying with, and healthily interacting with, significant others within their HE experience. This is expressed through becoming socially embedded within and developing a sense of belonging and inclusiveness towards one's HE social context.

v.   Agentic Engagement: The student's intentional, constructive efforts to shape their teaching and learning experience. This is expressed through proactively participating in reciprocal transactions with others across relevant domains and collaborating on the nature of the educational experience.

Broadly, these components of engagement centre around students' discovery, utilisation and development of their personal and environmental resources to optimally participate in their HE experience. Therefore, at its heart, engagement pivots on students forming a constructive relationship with their educational community (Yazzie-Mintz & McCormick, 2012) – an embedded undertaking, shaped by the active interplay between students' internal self and their external environment (Ecclestone, Biesta, & Hughes, 2009; Fredricks et al., 2004; Kahu, 2013; Phan, 2014).

The NCESS (1992) note that engagement occurs when 'Students make a psychological investment in learning…They take pride not simply in earning the formal indicators of success (grades), but in understanding the material and incorporating or internalising it in their lives'. However, this investment is not solely students' responsibility; HEIs also need to create an environment conducive to students' participation (Trowler & Trowler, 2010). Given the reciprocal role that students and institutions play in fostering engagement, the agency students accrue throughout their HE journey is not synonymous with complete independence. Instead,

it emerges through navigating the various interpersonal challenges and opportunities entailed in being an active and embedded participant; 'engagement needs to be considered within personal, dynamic student ecosystems' (Lawson & Lawson, 2013). Here, a key role of student advisory services is to help students establish and maintain meaningful relationships with significant others in their academic hinterland, including peers and staff (Fergy, Marks-Maran, Ooms, Shapcott, & Burke, 2011).

HEIs have made engagement a more explicit component of course design and delivery as our understanding of the interpersonal and environmental factors underpinning student attendance and attainment continues to evolve. Given that the meaning of engagement, and the means through which it is achieved, may vary from student to student and cohort to cohort, it is vital that SAs are responsive to evolving student needs and preferences, and adapt engagement opportunities accordingly. Notably, when students may be lacking in the inherent benefits accrued from in-person attendance, supports and resources must continue to be made available to students, who should be educated and empowered to seek out and avail of them.
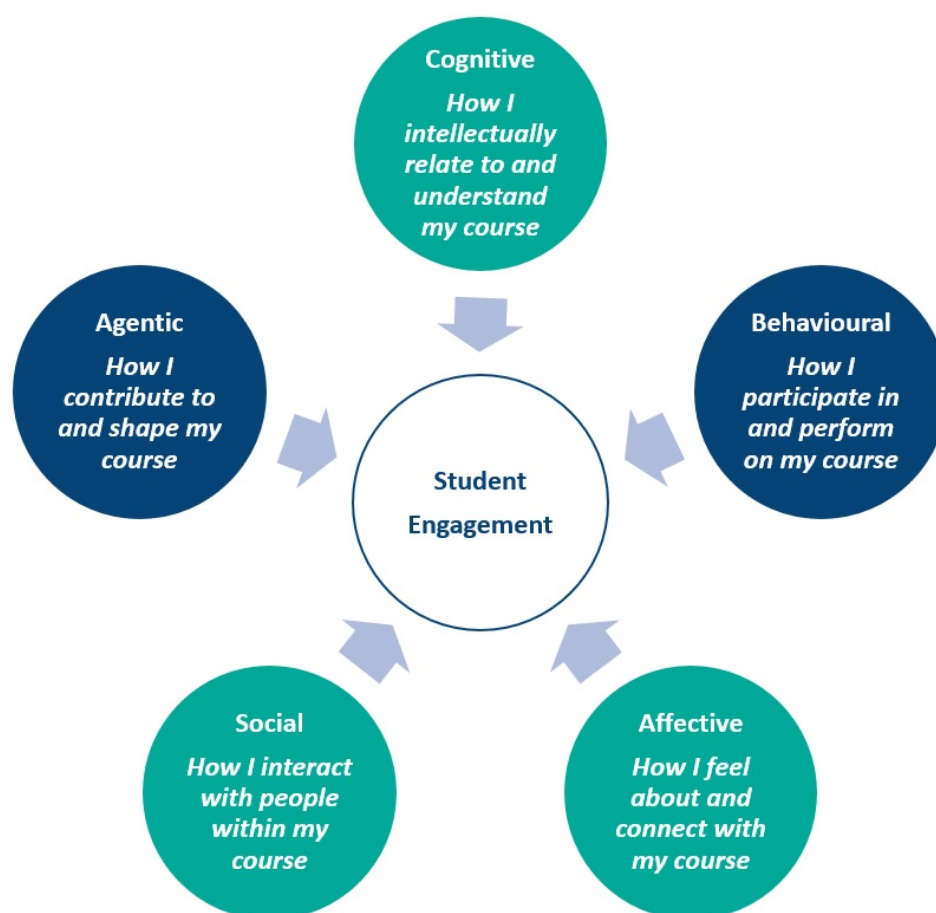
Figure 1. The Core Components of Student Engagement

Delivering Higher Education Supports: The Student Adviser

The mission statements of HEIs in Ireland tend to place students at their core and emphasise the expectation that students receive a holistic education, leading to the creation of civic-minded individuals ready to contribute to wider society (see, for example, (University College Dublin, 2020). Within these strategic documents, the student is not viewed as a monolithic entity, nor are their experiences seen as homogenous as they progress through their HE journey.

Instead, they experience distinct challenges and opportunities that can foster or impede their psychosocial development and aligned attainment. Here, students' HE experience is not exclusively the responsibility of academic faculties. This responsibility is shared across multiple domains, including student services and resources, administrative services, ICT infrastructure, and student supports.

Of particular relevance to this research is the role of the SA and their contribution to holistically fostering student engagement. SAs play a significant role in ensuring that interpersonal engagement remains a central aspect of students' experience by providing pro-active and personalised assistance through monitoring, motivating and mentoring students throughout their HE journey. Central to this discipline is academic advising which provides a dyadic approach to supporting student success.[3] Advisory supports are ubiquitous within HEIs; generally, they comprise academic staff who deliver personalised educational assistance in conjunction with their lecturing and research duties. This resource aims to facilitate meaningful student-HEI engagement to enhance academic achievement and support retention (Edwards & Person, 1997; G. Kuh, 2006; Tinto, 2006; Young-Jones, Burt, Dixon, & Hawthorne, 2013). Given that academic advisers are called 'to be accessible, and to be a source of information and encouragement in the advising process' (Crockkett, 1985), this role requires an understanding of both institutional issues (e.g. curriculum content and academic policies) and student issues (e.g. psychosocial development) (Coll, 2008; Grites & Gordon, 2000).

Academic advisers help students address issues relating to their specific programme or module; however, students' ability and willingness to engage can be affected by matters beyond this arena. This calls for a support resource that addresses students' holistic needs. Here, the SA models developed within UCD and DCU differentiate themselves through the distinctive role that SAs play for both students and the institution. This resource is a central component of the student support services, particularly around issues related to transition and retention, such as social and academic integration (Fergy et al., 2011; Tinto, 1987). At the local level, they enable students to identify and achieve goals and tackle personal challenges, playing a vital role in the orientation and integration of new students and community-enhancement projects. At the institutional level, they play an essential role in advocating for policy and structural change in response to evolving student needs and preferences.

SAs are embedded within a professional network across their HEI, including careers, counselling, disability, health services, and academic supports; this enables them to provide a universal service across numerous stages of a student lifecycle and facilitate appropriate referrals when necessary. As a result, they are uniquely positioned at the heart of the student-institution interface. In this context, operating on both the individual and community levels, they provide a range of services, including:

i.   Academic: Students may require additional course supports outside of the student-lecturer academic dyad that may be perceived as evaluative. By delivering personalised academic oversight and assistance, SAs can augment students' teaching and learning experience, and empower them to become self-determined learners, e.g. liaising with academic support centres and lectures.

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[3] UNESCO. (1998) outlines the purpose and functions of academic advising across six areas of assistance: Education plans consistent with life goals; information about academic progression and degree requirements; understanding academic policies and procedures; accessing campus resources; overcoming education and personal problems; and identifying and intervening with conditions that may impede a student's academic achievement.

ii.   Social: Students need to understand and navigate the culture of their HEI and build a sense of belonging (Exter, Korkmaz, & Boling, 2014) if they are to integrate and become constructive members of their cohort. Particularly for incoming first-year students, SAs can foster the process of peer-to-peer integration, such as through involvement in social activities, e.g. support for clubs and societies, and peer mentoring.

iii.   Personal: Students' motivation to participate can be affected by issues within their personal life. SAs can provide pastoral supports through strategies such as intrinsic motivation enhancement, goal creation, and strengths-based advising, all of which can increase engagement, self-regulation, self-efficacy and retention (Locke & Latham, 2002; Soria, Laumer, Morrow, & Marttinen, 2017).

iv.   Financial: Given the broad demographic profile of HE students, they often present with different needs, such as financial issues, that can impede their access to material and experiential resources. SAs can help locate and secure financial supports for students, e.g. nationally-available student-support funds.

v.   Referrals: SAs are embedded within the HEIs, acting as a liaison between different schools and departments. The services a student requires may be beyond the direct scope of SAs' role; at such times, they can refer students to appropriate supports and resources, e.g. health, counselling, chaplaincy, careers services.

Technological Innovations within Higher Education

Digital mediation within HEIs is most evident as a pedagogical resource, supplementing and, presently, substituting for in-person activities. A core example of this is virtual learning environments (VLEs) which facilitate teaching and learning by distributing learning content, communications and assessment (Alves, L, & Morais, 2017). VLEs can also be an essential resource for students who may otherwise struggle in a solely face-to-face instruction environment. In addition, learning analytics are a vehicle through which potential disengagement issues are mitigated and retention is enhanced (Cooper, Ferguson, & Wolff, 2016; Nik Nurul Hafzan, Safaai, Asiah, Mohd Saberi, & Siti Syuhaida, 2019). Hlosta, Zdráhal, and Zendulka (2017) note the high dimensionality of learner data, with engagement models and records constructed from digitally-sourced metrics such as VLE access and usage, library access, grades, fee compliance, and physical attendance.

The increasing degree to which technology is embedded in the student experience is apparent in the UCD INDEX Survey (2019) which found that 84% of respondents use smartphones to support their learning and 95% use digital resources to find information online. Alongside this, the ubiquity of social media, i.e. 'web-based and mobile applications that allow individuals and organisations to create, engage, and share new user-generated or existing content, in digital environments through multi-way communication' (Davis, Deil-Amen, Rios-Aguilar, & Canché, 2012), also enables community-driven, peer-to-peer connections among students.

Appropriately used, digital resources and strategies can be instrumental from an intervention standpoint, with Gardner and Brooks (2018) noting that early access to course resources provides accurate predictions of success or failure within two weeks of student commencement. Nevertheless, despite their numerous contributions, engagement metrics should be collected, analysed and actioned with caution. As Brooks, Thompson, and Teasley (2015) highlight, there is also a risk of harm when digital resources are not used to reflect students' participation either accurately or appropriately. These concerns are echoed by Wolff, Zdrahal, Nikolov, and Pantucek (2013), arguing that 'there is a need to take into account the interplay between how a

module is structured and how the VLE is intended to be used within that structure'.[4] Therefore, having a clear understanding of what is being captured and measured by learner analytics and ensuring engagement thresholds are well-defined is necessary to gain meaningful, predictive and actionable insights (Gašević, Dawson, Rogers, & Gasevic, 2016).

Importantly, technological innovations are also broadening how HEIs foster, capture and analyse student engagement across a range of domains, including within advisory fields. Here, the reciprocal functioning of digital and interpersonal engagement is also evident within HEI Student Advisory services which utilise both approaches to anticipate, identify, and respond to students' needs. Therefore, beyond reducing potential barriers to learning, technological innovation provides HEIs with additional support avenues and capabilities (Morra & Reynolds, 2010), including increased flexibility and adaptability in connecting with students across different platforms. For SAs, digital mediation was, in fact, already a service feature (White, 2020), e.g. one-to-one video meetings, online resources and repositories, social media, messaging services (e.g. live chat functions), and email. This digital integration was primarily due to the diverse nature of the student population and their experience, encompassing Erasmus students, students with caring responsibilities, students on placements, and students who are doing online degrees.

As SAs accelerate their adoption of technological supports, it is clear that student support services have the capacity to expand to deliver a broader spectrum of resources and initiatives. Notwithstanding, it is always a concern as to whether or not students will choose to access support services; Simpson (2018) notes that 'one cannot assume that online students will request help or proactively seek advising assistance'. This could be an issue for SAs working with, in particular, current first-year students (incoming Autumn 2020) who may not yet have experienced the traditional, in-person model. It also poses an additional, potential challenge for SAs in promoting their services. SAs will need to commit to ensuring that the same type of quality advising methods continue to exist online as existed pre-pandemic.

Research Design

The theoretical model underpinning this research is psychosocial developmental theory and engagement theory. The research sites were Dublin City University and University College Dublin. Participants are drawn from a purposive sample of SAs currently working within these HEIs (UCD: n=10; DCU: n=4). They are homogenous concerning their profession, with latent heterogeneity apparent regarding issues such as professional experience, student cohorts, and professional interests. A mixed-methodology was employed to reveal and critically examine participants' professional experiences and attitudes towards the investigation issues. This comprised a mixed-methods questionnaire, consisting primarily of open-ended, structured, qualitative questions, administered online via Google Forms. It addressed the broad issues of student engagement, supports delivery and the student experience. A reflexive thematic analysis, rooted in interpretive phenomenological philosophy, was adopted to analyse and interpret the results. This approach frames the researchers' subjectivity as an analytic and interpretive "resource" (Braun & Clarke, 2019; Clarke & Braun, 2018). Ethical approval was granted by the UCD Office of Research Ethics and the DCU Research Ethics Committee.

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[4] It is also worth considering the issue raised by Gardner and Brooks (2018) that a substantial proportion of digital engagement literature to date has been informed by MOOCs (Massive Open Online Courses) as opposed to engagement data augmenting physical classroom environments, which raises concerns regarding its universal applicability.

Results: Questionnaire
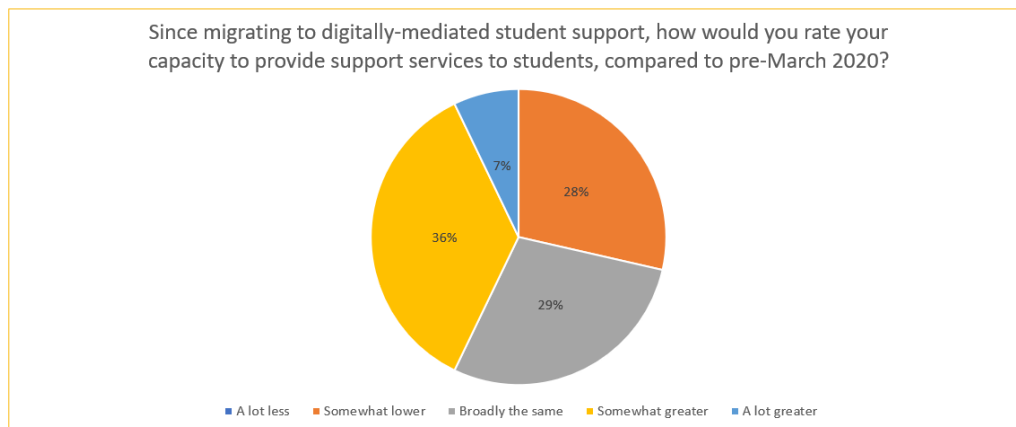
Figure 2. Questionnaire Results: Providing Supports
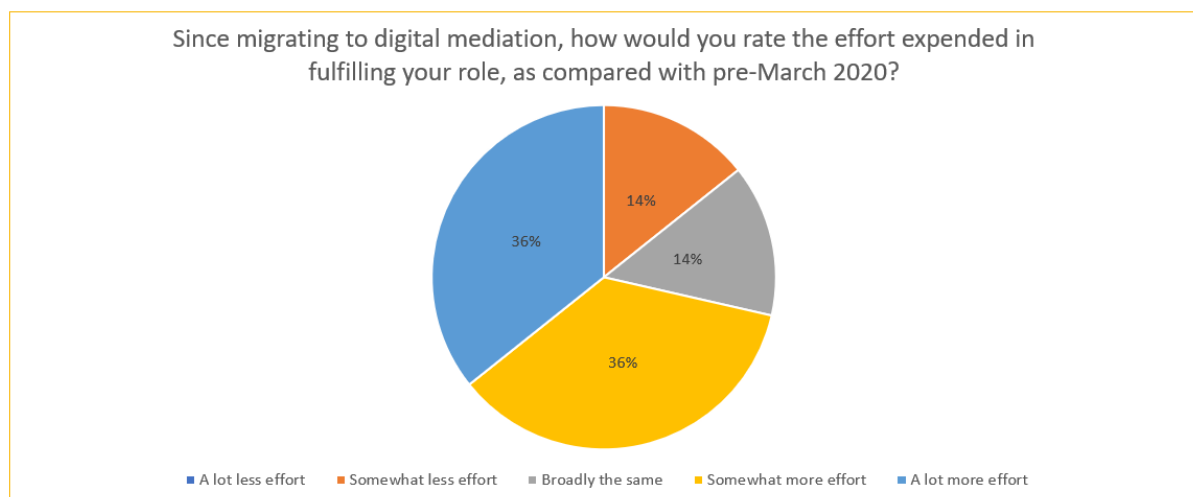
Figure 3. Questionnaire Results: Effort Expended
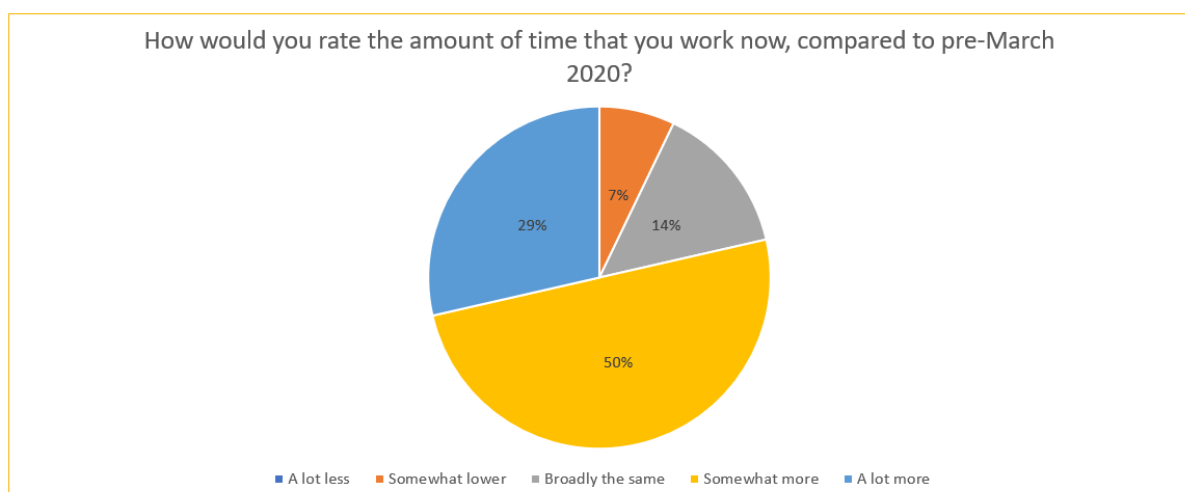
Figure 4. Questionnaire Results: Time Worked

Results: Thematic Analysis[5]

Theme I: Motivational Impairment

Students' motivation to engage has been affected by lack of access to in-person activities and interactions, both academic and social.

Students' capacity to constructively engage with their HEI is underpinned by their level of motivation. Motivation is a psychological state characterised by the arousal and adoption of goal-directed behaviours (Valle, Nunez, Cabanach, & González-Pienda, 2009). In the context of our current discussion, Brophy (1988) defines motivation as 'a student tendency to find academic activities meaningful and worthwhile and to try to derive the intended academic benefits from them'. Here, Janke (2020) notes that intrinsically-motivated students with a learning-goal orientation had higher levels of satisfaction and were less likely to drop out than extrinsically-motivated students with a performance-goal orientation. Therefore, students' motivation is pivotal to attainment – a complex and relational phenomenon that SAs should approach as existing within and influenced by the resources and constraints they navigate daily.

While digital tools and VLEs have enabled continuity of services and supports, students' holistic engagement has been undermined during the COVID-19 pandemic as they have missed out on in-person relationships (both formal and informal) within social and academic settings; in-person academic activities can offer structure and direction, and social activities can offer connection and belonging.

> *"The move to online learning has removed the physical interaction between the student and their learning environment, which is a core motivating factor when it comes to academic success"* (PG-UCD).

> *"Students are less motivated, missing out on the social aspect of UCD and connecting with their peers"* (PF-UCD).

Theme II: Multi-dimensional Engagement

Student engagement is multi-dimensional, arising from various experiences; digital mediation has impeded SAs' options in seeking to foster multi-dimensional engagement.

Student engagement encompasses a variety of experiences and capacities. Fostering engagement goes right to the heart of student advisory services – collaborating with students on identifying engagement impediments and enhancers, and tailoring supports accordingly, e.g. through information, referrals and student-led activities. Forms of student engagement include:

> *"Interactions with peers/faculty/staff face to face; online; by phone"* (PA-UCD).

> *"Utilisation of student supports and services to develop personally, professionally or academically"* (PB-DCU).

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[5] P=Participant, followed by alphabetically categorised participant and their respective HEI.

The multi-dimensional nature of engagement is reflected in the broad range of roles and responsibilities that SAs occupy – extending across academic, administrative and pastoral domains. Here, they note tasks such as:

> *"Work with students who are facing obstacles on their academic journey that may hinder their engagement, success or performance at university"* (PB-DCU).

> *"Providing a relationship space for the student to reflect upon and identify their issues and assist and empower the student to address those needs"* (PH-UCD).

Given the range of student issues and concerns they engage with, it is important that SAs are embedded within their HEI and can, in turn, draw on a variety of resources when providing supports. SAs have been able to maintain service provisions in the form of, for example, connecting with students one-to-one via video calls and addressing queries through online forums. Nevertheless, heightened reliance on digital mediation and the lack of in-person campus attendance have impeded SAs' options in offering student support and resources, particularly community-based transition and integration initiatives, and academic resources.

Theme III: Ongoing Functionality of Student Supports

Digital mediation has shaped student-support communications; however, it has not undermined its functionality.

While heightened reliance on digital tools has shaped how SAs and students engage, this shift has not undermined SAs' capacity to make tangible contributions to students' welfare. Digital mediation has presented both opportunities and challenges for SAs; it has made demands regarding their technological proficiencies and interpersonal skills. Opportunities have included increased accessibility and flexibility in service provision, bolstered by students' latent receptivity towards the usage of technology, given that they "…are more innovative in this space than staff as they are digital natives" (PB-UCD).

> *"It allows students access some services 24/7 so they use information when they need it and not when we are available"* (PB-DCU).

> *"I am more flexible to meet students online after regular working hours"* (PA-DCU).

Nevertheless, there have been challenges in fostering interactivity, wherein it is more difficult to establish an organic, fluid dialogue that is responsive to emotional needs arising in the moment:

> *"Sometimes the tech is a bit clunky and a moment is lost and the fluidity of conversation is impacted comparatively to other arenas"* (PD-UCD).

> *"I may lose some of the advantages that physical meetings can bring in terms of verbal/non-verbal communication"* (PG-UCD).

This stance supports the importance of the interpersonal underpinnings to student-adviser relationships. Vianden (2016) noted that positive adviser-student interactions influenced students' overall satisfaction. Building on this, it is vital that the resources are in place, e.g.

infrastructure and education, to ensure that SAs can effectively integrate technology into service and resource delivery.

Theme IV: Blended Interpersonal Supports

SAs possess the ability and willingness to provide "blended" supports, utilising in-person and digitally-mediated communications.

The concept of "interpersonal" support has evolved to encompass both in-person and digitally-mediated interactions. While these have been seen as being in a binary relationship, notwithstanding their qualitative distinctiveness, they are increasingly experienced as existing on a continuum of student-staff HEI interactions i.e. they both facilitate and foster student engagement albeit in different ways and to different extents. While digital mediation is vital, it is perceived as having a more limited capacity to foster holistic student engagement, for example, socially and emotionally; in-person engagement is perceived as remaining central to students' psychosocial and academic development.

> *"Many tasks can be completed competently at a distance but some face to face contact is desired by both students staff and important for student engagement"* (PE-UCD).

> *"At the moment the technology we have is robust, however does not replace the advantages to a face to face meeting"* (PB-DCU).

"Blended" approaches have traditionally been taken within a pedagogical context; here, the question is, can a similar integration of digital and in-person communication approaches be applied within advisory relationships? In this regard, SAs possess the ability and willingness to continue integrating technology into service provision following the recommencement of in-person activities. However, this requires ongoing efforts to ensure knowledge and competency in the area of digital tools and techniques.

> *"[A] blended approach will give more flexibility in the future for students…There is no point a student rushing to meet an adviser, if they can have the meeting online"* (PB-UCD).

Thematic Analysis V: Ongoing Institutional Assistance

Students' ability to successfully reintegrate into in-person engagement requires the provision of institutional supports.

As students embark on the process of commencing, or recommencing, in-person engagement, they require ongoing institutional assistance to ensure this process is as effective and seamless as possible. For both staff and students, the transition to digital engagement strategies was made more manageable through the provision of appropriate tools and resources. Likewise, actions will need to be taken to ensure that this process is as efficient as possible across three areas:

i.   Communication: Ensuring that there is a clear, transparent and timely dialogue between HEIs and internal stakeholders (both staff and students) concerning the decisions on how to navigate the reopening of campuses successfully and how to optimise digital mediation strategies – "ongoing regular communication and opportunities for students to provide feedback about the aspects of online learning" (PJ-UCD).

ii.   Community: Ensuring students feel that sense of interpersonal connection by providing resources and supports to engage in formal/informal and educational/social activities – "Connection is what the students are missing currently and efforts need to be made to create connection within the classroom or outside activity or informal online gatherings" (PB-DCU).

iii.   Connectivity: Ensuring that, given the increased reliance on digital communication, the functionality of digital resources is augmented – "More could be offered to students in terms of technology support – laptop rental, increased financial support" (PA-DCU).

Recommendations

Building on these findings, we have formulated a set of recommendations that can be adopted by HEIs seeking to ensure the effective continuation of in-person attendance:

i.   Student Supports: We recommend providing campus orientation/reorientation resources, e.g. information sessions, group activities. In addition, the ongoing provision of blended support services, both pedagogical and pastoral, will be important to meet students' needs for continued digital communication. Alongside this, as HEIs continue to utilise digital resources, it is important that SAs are attentive to students' off-site needs, such as technology access, and have the resources to cater to these needs should they arise.

ii.   Student Adviser Supports: There should be greater scope for blended supports and the provision of resources to achieve this. To enable this, there should also be education on evolving technological tools, e.g. workshops/seminars/best-practice sharing, and enhancement of SAs' insights into at-risk students with data analytics, e.g. VLE/attendance engagement.

iii.   Institutional Initiatives: Within a broader institutional context, specific initiatives can help ensure SAs can constructively integrate technology into the provision of student supports. Here, standardised and consolidated online student platforms, e.g. inter-module connectivity, can create a more seamless engagement experience. In addition, the criteria for at-risk student flags, drawing on a dynamic range of engagement information, should be examined. Finally, as students continue to engage with HEI activity from their homes through "blended" learning, it is important to re-appraise the extent to which student supports encompass student life beyond campus.

Conclusion

Despite its rapidity as a result of the COVID-19 pandemic, the transition to digital mediation has successfully helped SAs to continue to support students. Factors that have positively influenced this include institutional supports, e.g. information workshops; pre-existing digital architecture and resources; SAs' adaptability; and students' receptivity. The question of how changes to the delivery of student services and supports via digital tools shape the design and delivery of student supports moving forward is important to consider at this juncture. While interpersonal support can encompass both in-person and digitally-mediated interactions, the ongoing centrality of in-person engagement remains apparent – both pedagogically and pastorally. Nevertheless, the appropriate usage of technology allows for increased HEI student support capability, which is most effective when combined with face-to-face support as part of a blended approach. Consequently, there is a role for digital mediation and the provision of "blended" supports. For HEIs to make the fullest use of their resources and meaningfully contribute to students' engagement and success, and the overall student experience, they should consider extending their approach to fostering engagement beyond the traditional pedagogical teacher-learner dyad. By embracing a comprehensive range of opportunities for student engagement via digitally-mediated supports, HEIs can continue to enhance in-person service

provision and students' psychosocial development across a range of dimensions (Bowden et al., 2019).

Acknowledgements

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Contact email: maurice.kinsella@ucd.ie
john.wyatt@ucd.ie

Cultivating Social-Emotional Learning and Deeper Learning Skills through the Design and Implementation of Creative and Improvisational Activities in Science Education

Konstantina Kotsari, National & Kapodistrian University of Athens, Greece
Zacharoula Smyrnaiou, National & Kapodistrian University of Athens, Greece

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Abstract
Cultivating Social-Emotional Learning and Deeper Learning skills are some of the central skills of the future, according to the OECD report 'Future of Education and Skills 2030'. These skills should start to be developed by the kindergarten and end up in Secondary Education, even in Higher Education. This presentation refers to the results of a conducted doctoral dissertation with the subject "Creativity and Improvisation in Primary School Science Learning and their contribution to the development of Social – Emotional and Deeper Learning Skills". The research was conducted during the academic year 2019-2020 and the participants were 80 primary school students (grades 4,5 and 6), 3 researchers, and 3 art teachers. During the pandemic, we used the distant learning platform (e-class) from the Hellenic School Network. The methodological framework used was Educational Designed-Based Research. The scope of this research was to create an interconnection of improvisation and creativity through methodological approaches of Art and Science during the teaching in Science Classes. Besides, the purpose of this dissertation was the development of a new pedagogical framework that integrates the dimensions of Improvisation and Creativity in the field of science teaching in Primary School, in such a way as to promote Social-Emotional and Deeper Learning Skills. To achieve the objectives, we designed prototype toolboxes for students, teachers, and researchers where the various activities in the 4 phases of the research were described in detail: a) students' initial ideas, b) scientific knowledge, c) artistic expression, d) evaluation.

Keywords: Social – Emotional Learning, Deeper Learning, Science Education, Primary School, Educational Designed – Based Research

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Introduction

Since the beginning of the 21st century, theory and research have tended to link creativity with both cognitive and psychometric, and humanitarian parameters, thus emphasizing different scientific subjects (Caselli, 2009). Thus, more and more researchers recognize that creativity is a social phenomenon with motivation, interaction, and mood as the main elements (Craft et al., 2014). In this context, this research is an attempt to link the concepts of Creativity and Improvisation in the field of Natural Sciences with the skills of Social – Emotional Learning and Deeper Learning.

Initially, the basic concept of this thesis was Improvisation, that is, an articulated multidimensional activity based on an authentic creative performance. Through the experience of improvisation, participants develop aesthetic and perceptual coding, memory and recall, motivational control, and performance monitoring. Concerning education, improvisation relates to several aspects of everyday teaching practice such as creativity, spontaneity, and the collective creative process (Holdhus et al., 2016).

More specifically, the Improvisation Aspects in Education are as follows:
Communication and dialogue: Communication in improvisation can be described as a sequence of two positions: From the internal process of communication to its external intended effect. The goal can also vary by focusing either on the impact of listening or on the inquiry process.

Structure and design: All traditions (theatre, music, business administration, etc.) claim that to achieve professional improvisation, it must also involve structural thinking.

Repertory: The repertoire, which is a system of compiled catalogs that have been formed based on knowledge of content and pedagogical knowledge, is the basic prerequisite for improvisation in education.

Context: Professional improvisation practices are largely interwoven with the relevant reference framework.

The next concept studied was Creativity, mainly in Science Learning, where it is referred to as the "deliberate and imaginative activity that produces original and unique results concerning the student. This is done through the creation of individual or social ideas and strategies, which are critically justified and produce consistent with available data, explanations and strategies" (CREATIONS, Horizon 2020, Smyrnaiou et al., 2020).

Through the study of these concepts, activities were designed and implemented which, in addition to the creation of scientific meanings and the cognitive development of students, were aimed at the cultivation of skills of Social – Emotional Learning and Deeper Learning. Social-Emotional Learning is linked to terms that make up a set of skills such as character, personality, 21st-century skills, soft skills, non-cognitive skills, etc. All these approaches draw their definitions from slightly different theoretical perspectives, and different series of research follow their relevant scientific fields and disciplines (Jones & Doolittle, 2017).

Deeper Learning is a new term usually associated with how pupils must achieve excellence in school through a fair education system. According to the U.S. National Committee of the Research Council (AIR, 2015, p.5) deeper learning is defined as "the process in which

students acquire proficiency in a subject and beyond memorizing facts, concepts, techniques, and processes understand the basic principles and realize when and how they can apply what they have learned in new real situations. In this way, they seek to acquire not only academic knowledge but also the relevant skills".

Based on the above, the purpose of the research is to explore the process of implementing improvisational and creative acts at the level of both exploratory and creative planning that students and teachers will follow, to develop scientific meanings for the natural phenomena under study (Kotsari & Smyrnaiou, 2017). More specifically, the research questions of the study were as follows:
- To what extent do students' improvisation and creativity in the course of the activity develop social and emotional learning skills?
- To what extent do students' improvisation and creativity in the course of the activity develop deeper learning skills?
- How are the aspects of creativity and improvisation linked to the creation of scientific meanings through the process of investigation?
- To what extent are students' motivations for engaging in Natural Sciences affected through creativity and improvisation activities?

Research Methodology

For the investigation of the above research questions, the methodological framework of Educational Research Planning was used, as it includes both the design and development function, as well as a specific purpose to provide theoretical knowledge on how to promote specific ways of implementing activities aimed at developing skills of Social Emotional Learning, as well as Deeper Learning. Educational design research is a methodological framework, Design-Based Research is a method that according to Wang & Hanafin (2005) incorporates the following characteristics:
- bridges theoretical approaches with educational practice,
- focuses on the relationship between theory, the artifacts we have designed and developed, and in practice,
- recognizes the need to go one step further than the limited measurement of learning and leads to results that are not generalized, but relate to the process followed and the characteristics of the framework on which it was applied.

Based on the methodological framework of design research, this study was conducted in three stages (McKenny & Reeves, 2018; Bakker, 2018: During the first stage, the design of the tools of improvisation and creativity was carried out on a specific thematic axis of Optics during the teaching of Sciences in the last three classes of primary school, then an overview of the literature on other applications of similar tools was carried out to promote the design of the appropriate tools and activities of teaching intervention. In the second stage, the intervention was implemented and the data were collected which will lead to findings on the effectiveness and disadvantages resulting from application in the field. Finally, in the third stage, conclusions are drawn which lead either to a redesign of the intervention or to the creation of a new theoretical framework and which are based on research findings on the generalization of this educational application.

Analyzing the general application of this methodological approach, the course to be followed in the conduct of this research focuses mainly on the design and implementation of innovative action that incorporates elements of creativity and improvisation in the teaching of

the thematic axis of Optics in the last three classes of the Primary School. In this dimension, specific toolkits will be created for students, teachers, and researchers, through which the development of creativity and improvisation skills will be studied.

The method applied is the "triangulation" of research data. Triangulation is a research technique and is essentially a way of ensuring validity in quality surveys and can be described as the use of two or more methods for data collection (Cohen & Manion, 2008).
The tools used in the implementation of the activities were:
• Observation key for participatory observation.
• Specially designed research protocols, based on weighted questionnaires on motivations in Science and the dimensions of Social Emotional Learning (the Relation Of Science Education, Ten-Item Personality Inventory (TIBI), The Self-Efficiency Scale: Construction and validation, High self-control predictions good adjustment, The role of trait emotional intelligence , Stories of Tommorow).
• Specially designed Rubrika Evaluation for Social-Emotional Learning Skills.

The survey took place in 2 Athens Primary Schools during the 2019–2020 school year and involved 80 students from the last three classes of the Primary School, 3 teachers, and 3 researchers, while during the period of exclusion due to the pandemic the activities were carried out through the digital e-class platform, the GSP. During the pilot phase of the survey, the group consisted of 20 students from the 4th, 5th, and 6th grades. Its members were involved in activities of creativity and improvisation in the Natural Sciences, both through the field of art (theatre, painting, music), as well as through the field of science (experiments, scientific meanings, problem-solving).

During the main phase of the research, activities took place in the single framework of the toolkits in 60 students of D, E, and F primary school, both live and mainly remotely, due to the pandemic. The research also involved classroom teachers, teachers of art (theatre, visual arts, and music) as well as two researchers from the University of Athens, and professors of Natural Sciences. The following table [Table 1] summarizes the phases with the activities of the toolboxes with which the students were involved:

Table 1: Table with a Summary of the Activities of the Toolkits

Phase A (2 hours) Selection of a scientific topic	Phase B (6 hours) "Disciplined Improvisation" Activities	Phase C (6 hours) Artistic improvisation activities	Phase D (2 hours) Evaluation – SWOT analysis
a) Presentation of Optics theme in different ways: - simple information – emotional aspect (positive/negative) - Social impact (positive/negative)	a) Offering scientific tools (e.g. scientific dialogue, such as questioning, structuring explanations and engaging in scientific arguments, and debates)	a) Creation (ideological storm, theatrical play, improvisation game, etc.) - scientific content - different contexts - different means of expression	a) Assessment by Students: Includes mini-interviews with open-ended questions, discussion at work tables (focus groups), and a questionnaire on students' interest in Sciences.
b) Pupils' prior knowledge of the subject: - familiar subject -	(b) Development of activities for the development of scientific thinking	b) Presentation of video presentations, cultivation of arguments, focus on	b) Evaluation by Teachers: Includes discussions on the design and application

completely unknown subject	(e.g. linguistic and graphic representations, experimental implementation of scientific concepts).	team skills)	of focus groups a SWOT analysis (Strengths-Weaknesses, Opportunities – Threats)
c) Scientific meanings - possible intuitive knowledge - knowledge of scientific content	(c) Evaluation – Reflection (completion of specially designed skills-related research protocols)	c) Feedback Commentary on presentations, feedback, and focus groups	c) Evaluation by Researchers: Includes evaluation rubric for relevance, consistency, practicality, and effectiveness of both design and implementation.

The toolkit for students was developed in the e-class of the Panhellenic School Network, so that there is a continuation of activities in distance education, due to the interruption of lessons on 11 March 2020 due to the crown epidemic [Figure1].
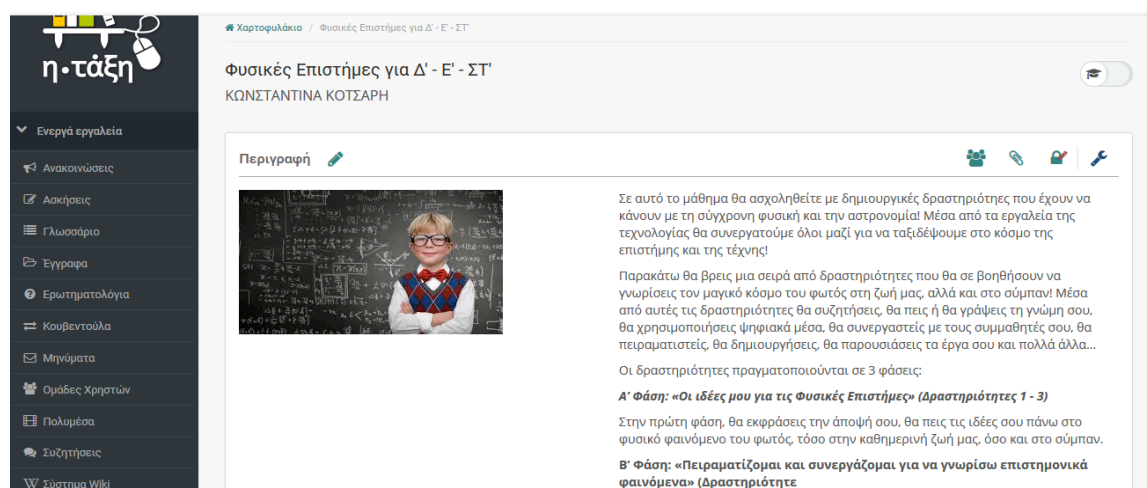
Figure 1: The Toolbox of Students in the E-class of the GSP

In this research, the focus was mainly on the dialogue of students both within the group and in the plenary of the class, as well as on the students' involvement with the proposed activities of the specially designed toolkit distributed to them. For this reason, the following instruments were used to collect survey data:

Participatory observation is a predominant method of recording and analyzing directly accessible external behavioral data. For participatory observation, a specific observation key was created for researchers (presented in detail in the annex and the analysis of the results).

Hypercam for filming verbal information and movements on the interface of the computing environment, where activities required students to engage in simulations and other software or computational environments.
The specially designed research protocols structured based on the theoretical framework and the research questions raised, as presented in the previous sub-section.

<u>Artifacts - produced products</u> through student interaction in distance learning, as well as through usage software and Web 2.0 tools integrated into the online classroom.

Results of the research

Based on the theoretical framework developed as well as the objectives of the study, the method of content analysis was selected for the analysis of the data collected from the survey. The content analysis was based on the data collection tools developed in the methodology chapter and in particular on the observations made by the researcher. In addition to completing the toolboxes, the analysis unit was the thematic episode which refers to the categorization of parts of the discourse corresponding to an idea. Thus, a categorization system was gradually developed, based on covering the main axes as they are structured through the research questions raised. The data analysis tools used were Atlas.ti for qualitative analysis and SPSS for qualitative analysis.

The data collected from the qualitative analysis of the dialogue between the subjects during the conduct of the survey, together with the three research protocols, were codified and entered in the Categories Analysis Tables to extract quantitative findings concerning the research questions of this study. The results of the research were based on the processing of data in conjunction with the coexistence of improvisation and creativity with deeper learning, Social-Emotional Learning, as well as the creation of scientific meanings through the inquiry process.

Concerning the research question concerning the extent to which improvisation and creativity of students in the course of the activity develop social and emotional learning skills, it is noted that through the activities of the toolboxes Social-Emotional learning skills have been enhanced through Improvisation and Creativity mainly in terms of the dimensions of Self-knowledge, relationship skills, and effective communication. Then, to develop Deeper Learning skills, analyses of the data showed that Improvisation and Creativity in the course of activities enhanced both cognitive skills and critical thinking as well as students' motivations for their involvement with the Sciences.

Finally, regarding the creation of scientific meanings through the process of exploratory learning, students developed skills of scientific argumentation and research of scientific content during the exploratory learning process.

Conclusions

Based on the above, we could argue that the integration of the concept of Improvisation and Creativity into the teaching of Physics in Primary School reinforced not only cognitive skills but also Social-Emotional learning and deeper learning skills. This approach was achieved through the selection of various instruments and applications, such as simulations, theatrical events, visual creations, and experiments and, aimed at the multifaceted exploration of the phenomena of physics under consideration. , as well as skills related to the dimension of Social-Emotional Learning as well as Deeper Learning. In particular, evidence was presented that shows that:
•   In their involvement with the proposed activities, the students developed improvisational and creative skills that enhanced social-emotional learning skills, as well as collaborative learning, as described in detail in the theoretical framework of the thesis.

- In engaging with the proposed activities, the students developed improvisational and creative skills that enhanced the skills of Deeper Learning, as described in detail in the theoretical context of the thesis. In engaging with the proposed activities, the students succeeded in creating scientific meanings (scientific content, scientific language, and scientific arguments) to a fairly large extent.

- In engaging students with the proposed activities, the aspects of creativity and improvisation were sufficiently linked to the process of investigation, as has been described in detail in the theoretical context of this thesis.

- Finally, during the activities the students seem to have developed incentives for their further involvement with the course of Natural Sciences, both within the school and in their daily lives.

From the above, we could conclude by saying that through the design and implementation of specific activities that enhance Creativity and Improvisation, the skills of Deeper Learning and Social-Emotional Learning of students are enhanced. It has also proved particularly important to negotiate concepts through the collaboration of students both in their creative and exploratory interaction through different means of expression and collaborative learning activities.

At this level, the assumptions that determine the factors influencing the creation of meanings (physical concepts contained in the activities, strategies followed by students, collaboration with each other, verbal interaction of students) were strengthened, but also the importance of the integrated cognitive content of the toolkits, simulations and more generally the various effective learning environments proposed. In conclusion, therefore, we could conclude that it is possible to cultivate skills of Social – Emotional and Deeper Learning, through the creation of a strengthened, pedagogical and cognitive, support framework in the form of tools to promote the teaching practice of Natural Sciences in the Primary School.

However, it should be noted that this proposal should be further explored as a more general pilot application in other schools, different regions, and socio-cultural contexts to confirm the resulting findings as regards the interconnection of creativity and improvisation with Deeper Learning and Social-Emotional Learning, but also in terms of creating scientific meanings and developing student motivations for Sciences.

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Contact email: conkotsari@gmail.com

Student-Led Design of Online Tools to Support the Quality of Research Life at the University of Tokyo: A Survey-Based Approach

Maximilien Berthet, University of Tokyo, Japan
Kozue Okamura, University of Tokyo, Japan
Li Yang, University of Tokyo, Japan
Saeko Kawataki, University of Tokyo, Japan
Paul Nadeau, University of Tokyo, Japan

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Abstract
The Toward Diversity team consists of PhD students from four countries at the University of Tokyo (UTokyo). In June 2020, at UTokyo's Post-Corona Society Future Vision Symposium, we proposed to build a new online platform to support the quality of research life among students and faculty members. The platform is being designed to enhance research life in three areas: interactions between researchers, the balance between research and personal life, and mindsets and attitudes towards diversity. In order to gather feedback on the proposal, a survey was distributed and received 290 responses. The five lessons learnt are that: there is a demand for multiple functions including access to information and communication; the types of issues that people face vary mainly with age rather than gender or nationality; anonymity is preferred when using the platform; minorities are the majority at UTokyo, based on the survey respondents; and there is a demand for personalisation. After highlighting key features of the survey-based methodology, this paper explains how the results are being translated into system requirements for the online platform for research life support.

Keywords: Diversity, Higher Education, Learning Environment, Networking, Online Platform

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1. Introduction

The Toward Diversity (2021) project was initiated in March 2019, under the University of Tokyo's (UTokyo) Global Leader Program for Social Design and Management (2021). The project was founded by nine graduate students, and initially focused on studying the "leaky pipeline" (Business at OECD, 2012) of female researchers between junior and senior positions at UTokyo. Our team conducted a one-year interview-based research project in FY2019, to identify the most significant causes and to draft potential solutions (Berthet et al., 2020). The causes are summarized in Figure 1 (left).

In FY2020, our objective shifted from research to action. In particular, we have realised that the above-mentioned causes have a negative impact not only on female researchers, but also on male researchers. For example, traditional academic role models (causes 2, 3) can increase pressure, create stress, and degrade the work-life balance of both male and female researchers. In other words, addressing these factors would create a more enjoyable and fruitful research environment for all members of the university. In addition, the COVID-19 pandemic has created new opportunities to launch online initiatives within UTokyo. In June 2020, the School of Engineering's Post-Corona Society Symposium (Faculty of Engineering, 2020) welcomed proposals to enhance UTokyo in the post-COVID era, offering funding to selected submissions.
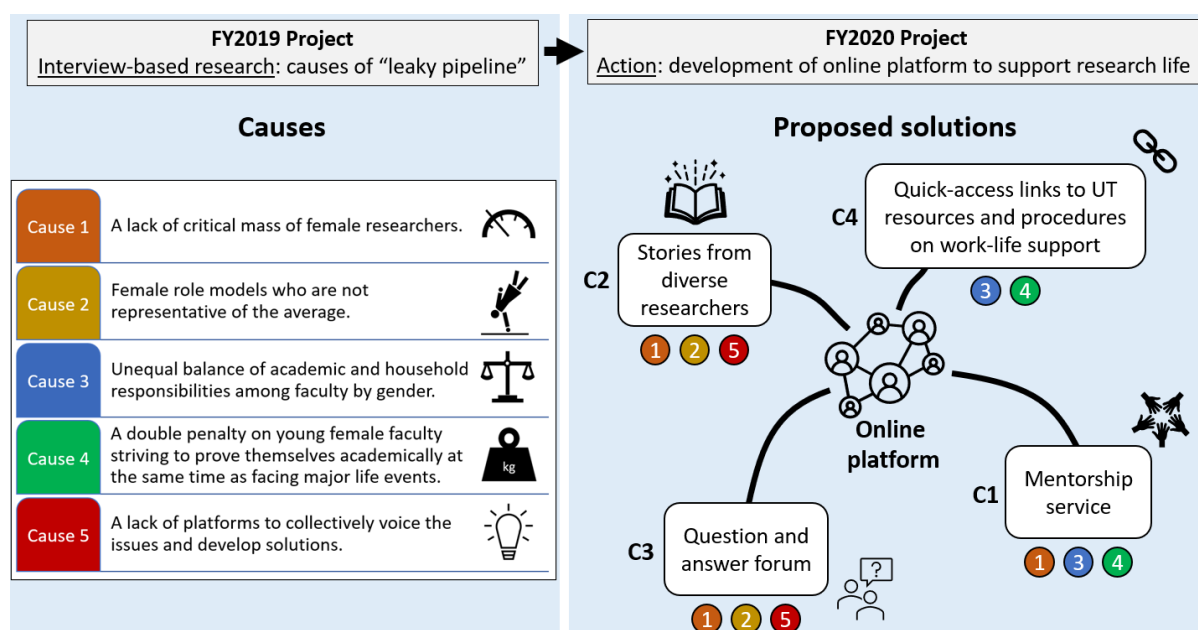
Figure 1: Linkage between FY2019 and FY2020 Projects: from Research to Action

Toward Diversity submitted a proposal to the symposium, which was accepted for development into a prototype: to create an online platform for supporting research life at UTokyo. The linkage between the proposed platform and the findings of the FY2019 project is shown in Figure 1. The platform – which will consist of a collection of tools for students, faculty members, and other researchers – aims to enhance research life in three areas: interactions between researchers, the balance between research and personal life, and mindsets and attitudes towards diversity. At present, the platform is at the concept stage, as shown in Figure 1 (right).

Before conducting a detailed design, a survey was distributed to gather insights from prospective users on: issues they face in their research life, the most popular current solutions, gaps in existing support services, and eventual differences between categories of users. This paper presents the survey methodology and explains how the trends identified in the survey results have been converted into system requirements for the online platform. The focus of this paper is on the user needs obtained from the survey responses, and the detailed design of the tools will be the subject of future work. We hope to convince the reader that students can play a useful role in developing new support systems for research life within higher education institutions.

The text is organised as follows. Section 2 introduces the conceptual design of the online platform. Section 3 explains the survey methodology. Section 4 summarises the survey results. Section 5 draws implications for system requirements of the online tools.

2. Conceptual Design of the Online Platform

The objective of the proposed online tools is to create an environment which supports all researchers at UTokyo to fruitfully pursue their research, and to achieve a balance between their personal life and research.

The online tools are planned to comprise two major parts, consisting of four components, as shown in Figure 1 (right). In Table 1 we identify the four components, their purpose, and missing information to be gleaned in the survey. We use the notation "C + component number" to refer to each tool. These will also be used later in the text.

Component	Function	Missing information
Mentorship service (C1)	Academic career advice and mentorship, open to all UTokyo students (as mentees) and faculty members (as mentors)	Is there demand (mentees)? Is there supply (mentors)?
Experience sharing (C2)	Providing relatable experiences of balancing research and life events	Is there interest?
Q&A forum (C3)	Casual and quick-response forum on research life, for daily usage	Is there demand (both Q side and A side)? Usage preferences?
Quick access links (C4)	Easy access to official research life support resources/services by UTokyo	Are official services already well known? Are other solutions used? Are there barriers?

Table 1: Components of Planned Online Platform to Support Research Life at UTokyo

The first part (C1) is an <u>online platform for academic career advice and mentorship</u>. In this mentoring system, students (as mentees) would be able to consult with faculty members or UTokyo graduates inside/outside UTokyo (as mentors), for advice on their academic career development. The system would be open to all students and faculty members. While an online platform for general career advice has already been developed at UTokyo (Career Support Office, 2021), to our knowledge a dedicated system for careers in academia does not yet exist. In our experience, many researchers at UTokyo tend to network only with members of their own laboratories or close group of peers. Therefore, it may be difficult to create connections beyond these surroundings, and so the proposed tool may help provide to access

more varied (and potentially more relevant) mentorship. In the survey, we assess whether there is supply (of mentors and mentees) and demand (for mentoring and receiving mentorship) for this tool.

The second part (C2, C3, and C4) is an application to share resources about the intersection between research and personal life. The tool would be open to all UTokyo members. This includes the following four components:

- An experience sharing portal (C2) to read or listen to experiences about balancing research and life events. This tool would enable students or researchers who are facing hurdles to find relevant advice and suggestions. Topics may be related to major life events or to everyday challenges, both of which impact the quality of research life. This tool is also expected to help UTokyo members to learn about the diversity of researchers within the university. One good example of an existing experience-sharing platform specifically for prospective – though ironically, not current – students is *Kimi no Todai* (2021). In the survey, we assess whether there is interest in experience sharing.

- A question-and-answer forum (C3) where users can share queries and provide answers to those in need. This would complement the experience-sharing platform. In the survey, we assess whether there is interest in a question-and-answer forum (both from those seeking and those willing to share advice), as well as how prospective users would like to interact with the tool (e.g. anonymously or not).

- Quick-access links to services for research life support at UTokyo (C4), which are currently scattered. Consolidating access to all the information in one place may make it easier to find services for work-life support at UTokyo (e.g. maternity/paternity leave procedures, applications for babysitting support, etc.). In the survey, we assess whether respondents are aware of existing support services, whether they prefer to use alternatives, and whether there are barriers to using them.

Overall, the above tools have strong potential: to encourage positive approaches to work-life balance, to empower students and faculty members to positively contribute to the UTokyo research environment, and to promote greater understanding of diversity. At the same time, Table 1 shows there is missing information to be gathered before the tools can be designed. In the next section, we introduce the survey approach we used to collect this information.

3. Survey Methodology

3.1 Objectives

In order to design an effective platform, a survey was distributed to gather feedback from prospective users: students, faculty members, and other researchers. The three objectives were:

- To understand the issues faced by diverse members of the UTokyo community, especially related to research and work-life balance.
- To identify gaps and barriers, as well as positive points, in current solutions.
- To identify improvements which are in highest demand.

In addition, the survey collected data on respondents' gender, origin, and age (among other variables), in order to understand potential differences between the expectations and needs of various platform users.

3.2 Design

The survey was designed based on feedback received over several weeks from UTokyo faculty members and from the UTokyo Office for Gender Equality among others (see Acknowledgments section for more details). On its opening page, the survey explained the background of this project, as well as the objectives of the proposed online tools.

The survey comprises 21 questions, divided into three modules. The title and purpose of each module are summarised in Table 2. More detail on the content follows in Section 3. (Note: the survey contained a fourth module on understanding of gender equality, but we decided not to include the findings in this paper.)

#	Title	Data collected	Purpose
1	Tell us about yourself	Basic personal information	Enable disaggregation of the data in subsequent sections by variables such as gender, age, and origin.
2	Tell us about your academic life at UTokyo	Issues faced in academic life	Identify what are the issues, and whether/how they are currently being addressed.
3	Tell us your opinions on the proposed academic career support tools	Most needed functions, and how to use them	Understand which functions should be prioritised, and identify eventual user-specific requirements.

Table 2: Structure and Purpose of the Survey Modules

The survey was distributed to students, researchers, faculty members, and graduates of UTokyo, via the Gender Equality Committees of the School of Engineering and School of Science among others (see Acknowledgements). The response period was 7-19 October 2020. 290 responses were received. The results are presented and analysed in the next section.

4. Survey Results

This section presents the survey results. One subsection is allocated to each survey module. In each subsection: the survey questions are shown; the responses are summarised; and the most interesting or surprising trends are highlighted.

4.1 Module 1: About the Participants

In Module 1, the objective (see Table 2) was to gather basic personal information on respondents to allow data disaggregation by age, gender and origin in later Modules. The questions are summarised in Table 3. The "Purpose" column highlights eventual links to the components of the online tools for which more information was required (see Table 1).

The distribution of the 290 survey respondents is representative of the average demographics at UTokyo in terms of age and origin, though not in terms of gender. Most respondents are under 30 years old (51%), then 30-45 (33%), and 45+ (15%); and most respondents are from Japan (85%). Most Japanese respondents have not spent over 6 months outside Japan.

For gender, four single-choice options were provided: "male", "female", "prefer not to say", and "other". The third option was selected by five respondents, and the latter option was not selected by any respondents. Therefore, disaggregation by gender is performed using two categories in this study. The female ratio among respondents (44%) is significantly higher than the average at UTokyo, which is likely due to a biased use of distribution channels for the survey (it is likely that the audience of the Office for Gender Equality has a high female ratio).

Regarding respondents' affiliations, most of the respondents are students (Master's, 26%; PhD, 24%), and faculty members (Assistant Professor, 10%; Associate Professor, 9%; Professor, 9%). Most current graduate students graduated from UTokyo before beginning their graduate degree (51%), followed by Waseda University (5%); and most faculty members were granted their final degree at UTokyo (63%), followed by Kyoto University (6%). Therefore, most of the respondents who are current graduate students and faculty members have stayed at UTokyo for several academic career steps, suggesting that there may be demand for advice on academic career planning within UTokyo, as well as a pool of existing potential mentors.

Question	Purpose
Q1. Grade or Position	For disaggregation
Q2a. If you are a student, which school were you affiliated with before entering UTokyo? / **Q2b**. If you are not a student, from which university were you granted your final degree?	Identify whether respondent has completed more than one "academic step" at UTokyo (*C1*)
Q3. Field of Study / **Q4**. Gender / **Q5**. Age	For disaggregation
Q6. Where are you from? / **Q7**. If you come from Japan, which prefecture are you from? If not, which country are you from? / **Q8**. Have you ever spent more than six months outside Japan?	Q6: For disaggregation Q7/8: Determine whether origin within Japan (Q7) or substantial experience abroad (Q8) has impact on Japanese respondents' subsequent answers
Q9. Do you think you are a minority for whatever reason? / **Q10**. If yes, is there a person who belongs to the same minority group in the same laboratory, major, or graduate school as you?	Q9: For disaggregation Q10: Determine whether presence of other member of same minority group has impact on respondents' subsequent answers

Table 3: Survey Questions in Module 1

Finally, half of respondents self-identified as a minority. For females, the ratio was around 60-70% of both Japanese and overseas respondents. For males, this was 56% of overseas and 41% of Japanese respondents. In other words, the minority is the majority in this survey. This result suggests that many minority groups exist inside UTokyo, both among males and females, though female respondents self-identified as a minority around 1.5 times more frequently than males. In addition, around half (41%) of those who self-identified as a minority do not have a person who belongs to the same minority in their academic

surroundings. The ratio was similar for males and females, and Japanese and overseas respondents. This suggests that both males and females may be at risk of social isolation within UTokyo, and especially females.

In summary, the main insights gathered in Module 1 are:
-        The survey respondents provide a representative sample of the UTokyo community.
-        Most respondents have stayed at UTokyo for several academic career steps (if applicable), suggesting that there may be demand for advice on academic career planning within UTokyo, as well as a pool of existing potential mentors.
-        The majority of respondents (and especially females) self-identified as a minority, and for around half of such respondents, there is no person belonging to the same minority in their close academic surroundings, suggesting a risk of social isolation.

4.2 Module 2: Academic Life at UTokyo

In Module 2, respondents were asked whether they are facing issues in their academic life at UTokyo. The objective was to identify the issues, as well as whether/how they are currently being addressed. This information was expected to provide insights into functions required for all the online tools. The questions are summarised in Table 4.

Question	Purpose
Q11. If you are currently a student, do you plan to become a researcher after graduation?	Quantify demand for (academic) research career support (*C1*)
Q12. Do you have any issues in your academic life at UTokyo? (multiple choice)	Identify the issues (*C1, C2, C3, C4*)
Q13. Do people around you have any issues in their academic life at UTokyo? (multiple choice)	Understand perception of others' issues (*C1, C2, C3, C4*)
Q14. Who can you consult with about the issues?	Understand preferred solution methods (*C1, C2, C3, C4*)
Q15. If applicable, do you think you have difficulty solving the issues due to a lack of information for speakers of languages other than Japanese?	Assess barriers for internationals (*C4*)
Q16. Do you know which office(s) inside UTokyo can help you solve the issues?	Assess engagement with existing solutions provided by UTokyo (*C4*)

Table 4: Survey Questions in Module 2

Firstly (Q11), the majority of both male and female (undergraduate and graduate) student respondents plan to become researchers after graduation. A difference was observed between Japanese males and females. For Japanese males, 48% plan to continue in academia, and 13% in industry. For Japanese females, 32% plan to continue in academia, and 23% in industry. 14% of Japanese males plan to not continue research, compared to 30% of females. This suggests that there is a large pool of potential users of tools for research career development,

including with academia as a target. (The data for overseas students was not sufficient for meaningful analysis.)

Legend

I1: Balancing research with childcare

I2: Balancing research with elderly care

I3: Balancing research with job hunting

I4: Getting opportunities to develop my academic career

I5: Harassment (including sexual, power, academic)

I6: Health

I7: I have no issues

I8: Making a career choice: continuing research at UTokyo or not

I9: Not sure about the reason but feel depressed

I10: Relationships inside lab

I11: Relationships outside lab (department, school, etc.)

I12: Relationships with family members

I13: Research itself

Figure 2: Answers to "Q12. Do You Have Any Issues in Your Academic Life at UTokyo?". (Top Left) All Respondents, (Top Right) Disaggregated by Age And Gender, and (Bottom) Multiple-Choice Options (Multi-Selection Permitted)

The next question (Q12) collected issues encountered in daily academic life, from a preassigned set of multiple-choice options. The results are shown in Figure 2. The most frequently reported issues are: "Research itself" (20%), and "Getting opportunities to develop my academic career" (17%). Similar answers were given by male and female respondents. On the other hand, when the results were separated by age group, clear trends were identified. The most frequent responses were:
-        Under 30: "Research itself" (21-23%), then "Getting opportunities to develop my academic career" (16-17%), and "Balancing research with job hunting" (12%).
-        30 to 45: "Getting opportunities to develop my academic career" (18-20%), "Research itself" (11-19%), and "Balancing research with childcare" (13-19%).
-        45+: "Research itself" (22-23%), then "Balancing research with elderly care" (7-13%), and "Health" (11-15%).

The implications for the design of the online tools are discussed in Section 5. Regarding perception of others' issues (Q13), the results (not shown) present a similar trend.

Regarding currently preferred solution methods (Q14), the results show that most respondents feel they can consult with their friends (23%) and family (21%), suggesting the importance of personal ties. The option "Office or organisation" (both within and outside UTokyo) was selected in around 5% or fewer of responses, by all groups. This suggests there is limited usage of these resources.

Separated by origin and gender

All respondents

Male

Female

Japan

Overseas

(n=290)
(Note: n = no. of single-choice responses)

Legend

O1: I have no issues, and my colleagues do not either

O2: No (I could not find help)

O3: No (I have not searched)

O4: Yes (I have consulted and not solved the issues)

O5: Yes (I have consulted and solved the issues)

O6: Yes (I have never consulted)
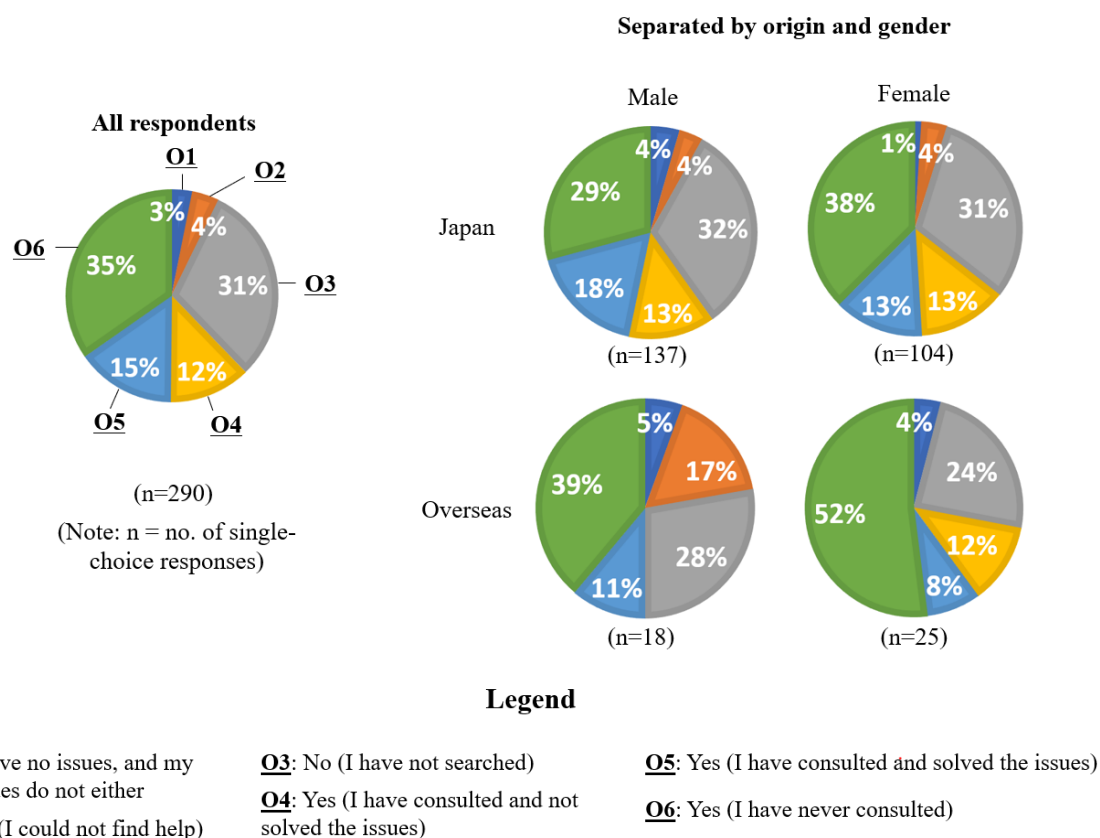
Figure 3: Answers to "Q16. Do You Know Which Office(s) Inside UTokyo Can Help You Solve the Issues?". (Top Left) All Respondents, (Top Right) Disaggregated by Origin and Gender, and (Bottom) Multiple-Choice Options (Single Selection Permitted)

Indeed, when asked whether they are aware of and use support services provided by UTokyo (Q16), respondents selected the option "Yes (I have never consulted)" the most frequently (35%), especially among females, as shown in Figure 3. This suggests that in general, those trying to solve issues know where to find help from UTokyo organisations, but choose not to use it. Also, the frequency of "Yes (I have consulted and solved the issues)" is almost the same as "Yes (I have consulted and not solved the issues)" suggesting that the support services provided at UTokyo may not match users' needs in a large number of cases. The implications for the design of the online tools are discussed in Section 5.

Regarding potential language barriers for accessing support services provided by UTokyo (Q15), 26% of respondents answered that they have difficulties overcoming issues they are facing due to a lack of information for non-Japanese speakers. However, Japanese respondents also reported difficulties, which suggests the question was not clear: some respondents may have been thinking of others' issues. Even so, this suggests a need for multilingual content in support services for research life.

In summary, the main insights gathered in Module 2 are:
-        The types of issues that people face during their research life at UTokyo differ mainly by age-group, suggesting a relationship between the issues and life stages.
-        When seeking help, the respondents rely on friends and family more frequently than on official support services provided by UTokyo.
-        A lack of information for non-Japanese speakers may be preventing some UTokyo members from accessing official support services.

Overall, these results suggest the importance of lowering hurdles for using support services provided by UTokyo, as well as a potential need to re-evaluate whether the services match actual needs.

4.3 Module 3: Opinions on the Proposed Online Tools

Finally, in Module 3, respondents were asked to explain their preferences for the online tools. This included: which functions they feel are most needed, and whether to use them in an anonymous way. The objective was to understand which functions should be prioritised, and to identify eventual user-specific requirements. The questions are summarised in Table 5.

Question	Purpose
Q17/Q18/Q19. Which function do you think is the most / second most / third most needed for the online tools?	Identify overall priorities for online tools (*C1, C2, C3, C4*)
Q20. Would you like to try the tools if a sample version is launched?	Assess overall demand for online tools (*C1, C2, C3, C4*)
Q21. If you chose to use the online tools, would you prefer to remain anonymous?	Understand preferred usage method (*C1, C2, C3, C4*)

Table 5: Survey Questions in Module 3

As shown in Figure 4, the functions stated as the most needed by respondents (Q17) are, overall: "Reading stories of others' experiences at UTokyo" (22%), "Posting questions and getting answers from mentors in an online forum" (17%), and "Searching for offices inside UTokyo where you can get support on your issue" (16%). Similar responses were given by Japanese males and females. For overseas UTokyo members, "Joining a community of people with similar issues and communicating" was the top choice (31%). These results show that there is a demand for multiple functions, including information on how to access UTokyo resources, and dialogue facilitation (reading/writing stories, communicating, and mentorship).

Separated by origin and gender

Male   Female

All respondents

Japan

F8   F1
      F2

F7   F3

                 F4

F6
      F5

(n=269)
(Note: n = no. of single-
choice responses)

(n=127)   (n=99)

Overseas

(n=16)   (n=23)

Legend

F1: Consulting with mentors (faculty members and alumni) via an interactive tool like Zoom

F4: Learning how to support those facing issues

F6: Reading stories of others' experiences at UTokyo

F2: Consulting with mentors (faculty members and alumni) via email

F5: Posting questions and getting answers from mentors in an online forum

F7: Searching for offices inside UTokyo where you can get support on your issue

F3: Joining a community of people with similar issues, and communicating

F8: There is no need for the tools

Figure 4: Answers to "Q17. Which Function Do You Think Is the Most Needed for The Online Tools?". (Top Left) All Respondents, (Top Right) Disaggregated by Origin and Gender, and (Bottom) Multiple-Choice Options (Single Selection Permitted. Total Not 290, as Free-Text Options Not Shown)

For those who self-identify as a minority (147 people), the responses (not shown) were not significantly different from the overall average. However, for the sub-group of respondents for whom there is no person belonging to the same minority in their academic surroundings (55 people), "Learning how to support those facing issues" appeared more frequently than the average (11% vs 6%). This suggests that this group has an especially high interest in supporting those in need. Therefore, tools to learn how to support those in need should also be considered for the platform.

Regarding the second most needed function (Q18), "Joining a community of people with similar issues and communicating" was the most frequent response (21%), both among Japanese and overseas males and females (results not shown). This option was especially popular among overseas members of UTokyo (as in Q17). Apart from this difference, the responses were similar to Q17. Respondents expressed no clear preference for the third most needed function (Q19).

When asked if they would like to try the proposed online tools (Q20), the majority of respondents (54%) said yes. The ratio of respondents who were "Not sure" is high (41%),

which may be due to a lack of specific details on the tools in the survey. Therefore, based on these results, there is strong overall demand for the proposed online tools.

Finally, when asked if they would prefer to remain anonymous when using the tools (Q21), the majority of respondents (64%) stated yes. The ratio was highest among overseas respondents (>70%), and among females (>65%). There was no significant difference for those who self-identify as a minority. One exception was for the sub-group without a person who belongs to the same minority in their academic surroundings. Respondents from this sub-group expressed a higher-than-average preference for anonymity (72%), and a lower-than-average preference for non-anonymity (2% vs 8% average). Based on these results, we learnt that there is a need for anonymity in the online tools.

In summary, the main insights gathered in Module 3 are:
-        The majority of respondents stated that they would like to try the tools when a sample is launched, showing that there is demand for the tools.
-        An even higher majority stated a preference to remain anonymous when using the tools.
-        There is a similar level of demand for multiple functions, including communication (reading/writing stories, Q&A, mentorship), provision of information on how to access UTokyo resources, and learning resources to support those in need.
-        Respondents who self-identify as a minority and for whom there is no person who belongs to the same minority in their academic surroundings expressed a higher preference for learning materials to support those in need.

In the next section, we distil the survey results into a list of lessons for the design of the online tools. First, we briefly review the limitations of the present survey methodology.

4.4 Limitations of Survey Methodology and Results

The main limitations of our survey method are summarised below:
-        Demographic bias: The proportion of female respondents was higher than the average demographics at UTokyo. One cause was the survey distribution channels (see Section 4.1).
-        Small sample size of non-Japanese respondents: This prevented meaningful analysis of differences between Japanese and overseas respondents, in some cases.
-        Short response period: The response period for this survey was less than two weeks. Some respondents wrote in the free comments section that they would have preferred more time.
-        Ambiguous question: In Q15, both overseas and Japanese respondents reported difficulties due to a lack of information for speakers of languages other than Japanese. Due to the question statement, it was unclear whether this difficulty referred to their own experience or to others'.

5. Lessons Learnt for Design of the Online Tools

Over 85% of respondents reported that they encounter issues in their academic life at UTokyo. This highlights the need for support services, including from within UTokyo. Overall, the survey results provide strong proof that there is demand for our proposed tools. Table 6 summarises this evidence, addressing the "missing information" items from Table 1.

Tool	Missing information	Findings
Mentorship service (C1)	Is there demand? Is there supply?	Yes: the majority of graduate students and faculty members have spent several academic stages at UTokyo, and the majority of grad. students plan to continue research (incl. in academia), suggesting that there is a pool of potential mentors/mentees.
Experience sharing (C2)	Is there interest?	Yes: this was the single most popular tool selected by respondents among available options.
Q&A forum (C3)	Is there demand (both Q&A)? Usage preferences?	Yes: there is demand both from recipients (Q) and helpers (A), and some respondents also expressed a demand for training to learn how to help others.
Quick access links (C4)	Are official services already well known? Are other solutions used? Are there barriers?	When seeking help, close personal connections are preferred to existing UTokyo services. Although many services are already known, there is still demand for easier access to information on where to find help. Most respondents reported not being able to solve their problems via UTokyo-provided services, suggesting a need to re-evaluate whether they are adapted to actual needs.

Table 6: Feedback Received on Components of Planned Online Platform

In addition, the survey results provide general insights into system requirements for the online tools. Specifically, we plan to take five main lessons forward to the detailed design stage:

- Lesson 1: Multiple functions. There is a similar level of demand for multiple functions for the online tools, including access to information (on UTokyo resources, and on how to help those in need), and communication (reading/writing stories, Q&A, and mentorship).

- Lesson 2: Designing content by age group. The types of issues that people face during their research life at UTokyo differ mainly with age, rather than other factors such as gender and nationality. Therefore, it may be important to divide content on the platform by age group.

- Lesson 3: Anonymity. Most respondents expressed a demand to remain anonymous when using the online tools. Therefore, incorporating anonymous features into the tools, and yet maintaining a balance with accountability (e.g. respectful discussions), is one priority.

- Lesson 4: Minorities are the majority. The majority of both male and (especially) female respondents self-identified as a minority in the survey. This shows that diversity and inclusion (including multilingual content) should be a cornerstone of the online tools, if they are to be availed of by diverse members of the UTokyo community.

- Lesson 5: Personalisation. Although most researchers are aware of existing support services offered by UTokyo, a majority chooses not to avail of these opportunities, turning instead to close connections such as family and friends when faced with an issue in their research life. This suggests that including a "personal touch" in the online tools may be key for their success. In addition, developing connections between UTokyo support services and external support may be necessary in some cases.

6. Conclusions and Future Work

In this study, we proposed a new online platform to support the quality of research life at UTokyo. The platform is planned to consist of four elements: an online tool for academic career advice and mentorship, an experience sharing portal, a Q&A forum, and quick-access links to services for research life support at UTokyo. In order to improve our concept design, we conducted a survey to assess current issues faced by UTokyo members in their research life, gaps and barriers in existing solutions, and improvements in highest demand. The 290 responses taught us five lessons which will be carried forward to the next stage of the design process: there is a demand for multiple functions including access to information and communication; the types of issues people face vary mainly by age rather than gender or nationality; anonymity is preferred when using the platform; minorities are the majority at UTokyo, based on the survey respondents; and there is a demand for personalisation.

We hope that this study will have two positive outcomes within UTokyo: to raise awareness among university decision makers of the unmet need for online tools to support the quality of research life at the university, and to highlight important focus areas based on the survey results. One recent noteworthy development is the launch in February 2021 of UTokyo Women (2021), an informal university-wide Slack-based exchange network with an emphasis on female researchers. The results of this study may play a role in expanding this network. In addition, we hope that our survey-based design methodology will inspire students in other universities to contribute to improving their own university environment.

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Contact email: ge.at.utokyo@gmail.com

International Expansion Strategy of Gülen Inspired Schools Through Internationalization and Localization

Mehmet Evrim Altin, International University of Applied Sciences, Germany

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Abstract

From the perspective of the educational sciences, globalization is one of the crucial subjects today and several educational movements attempt to open international markets by opening branches or working on cooperations. The Gülen Movement (GM) is one of these movements which has successfully globalized their schools and, thus has become an international educational movement in the last three decades, like the Waldorf and Montessori movements (Alam, 2019, p. 136). The purpose of this study is to examine the globalization of the Gülen Inspired Schools. A qualitative research design is used to study this issue. Semi-structured expert interviews are conducted with managers of the Gülen Inspired Schools and experts on the movement from three continents, such as Europe, Africa, and America. The results show that, initially, globalization strategies, founding, and the success of the Gülen Inspired Schools in different regions of the world are researched. Following the effects of the failed coup attempt in Turkey in July 2016 on the globalization of Gülen Inspired Schools, their current situation, and the future of these schools is discussed with the participants of this study. The results show that Gülen Inspired Schools used internationalization, despite globalization, and localization as a basic strategy throughout their international expansion. Besides, the failed coup also accelerated the global expansion of the movement and forced the movement and their schools to become more international and local. As a result, Gülen Inspired Schools transformed themselves into local schools without losing their international network and practice "global thinking, local acting" philosophy in these institutions.

Keywords: Expert Interview, Gülen Movement, Private Education, Qualitative Research Method, STEM Education

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Introduction

Muhammed Fethullah Gülen, a Turkish thinker, preacher, teacher, and writer is accepted as one of the important characters of Turkey in the 21th century. He has written more than seventy publications such as books, articles, etc. and has conducted thousands of speeches based on religion, Islam and social sciences in the last 52 years (Mercan & Kardaş, 2018, p. 45). He is also the founder of the so-called "Gülen Movement", which is a civil society movement that arose in the late 1960s in Turkey, initially composed of a loose network of individuals who were inspired by him (Ebaugh & Koç, 2007, p. 540). Today, according to uncertain statistics, more than five to eight million people support his ideas and the followers of the movement are active in different fields such as education, media, business world, helping foundations, and interfaith and intercultural dialogue organizations (Ebaugh & Koç, 2007, p. 540). Among these different fields, it is easy to say that the core activity of the movement is education.

This part could be seen as a vast network of tutoring centers, elementary and secondary schools, math and science academies, colleges and universities that spread from a single institution in Izmir in 1968 to roughly 1,200 schools in 180 different countries by 2016 (Pahl, 2019, p. 17).

In this point, it is difficult to understand the expansion of such a local movement to the whole world. Initially, the disintegration of the Soviet Union in 1990-91 and the independence of the Central Asian Republics provided a golden opportunity for Gülen to expand his Hizmet work abroad (Alam, 2019, p. 136). Later, after 2000, the Gülen Movement (GM) founded different educational institutions all over the world from the Far East to the US. The transformation of a national movement to a multinational actor is an interesting task to study. Park (2007, p. 46) highlighted this subject as follows:

Yet its roots are quintessentially Turkish, located in Turkey's historical baggage, its domestic political circumstances, and in a version of Islam, that arguably has more currency in Turkey than elsewhere. This rich 'Turkishness' endows this globally-engaged movement with a paradoxical and sometimes quixotic character.

In this papier this dilemma, the internationalization of the Gülen movement, is analyzed in detail. This is mainly because such a transformation constitutes a good example for other national companies or national actors who attempt to be global player in the international markets, especially in the education and service sector. In addition to that, one of the other goals of this research is to analyze how the movement transformed its national identity, according to the changes in the last three decades and the internationalization process of the Gülen Inspired Schools during the same time period. Especially the effects of modern technology during internationalization are analyzed in this research. Additionally, the results of this study give social scientists who are working on internationalization concrete data and experiences of the movement, which could lead to delving deeper in different aspects of the internationalization.

To achieve the mentioned goals, in addition to content analysis, a qualitative research method was selected in the field study to understand this controversial subject (Babbie, 2004). One of the main reasons for this choice are the research questions which are based on "how" questions. The initial goal of the researcher during the course of his PhD was to analyze the Gülen Inspired Schools in April 2016. However, in July 2016, three months later, the failed coup attempt took place in Turkey and, mainly because of the importance of the event, Erdogan's political and

educational activities against the movement took an important place in his study as another aspect of the dilemma.

In the data collection part, only the "expert interview" method is available because of the several reasons depending on the controversial structure of the subject. However, expert interview fits very well to this research that helps the researcher to collect high quality data. Participants of this study could be categorized into four groups, which are shown in the table below:

Participant's Code	Participant's Position	Participant's Occupation	Interview Language
USAM1	School Manager (Group1)	Director	Turkish
USAM2	School Manager (Group1)	Computer Engineer - Teacher	Turkish
USAM3	School Manager (Group1)	Teacher	Turkish
EUM1	School Manager (Group1)	Director	Turkish
EUM2	School Manager (Group1)	Teacher	Turkish
EUM3	School Manager (Group1)	Teacher	Turkish
AM1	School Manager (Group1)	Teacher	English
AM2	School Manager (Group1)	Teacher	Turkish
AM3	School Manager (Group1)	Teacher	Turkish
EX1	Follower (Group 2)	Journalist – Writer	Turkish
EX2	Follower (Group 2)	Imam	Turkish
EX3	Follower (Group 2)	Project Manager	Turkish
EX4	Positive-Neutral (Group 3)	Assistant Professor	German
EX5	Positive-Neutral (Group 3)	Writer	German
EX6	Positive-Neutral (Group 3)	Professor	German
EX7	Detractor (Group 4)	Assistant Professor	German
EX8	Detractor (Group 4)	Political Scientist	German
EX9	Detractor (Group 4)	Assistant Professor	Turkish

Table 1: Participants of the Field Study

As it is easy to see in the table, in total, there were 18 structured expert interviews which enables the comparison of different thoughts and understandings and also the comparison of the theory and the practice. The researcher visited nine Gülen Inspired Schools in different continents, the U.S., Europe and Africa (3 schools in each), and conducted countless talks and discussions with teachers, parents and students of these schools. The main reason for choosing these three regions depends on the structure of the Gülen Inspired Schools. During the preparation part of

the field study, it was seen that at the international level the GIS are founded and expanded in developing countries or in the developed countries. The schools in undeveloped countries were either closed after the failed coup attempt, mainly because of the pressure of the Turkish administration, or were in a bad, insecure condition, which is why the researcher prefered to visit to the mentioned regions.

All data was collected in face-to-face semi-structured interviews, which were recorded and transcribed so that the detailed analyses can be easily carried out (Merriam, 2009). Mainly because of the actual situation of the movement, the researcher of the study decided to anonymize all the participants' names and institutions and used codes above. To achieve high-quality data during the interviews, all interviews were conducted in the mother tongue of the participants. Participants' mother tongues are German, English, and Turkish in this study (See table above). In the data analysis part, the Maxqda program was used because of its special features and availability and Gläser and Laudel's (2009, p. 203) procedures were followed. Besides, the researcher of the study practiced five general criteria for qualitative researchers, which Mayring (2002) explained in his book, such as procedural documentation, rule structured construction, argumentative interpretation assurance, proximity to the object and communicative validity. Conducting the field study in the mentioned three continents and only one data collection method is available for the research are several important limitations of the study.

Results

One of the core points of the PhD study of the researcher[1] is the international expansion of the Gülen Inspired Schools. Among different strategies, such as globalization, internationalization, glocalization, localization, etc… during the international expansion, the movement initially used internationalization. However, especially after the political disorder in Turkey in 2016, the movement prefered to use localization instead. These strategies are explained in detail.

Internationalization of Gülen Inspired Schools

Several above-mentioned terms like globalization, internationalization, and localization have become very important and popular in the last two decades. Therefore, they are very well known topics today and that is why the author of the study avoids explaining them in detail here. However, it would be better to talk a little more about internationalization because of the relation with the topic. According to Välimaa (2004, p. 29) "Internationalization" is the approach of skeptics towards globalization who maintains that instead of globalization we should be speaking about internationalization, the implication being that global interactions are predominantly taking place between national economies. Similarly, Caruso and Tenorth (2002, p. 19) also stated this point and mentioned that these two terms, globalization and internationalization, have certain contrasts.

On the one hand, "internationalization" stands for a degree of reciprocity and interaction, and even suggests a formal equality of nations as a crucial condition for reception and transformation (not for the production) of cultural and social patterns. On the other hand, the view of the historical peculiarity of the nation as a category of analysis and construction of the social is not particularly promoted. (Caruso & Tenorth, 2002, p. 19)

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[1] Altin, M.E. (2020). Internationalization through Localization: Gülen Inspired Schools, PhD Dissertation on Faculty of Philosophy of Heinrich Heine University of Düsseldorf, Düsseldorf: HHU Universität Publikation Server

It is clear to see from this quote, that unlike globalization, all nations and cultures are equal and the same in internationalization, and there will not t be any dominant culture or identity.

In practice, Gülen convinced his other followers to go to other former Soviet regions in Central Asia first and they founded the first GIS outside of Turkey (Ebaugh and Koç 2007, p. 542). One of the participants of the field study, (Ex1), was one of the first followers who went to Azerbaijan after the resolution. According to Ex2, after the 2000s, the movement founded schools in all other parts of the world with the same method. Active followers or some teachers and managers who had experience in Turkey were encouraged to move outside of Turkey and they were motivated by the foundation of schools in other countries outside of Turkey. To achieve this goal, these founders cooperated with local people and local administrations during the foundation process. As a result of this process, the movement founded different types of schools according to region by paying attention to the needs and regulations of that region. That is why, during the field study, it was observed that GISs in Africa, Europe and America differentiate from each other.

> "And my impression is that the Gülen Movement has understood to work very country specific. [...] The schools, so I think that depending on the countries, you have specific concepts that can be easily combined with the name Gülen Schools or Hizmet Schools [...] What I find very remarkable, is that the Hizmet Movement in Tanzania does not try to run the same education initiatives as in Germany or in America or Holland, yes. [...] It is actually floating in the national system and working on the lack of the national system. And that can be very different in Africa than in Germany." (Ex6)

As it is easy to see, this type of international expansion is clearly internationalization, because the movement or the GISS do not force other local people to accept their methodology and educational understanding based on their religous philosophy or Turkish values in this case, which is common in globalization, instead, they are reshaping their methodology and educational understanding depending on the motivation and needs of the local people in every region through cooperation with local people. The flexible structure of the movement and the current highly-developed technology allow the followers of the movement to realize this strategy with ease. For example, due to the lack of a technological infrastructure, such a practice could not have been realized in the past or it would be very difficult or very expensive in comparison to today. Therefore, other movements and also many companies, like McDonalds or Mercedes, use globalization during the international expansion process which dismisses local differences and presents people the same product in every part of the world. However, the Gülen Movement uses technology and creates a new education model for each different country. That is why it is difficult to talk about just one educational model of the Gülen Movement, instead it is combination of several educational models which have common values or points but also differentiations according to regions. For this reason, all visited schools during the field study are found to be different from each other, especially in different countries, but by looking at their quantitative growth, they are all accepted as a successful school in their regions. It is also observed in participant managers that they all have different perceptions about the Gülen Movement's educational model or understanding. This is mainly because local values and local environment also influenced them as much as Gülen did, and they all combined these two philosophies in their institutions.

Besides, it was also observed during the field study that despite the range of the movement and the difficulties of change, the movement easily adapts itself to this new international identity. One of the main reasons behind this is the flexible structure of the GM. Unlike other religion-

based movements, the GM does not have a rock-solid structure or strict rules. On the contrary, the most salient characteristic of the movement is its ability to adapt to widely varying local conditions and its flexibility and responsiveness in the face of rapid changes over time, in other words its remarkable mastery of change itself (Woodhall, 2005, p. 10). Ebaugh and Koç (2007) highlighted the important role of the study circles in the movement and reasoned this flexibility and responsiveness of the movement because of this local identity of the circles. The second issue in this point is the profile of the followers of the movement. The majority of the Gülen followers are very well educated, highly-skilled young people. That is why they all understand and know that we are living in a fast-changing digital world and they could easily reposition themselves in this new identity.

Localization of Gülen Inspired Schools

Despite the popularity of globalization or internationalization in the last three decades, local values and local understanding are become important in the recent years. Goodhart also pointed toward this issue by dividing modern British society into two groups: "Anywhere" and "Somewhere" groups. The Anywhere group represents the people who have internalized global values and have less connection to their local environment (Goodhart, 2017, p. 23). However, the Somewhere group represents the ones who still are connected strictly with their local language, culture and standards (Goodhart, 2017, p. 24). According to him, despite the influence of globalization and internationalization, which has increased the number of Anywhere groups in societies in the last two decades, today local values and local tendencies, which are represented by Somewhere groups, have increased rapidly. He (Goodhart, 2017, p. 38) gives British people as an example, in which 42 percent lives within five miles of where they lived when they were fourteen and 60 percent live within twenty miles and mentioned that is why the majority of the British people voted for Brexit (Goodhart, 2017, p. 218). Goodhart (2017, p. 218) also suggested that such a situation is not so different in other developed or developing countries. According to him, unlike Anywhere tendencies, Trump in the US, Putin in Russian and Erdogan in Turkey won the elections with the support of the Somewhere groups in their countries (Goodhart, 2017, p. 218).

These political tendencies demonstrated the importance of localization and need more research, especially from a political science perspective, which is out of scope of this study. However, it is important to define two important terms in this point such as "Glocalization" and "Localization". Glocalization is combination of "Globalization" and "Localization" and created by global players to challenge local difficulties. Ross and Lou (2005, p. 229) define this term as follows:

> Recently, theorists have employed this insight to create the neologism "glocalization," sometimes defined as "global localization." Glocalization implies a search beyond the contributions and the downsides of globalization in order to conceptualize a world of greater balance between the potentially empowering trends of global communication and the concrete challenges faced by local communities.

On the other hand, „Localization" solely focuses on the local needs and motivations without considering global perspective. To avoid any misunderstanding, these trends, glocalization or localization, are not a contra-movement against globalization and internationalization, instead it is a contribution to them.

Regional processes, therefore, obtain a new significance, that depends on a global dimension – regions need to be noticed by the global system due to the place that they can be found in,

with an example on significance of actions undertaken within the scope of the European integration process. (Barwinska-Malajowicz, 2011, p. 206)

Therefore, both in glocalization and localization, the main philosophy is "Global thinking, local acting" but the local structure or local needs have priority.

In this point, the faild coup attempt in Turkey in 2016 and the following political disorder play a crucial role. In a short summary, the Gülen Movement became the scapegoat in Turkey and the current Erdogan regime closed all institutions affiliated with the movement, forfeited their assets and more than hundreds of thousands of Gülen followers were arrested and a similar number of people who supported the movement lost their positions in the government or public sector. Several international institutions like Amnesty International or Human Rights Watch have reported this pressure several times in the recent years. As a concrete example the figure below is from Amnesty Interational's Report about Turkey in 2018.

107.000+
public sector employees, among them trade unionists and human rights defenders, summarily dismissed for their activism or for exercising their right to freedom of expression

100+
of those dismissed, had been reinstated by the State of Emergency Commission by the end of February 2018

100.000+
people have faced criminal investigations and potential prosecution

50.000+
people imprisoned pending trial

180+
media outlets closed down

120+
journalists and media workers

265+
academics prosecuted for signing an appeal for peace, as of 1 April 2018

1.300+
associations and foundations

Figure 1: Human Rights Violations After the Coup Attempt in Turkey According to an Amnesty International Report in 2018 (P. 4)

This topic is also related with political sciences and is thus out of scope of this paper. However, as a consequence of the event, the movement has changed it is global strategy and prefers to continue their international expansion process through localization outside of Turkey.

Therefore, in the visited three continents of Africa, America and Europe, the researcher of the study observed different types of actions. As it was mentioned above, there are some common values and practices which were observed in the field study, however many important points like teachers, curriculum and financial structure of GIS vary according to region.

As a concrete example, one subject could be whether GIS are discipline-centered or more focused on free involvement. Like many other points, this point differentiates according to the

region of the schools. During the field study, it was observed that the GIS in Africa are much more discipline based compared to schools in Europa and America. Students have to wear a uniform, there are several ceremonies before school starts and students get negative points if they do not pay attention to discipline rules in GIS in Africa. This is mainly because of the local educational tradition in Africa and GIS have adapted their identity to this tradition. However, in Europe and in America these practices are not standard, and more free involvement education was observed in these GIS. This also shows the flexible structure of the GIS which can adapt to different regions easily. On the other hand, according to Ex5, even in the GIS in Europe, there is discipline which does not limit or pressure students but focuses on the education in the schools.

I would say, there is a discipline there, yes there's a reason for discipline there, a basic chord of discipline but I would not say, I did not find it restrictive or distressing - the discipline and the truer mood, at the same time. This is my picture. (Ex5)

In the same manner, the second topic is the target group of these schools. Especially Gülen Inspired Schools and other educational institutions like tutorial centers targeted the Turkish Minority in Europe which settled in western Europe in the last six decades (Boos-Nünning, 2011, p. 207). Similarly, Gülen Inspired Private Schools in the U.S. also targeted the Turkish Minority in the U.S. and also international students from Turkey. The needs of this minority, such as integration to the majority society or educational problems of their offsprings were focused on and there was cooperation and collabration between the Movement and the Turkish Minority outside of Turkey. A common historical background, cultural similarities and several problems related to the educational system such as discrimination accelerated this alliance. In contrast, Gülen Inspired Schools in Africa and Gülen Inspired Charter Schools focused on the majority of the society instead of any minority in their regions. They were initially financed by Tukish entrepreneurs in Turkey but later on financed their education through tuition fees in Africa or through state-supported charter schools in the U.S. In both cases, the target group is clearly local people around the school and the Turkish background of the Movement does not play any role in the education in these two types of schools. On the other hand, as it was mentioned above, the failed coup attempt in 2016 is a crucial event in the movement's history which destroyed the alliance between the Turkish minority and the Movement. The main reason behind this break is the effects of the propaganda and pressure of the Erdogan regime.

> "But it is indisputable for me, that extreme repression had come, that actually should not happen here (Germany). That is very clear. There have been significant repressions and these repressions have also resulted in parents deregistering their children (from schools or tutor centers). So, we have the first group out of conviction, and some that were blackmailed, yes, with strong repression, yes, instead of blackmailed maybe we could say, no, no they are clearly blackmailed after all. And the second is that but these repressions have not only been practiced over the parents, but also over funding."(Ex6)

As an example, Ex5 mentioned that even some small entrepreneurs who have a shop or supermarket were blackmailed and forced to stop his or her support to the movement. The majority of the Turkish minority in western Europe were influenced by it and broke their relationship with the movement. Even in some places, like Gelsenkirchen, Germany, a group of people attacked institutions of the Movement and broke the windows and hung Turkish flags there. As a consequence, the schools, tutoring centers and other Movement institutions were confronted with huge financial problems for the movement in western Europe. As a result of these events, the observed two schools in Europe lost one fourth of their students after the failed

coup attempt and three schools in Germany and one school in Switzerland closed just because of financial problems.[2] Similarly, one private Gülen Inspired School in the U.S., called Putnam Science Academy, was transfered to another entrepreuneur because the international students from Turkey left the school after the event and the mangement could not deal with the financial consequences of this decrease.

> "We are Turk and already 100% of our students were Turk when we first opened. 35% of them are Turk at the moment and after one or two years, this rate will be 10%." (EM3)

> "Before the coup, we were more interested in the Turks, but after the coup, people were more out of contact. This was the case with the older sisters, we became more familiar with the Germans, the majority of this society. [...] I do not think there is a voluntary change. As a result of the change in some conditions and needs in this direction, especially after the coup, I think such a development took place."(Ex3)

Consequently, because of the mentioned experiences, the Movement and its schools accelerated the localization process and the Gülen Inspired Schools in Europe and also Gülen Inspired Private schools in the U.S. focused more on local people, like all other Gülen Inspired Schools.

In addition to the mentioned examples, educational structure and target group, it is easy to find more examples to the localization strategy of Gülen Inspired Schools. In general, it is easy to say that local needs shape the activities of the Gülen Inspired Schools in their enviroment. For example, Gülen Inspired Schools in Africa focus more on segregation and poverty in comparision to other Gülen Inspired Schools in Europe and in the U.S. Giving poor students scholarships (almost 14% of the all students recieve scholarships), organizing charity activities and cooperating with poor local schools around them and supporting them technically and financially are several examples conducted by the Gülen Inspired Schools in Africa. Besides, they advertise their successful students very often to give hope to the society against segregation. On the other hand, Gülen Inspired Schools in Europe focus more on social projects, arts and sport activities. Several projects are mentioned as follows:

> "For example, there is a project about citizenship, we do this together with the public authorities, and that's how a citizen in this city should be." (EM2)

> "The project of "No violence" is one of them, the project of solving the conflicts without resorting to violence, the other is the "pass of the media", the sensitivity of social media project, all the students have to participate in these projects, privacy, personal data, insults and not to harass are the subject of that project." (EM3)

Like the other managers in Europe, EM1 gave the art contest, which was organized by their city as an example to this point, where 170 schools joined.

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[2] According to Internet research, the mentioned three Gülen Inspired Schools and also another closed Gülen Inspired School outside of Germany are listed below:
-      Urselbach Gymnasium, Oberursel, Hessen Germany
-      Carl-Friedrich-Gauss Schulen, Ludwigsburg, Baden-Württemberg, Germany
-      Private Wirtschaftsschule Main-Bildung, Würzburg, Bayern, Germany
-      Sera Schule, Zurich, Switzerland

"The aim of this project is to give children the ability to think creatively and imagine ... For example, we work together with other schools in "culture and arts week" and we are working together with them" (EM1)

These kinds of projects are crucial especially for the parents of these students, because most of these students come from low-income families and they do not have the resources to do it by themselves. EM1 and EM2 highlighted the same issue during the interviews and they mentioned that the majority of their parents belong to low-income families. According to EM2, they cooperate with other schools or private clubs and build partnerships. In this way, their parents could send their kids to this kind of places even though they do not have enough financial resources. In addition to that, EM1 also underlined the same issue and mentioned that almost one third of their parents are unemployed and get support from the state. This effects their children's education and they have to find ways to solve this problem. Otherwise, these students could not get a good degree or even if they have skills in such fields, they do not have a chance to flourish with them and they will become a problem in their community in the future.

Mainly because of the huge diversity in the U.S. it is difficult to talk about the localization strategy of the Gülen Inspired Schools in the U.S. which varies in different states. Besides, unlike other regions, the movement has two types of schools, charter schools and private schools and they have different localization strategies. However, local needs also play a crucial role in the localization strategy of these schools and one of the major needs in the American educational system is the gap in STEM education according to USAM1. Therefore, one of the significant common strategies observed in both of these Gülen Inspired Charter and Private Schools is targeting this gap in their localization process and they both present STEM based education with high-tech Labs. Similarly, both USAM2 and USAM3 mentioned that they organize science fairs by cooperating with universities and other institutions to contribute to this issue in their educational activities.

There is a regional science fair on Saturday, so this region means that there is a main school in this county and there are all other private schools, there is an interstate competition. One of the sponsors of this contest is our school, the organizer, the other is George Mason University. [...] Sometimes we go to research and use the laboratories of the universities. Or to bring the experts in the field to our school, they are part of our education. It is important for our students to come together with these kind of people in order to do things, to have the horizon." (USAM3)

In addition to STEM education, there are also other local needs mentioned during the interviews like poverty, segregation, lack of financial sources...etc, but these differences vary depending on the local enviroment. In each school in different states, several strategies are practiced to solve these problems but it varies depending on the local enviroment.

Conclusion

As a summary, instead of carrying a common worldwide education model, the Gülen Movement has different education models depending on the region today. In this point, the philosophy and original values of the movement in these schools, especially regarding the educational aspect, empowering youth through the promotion of education for economic prosperity, altruism, love and peace and promoting tolerance, unity, stability and the establishment of civil society based upon democratic principles of governance are the common goals of these schools in different regions (Aydın, 2013, p. 17) and there will not be any change in these goals. On the other hand, depending on the needs of the local environment, activities

in different fields, especially in arts, research and science fields are expected as a consequence of localization strategy in the future.

Nonetheless, one of the remarkable points in this issue, is as a global player (Geier and Frank, 2018b, p.56), the enrichment of this localization strategy or understanding by adding **"global thinking"** in these schools. The management of the GIS follow the international contests seriously and try to prepare their best students for these programs. Besides, the network between different GIS in different regions helps them to inspire or to contribute to each other. During the field study, it was observed that the managers of the schools in Europe know each other, share their experiences and knowledge with each other or a school manager in Africa could find the same position in America after receiving a green card, which enables him to move and work in the US. Such similar connections and cooperation are also expected from other GIS in different locations. One of the main advantages of the Gülen Movement in this point is the use of modern technology. Today, Gülen and his followers have highly-developed technology and very fast communication options, which was not possible before. Therefore, Gülen and also his followers, especially in the GIS, could easily spread or share their ideas or experiences through media and social media. Interaction between Gülen and his followers or followers between each other is very high today. Therefore, it is clear that the followers of the movement have a global vision, in comparison to other local schools. Such a cooperation on an international level, using modern technology and communication options help or give the movement and also its students' global thinking ability, in addition to local acting, which differentiate them from other schools in their region.

Acknowledgment

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Contact email: mehmet-evrim.altin@iu.org

Erdogan's "New" Educational Movement: Another Battle Field Against the Gülen Movement

Mehmet Evrim Altin, International University of Applied Sciences, Germany

Abstract

The private education sector plays a significant role in the Turkish education system, which is based on central exams to attend the higher schools and universities and the sector has grown rapidly in the last four decades, in which the Gülen movement achieved significant success in this sector (Vicini, 2020). Therefore, the Erdogan regime created a new educational concept under the Maarif foundation and fights against the movement through this concept. The purpose of this paper is to examine the Erdogan administration's efforts in the educational field, how it fights against the Gülen movement and the educational concept of the Maarif foundation. A qualitative research design is used to study this issue. Semi-structured expert interviews are conducted with managers of the Gülen inspired schools and experts on the movement from three continents, such as Europe, Africa and America. The results show that the complete Gülen movement is labelled as a Terrorist organization, its reputation was damaged and, consequently, these educational institutions were closed in Turkey. In addition, the Erdogan regime used different methods against the Gülen inspired schools outside of Turkey and offered new colleges that were managed by the Maarif Foundation in Turkey. These new schools call themselves "Turkish Schools", have STEM based curriculum which are taught in English by Turkish teachers from Turkey and focus on expanding the Turkish language and culture outside of Turkey. How several countries reacted to this offer and current developments are focused on this paper.

Keywords: Expert Interview, Gülen Movement, Private Education, Qualitative Research Method, STEM Education

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Introduction

After the seventies, there were several social issues in Turkey like urban immigration, extreme left and right disputes, financial difficulties and political disorders, most of which were ended with a coup and helped two Islamic movements to flourish in Turkish society. One of them is Necmettin Erbakan's political Islam focused on the political realm like the Muslim Brotherhood in Egypt or Khomeini in Iran and the current president Erdogan and his party continues this legacy. Erbakan's political Islamic movement, so called "*Milli Görüs Hareketi*" (National Outlook Movement, MGH) increased the number of its votes during the decades mainly because of the authoritarian-centralist political system, which was trying to impose secularization from above, without being aware of it, has produced its antithesis through the segments it had excluded (Ergil, 2012, p. 318). In addition to that, Tittensor (2014, p. 51) mentions that:

> the rise of Islam in the political sphere is due to the failure of the center-right and center-left parties, in so far as they have been unable to put forward decent economic policies and are perceived as corrupt, thereby creating a vacuum into which the religious parties have fortuitously walked.

The second important Islamic movement is founded by Fethullah Gülen, a Turkish Islamic scholar, who based his movement mainly on the educational activities and later on several institutions in media, finance and charity organizations. According to Findley, mainly because of the social projects of the movement, in comparison to Khomeini or other political Islamists like Necmettin Erbakan in Turkey (Findley, 2010, p. 389), Gülen is considered to be a social Islamic scholar and also a follower of Said Nursi (Findley, 2010, p. 384), who is distanced himself from politics (Turam, 2007, p. 135). In addition to the philosophical differences between these two movements, another crucial difference between these movements is that, after the Soviet Dissolution, Gülen expanded his activities first to Central Asia and then later on to the whole world and to become an international movement, but Erbakan's movement, later Erdogan continues his legacy, movement stays local and limits itself in Turkey.

Despite the mentioned differences and minor conflicts between these two movements, the major fight started in December 2013, in which Gülen affiliated media organizations published Erdogan and his ministers' corruption scandals and sons of these ministers were arrested because of being part of the corruption. According to Erdogan this is a soft coup against him which was organized by the movement and he waged a war against Gülen and his movement (Arango, 2013). Initially, Asya Bank and several media organizations affiliated with the movement in Turkey were forfeited by the government and later on, after the failed coup attempt in 2016, Erdogan used his political power and banned the movement in Turkey. Since then more than a hundred thousand people have either been arrested or lost their jobs mainly because of their affiliation with the movement (Amnesty International, 2018b). However, according to Alam (2018, p. 287), on an international level Erdogan's narrative is not reliable and, with the exception of several countries, the Gülen movement is still active worldwide. Therefore, Erdogan founded his international educational movement under the Maarif Foundation to destroy the movement outside the Turkey. In this paper, the conflict between Erdogan and Gülen, how the Erdogan regime fights against the movement out of Turkey and educational concept of the Maarif Foundation is described in detail.

To achieve mentioned goal, in addition to content analysis, a qualitative research method was selected in the field study to understand this controversial subject (Babbie, 2004). One of the main reasons for this choice are the research questions which are based on "how" questions.

The initial goal of the researcher in his PhD was to analyze the Gülen inspired schools in April 2016. However, in July 2016, three months later, the failed coup attempt took place in Turkey and, mainly because of the importance of the event, Erdogan's political and educational activities against the movement took an important place in his study as another aspect of the dilemma.

In the data collection part, only the "expert interview" method is available because of the several reasons depending on the controversial structure of the subject. However, expert interview fits very well to this research that help the researcher to collect high quality data. Participants of this study could be categorized into four groups, which is shown in the table below:

Participant's Code	Participant's Position	Participant's Occupation	Interview Language
USAM1	School Manager (Group1)	Director	Turkish
USAM2	School Manager (Group1)	Computer Engineer - Teacher	Turkish
USAM3	School Manager (Group1)	Teacher	Turkish
EUM1	School Manager (Group1)	Director	Turkish
EUM2	School Manager (Group1)	Teacher	Turkish
EUM3	School Manager (Group1)	Teacher	Turkish
AM1	School Manager (Group1)	Teacher	English
AM2	School Manager (Group1)	Teacher	Turkish
AM3	School Manager (Group1)	Teacher	Turkish
EX1	Follower (Group 2)	Journalist – Writer	Turkish
EX2	Follower (Group 2)	Imam	Turkish
EX3	Follower (Group 2)	Project Manager	Turkish
EX4	Positive-Neutral (Group 3)	Assistant Professor	German
EX5	Positive-Neutral (Group 3)	Writer	German
EX6	Positive-Neutral (Group 3)	Professor	German
EX7	Detractor (Group 4)	Assistant Professor	German
EX8	Detractor (Group 4)	Political Scientist	German
EX9	Detractor (Group 4)	Assistant Professor	Turkish

Table 1: Participants of the Field Study

As it is easy to see in the table, in total, there were 18 structured expert interviews from which enables the comparison of different thoughts and understandings and also the comparison of the theory and the practice. The researcher visited nine Gülen inspired countries in the U.S.,

Europe and Africa (3 schools in each) and conducted countless number of talks and discussions with teachers, parents and students of these schools. The main reason for choosing these three regions depends on the structure of the Gülen inspired schools. During the preparation part of the field study, it was seen that, at the international level the GIS are founded and expanded in developing countries or in the developed countries. The schools in undeveloped countries were either closed after the failed coup attempt, mainly because of the pressure of administration of Turkey, or were in a bad, insecure condition, which is why the researcher prefered to visit to the mentioned regions.

All data was collected by face-to-face semi-structured interviews, which are recorded and transcribed so that the detailed analyses can be easily carried out (Merriam, 2009). Mainly because of the actual situation of the movement, the researcher of the study decided to anonymize all the participants' names and institutions and used codes above. To achieve high-quality data during the interviews, all interviews are conducted in the mother tongue of the participants. Participants' mother tongues are German, English, and Turkish in this study (See table above). In the data analysis part, Maxqda program was used because of its special features and availability and Gläser and Laudel's (2009, p. 203) procedures were followed. Besides, the researcher of the study practiced five general criteria for qualitative researchers, which Mayring (2002) explained in his book, such as procedural documentation, rule structured construction, argumentative interpretation assurance, proximity to the object and communicative validity. Conducting the field study in the mentioned three continents and only one data collection method is available for the research are several important limitations of the study.

Results

One of the core points of the PhD study of the researcher[1] are the effects of the failed coup attempt on Gülen Inspired Schools. The researcher of the study suddenly found himself in the middle of a conflict on the one hand and , on the other hand, he explored a new foundation, the so-called Maarif (means Education in Ottoman Turkish) Foundation, founded and supported by the Erdogan regime and the Turkish government. This conflict is stimulating during the field study, mainly because of the timing of the research, which is immediately after the failed coup attempt and almost all participants talk about this issue during the field study. Consequently, two important results of the failed coup were found in the field study.

Initially, why such a conflict happened and why these two Islamic movements fight each other are important questions to focus on. Mainly because of mentioned different approaches to Islam above, Erbakans' political approach and Gülens' social approach, these two leaders never came together and they were active in different realms of the society. According to Turam (2007, p.136), this is mainly because Erbakan did not accept the secular structure of the Turkish state and tried to change it politically which is why his political parties were closed several times, however unlike him, Gülen did not confront this structure and prefers to collaborate and cooperate with secular parts of the society. According to Alam (2019, p. 122), this is also one of the major difference between Nursi and Gülen, too. In general, Gülen is seen as a follower of Nursi and the Gülen movement uses Said Nursi's master Work "Risale-I Nur" in their teachings (Findley, 2010, p. 384), however, as Vicini (2020, p.155) mentioned in his earlier published book that unlike other Nur Movements, Gülen's books and talks are used as a core source in Gülen movement, too. Therefore, in some cases, like collaborating with secular state,

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[1] Altin, M.E. (2020). Internationalization through Localization: Gülen Inspired Schools, PhD Dissertation on Faculty of Philosophy of Heinrich Heine University of Düsseldorf, Düsseldorf: HHU Universität Publikation Server

Gülen goes his own way and does not follow Nursi's legacy. Similarly, Erdogan also refused to follow Erbakans' legacy after being selected a president in 2002 and cooperated with the secular forces, the army in this case, during his first two terms (Turam, 2007, p.137 and 138). His meeting with Colonel Yasar Büyükanıt, the head of the army in 2007 is still an enigma today (Sayın, 2019) but unlike the presidency of Erbakan, the army did not cause so much trouble for Erdogan legislation, which demonstrated the importance of the meeting of Erdogan with the head of the Army Colonel Büyükanıt. As a consequence, the two biggest Islamic movements and secular forces of the country suddenly stopped fighting with each other and started working together in the country, which caused financial stability and rapid growth in the first two terms of the Erdogan regime till 2010.

However, the alliance between these forces is broken down when heavy military guns were found in a hidden secret location outside of military regions and later on, several generals were arrested because of preparing a coup against the Erdogan regime, which is known as *Ergenekon* trials in Turkey (Pahl, 2019, p. 342). In general, all left oriented parties, also secularists of the country and some foreign scholars like Tee (2016, p. 167) blamed Gülen for how he dealt the event and suggested that this was a conspiracy organized by infiltrated followers of the Gülen movement inside the military. The second important event happened from 17-25 December, 2013, when security forces under the command of arrested sons of three Ministers of the Erdogan regime, several businessmen and governors of several districts in Istanbul and some other places in Turkey. The accusations were corruption, money laundering and misuse of state power to their own profit and after several days it was also clear that the Erdogan family was also involved this scandal. Interestingly, like in the Ergenekon trials, Erdogan also claimed that it is a conspiracy against his selected government that was organized by Gülen followers who infiltrated the Justice department and police departments of the country (Arango, 2013). Despite the fact that the major actor of this event, Reza Zarrab, a businessmen from Iran, was arrested in the U.S. and confessed to all these accusations in front of a U.S. court in 2018 (Hermann, 2017), these accusations were not investigated in Turkey. Instead, through cooperating with secular forces again, especially with the colonel Hulusi Akar, who became the Minister of Defence later, Erdogan waged a political war against the movement. Especially after the failed coup attempt in 2016, the Erdogan regime declared the movement as a Terrorist organization under the name of FETO (Fethullah terror organization), in which his attack became brutal against the movement and his followers.

Immediately after the event, all the Gülen affiliated institutions were closed in Turkey. In Turkey alone, 2,213 private schools and private (tutorial) courses, 1,005 dormitories and boarding houses and 22 Universities and affiliated hospitals were forfeited because of their affiliation with the movement (Gümüş, 2019, p. 50). Similarly, depending on the Amnesty International Report (2018a), 180 media outlets and 1300 associations and foundations were closed and hundreds of thousands of people, including judges, journalists, academics…etc are arrested or dismissed from their jobs because of being a member of a terrorist organization. Even the Ex8, who is one of the detractors of the movement in Germany explained this tragedy as follows:

> "So that's really beastly what he does. So even the dictator in Chili has not arrested and expelled so many people as Erdogan, so he's got nearly a hundred and fifty thousand people stuck there like many families and the whole numbers together, that's maybe half a million people suffering and affected." (Ex8)

Therefore, Keneş (2020) described this situation as "Genocide" in his book and according to him, this type of pressure on the masses is clearly contradicting with the Convention on the

Prevention and Punishment of the Crime of Genocide and International Criminal Court (Keneş, 2020, p. 17). He first quotes the second Article of the convention to demonstrate his point such as:

Any of the following acts committed with intent to destroy, in whole or in part, a national, ethnical, racial or religious group, such as:
(a)   Killing members of the Group
(b)   Causing seriously bodily or mental harm to members of the group
(c)   Deliberately inflicting on the group conditions of life calculated to bring about it is physical destruction in whole or in Part
(d)   Imposing measures intended to prevent births within the group
(e)   Forcibly transferring children of the group to another group.

And then giving exact concrete examples where all these five acts were committed by Erdogan regime in his book (Keneş, 2020, p. 85-121). Besides, Keneş also quoted from Gregory H. Stanton, the president of the Genocide Watch, that the Erdogan regime conducted nine steps out of ten steps of Genocide in Turkey (Keneş, 2020, p. 123). According to Stanton Classification, Symbolisation, Discrimination, Dehumanisation, Organisation, Polarization, Preparation, Persecution, Extermination and Denial are the ten steps through genocide and Keneş demonstrated with examples that except Extermination, all other steps were conducted by Erdogan regime against the movement in Turkey (Keneş, 2020, p. 155). Keneş warns the other countries to be aware of the situation and mentioned that the Extermination step is also on the way, which is depending on Erdogan's political plans (Keneş, 2020, p. 151). Whether it will be an issue in the future or not, but it is clear that the aim of Erdogan regime and his secular partners is to destroy the movement in all realms.

The second crucial result of the study is dependent on the effects of the event at an international level. As it was mentioned above, the major problem for the Erdogan regime is the international structure of the movement. In his speech to the United Nations in 2018, he warned all other countries to be aware of the schools of the movement and suggested that the students of these schools will organize similar coups in these countries against their legislators and after achieving the power, they will leave the management of these countries to the movement (Hürriyet, 2018). However, according to Alam (2019, p. 287), unlike Erdogan's expectations his coup narrative is not reliable at an international level. Supporting this approach, in the field study all participants, even the detractors like Ex7, Ex8 and Ex9, suggested the event was organized by Erdogan, like the Reichstag fire in 1933 in which the Nazi Party used the fire as a pretext to claim that communists were plotting against the German government, which made the fire pivotal in the establishment of Nazi Germany.

> "Unfortunately, a very painful comparison, but it's true, Fethullah Gülen supporters in Turkey experienced the same events that the Jews in Germany had experienced before. They want to sell their homes at that time, because they need to go, let we say one million marks costs the house, but they get 100 thousand instead. Because people know that, they have to go to survive" (Ex9)

Two of the main reasons behind this comparison are that, interestingly both Hitler and Erdogan, described these events, the Reichstag fire and failed coup attempt, as a "Gift of God" (Timur, 2016) and used these events to attack their opponents, communists in Germany and Gülen followers in Turkey. Therefore, the regime prefers to use different methods outside of Turkey.

In this context the Maarif (Education) Foundation, which was founded just before the coup attempt on 17 June, 2016 with law number 6721 according to Turkish law, plays an important role in Turkish context (Maarif, 2020). Initially, unlike "Eğitim", which is mostly used in dailly language today to refer to education, the founders prefer to use "Maarif" which is an old word used in Ottoman era, and mostly used in conservative parts of the Turkish society today. Besides as it is published in the law, the foundation was supported by the Ministry of Education with one million Turkish Lira in 2016 for the foundation costs (Maarif, 2020) and in the last three years the same Ministry supported 155 Million Lira to the same foundation (Schoene, 2020). It was also mentioned in the same law that the foundation will contact educational activities with the approval of the Ministry of Education in Turkey. Depending on these statements, it is clear that this foundation was founded and supported by Erdogan regime. The other important emphasized point in the website of the foundation is the international and global activities of the foundation. The foundation has 346 educational institutions in 42 countries of the world and the president of the Board of Trustees of the foundation Prof. Birol Akgün, who is a very close academic to Erdogans' party, also described the reason behind this foundation as follows:

> Maarif Foundation was constituted in such a global political atmosphere. As stated in our law of establishment, our mission is to provide formal and informal educational services on the basis of the common values and heritages of humanity; to raise virtuous "good people" who will serve for the hope of peace, justice and development and combine the knowledge and experience of the Turkish community with universal values. (Maarif, 2020)

Of course the question that comes to mind is why did Erdogan found such an "independent" international education foundation, just before the failed coup attempt?

According to Ex9, one of the very well-known detractors of the Gülen movement in Germany, one of the answers will be the repetition of the Gülen Inspired Schools in their host countries. As it was mentioned above, since the corruption scandals of the Erdogan government in December 2013, the Erdogan regime pressures foreign countries, however the internationalization of the Movement started after the nineties and it already has more than 20 years experience in different parts of the world. Therefore, most of these countries profited from these schools and refused to close them.

> "See, Macedonia or Albania have refused to close those schools. Turkey has made a lot of pressure, both very small poor countries, countries that are under pressure from Turkey. Two million inhabitants in Macedonia, three million in Albanian, education is very low and poor, both said they are not closing the schools. In Macedonia, there are schools of the Gülen community called Yahya Kemal schools. I don't know the name in Albania[2] but they said that they have made a great contribution to our education system." (Ex9)

To solve this problem, the Erdogan regime offers these type of developing countries to transfer Gülen Inspired Schools to the Maarif foundation and promised to conduct the same quality education under their control. Such an attack will decrease the power of the movement and also helps the Erdogan regime to be active in different parts of the world. Consequently, depending on the Turkish news (Sabah, 2019), several countries like Pakistan accepted this offer and 83

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[2] It is called „Mehmet Akif Colleges" in Albania (Mercan, 2019, p. 313)

educational institutions and 11 dorms are taken from the movement and transferred to the Maarif foundation.

The other side of the coin is the Turkish societies approach to this conflict. As it was mentioned above, especially in the first two terms of the Erdogan regime, his conservative party, the Gülen movement and the secular state met in the same ground and cooperated and collaborated with each other (Turam, p. 137). In this period, between 2002 to 2010, the Gülen movement found chances to present their successful students out of Turkey to the society in well-presented contests so called "Turkish Olympiads", where these students perform Turkish songs and poems in different parts of Turkey (Volm, 2018, p. 161). The event occurred in the biggest football stadiums and the several TV channels broadcast the event live in their streams. Therefore, Gülen Inspired Schools are called "Turkish Schools" in the Turkish society that was known as expanding Turkish language and culture to the whole world (Volm, 2018, p. 161). However, depending on the participants of the study, as a consequence of the failed coup attempt, Erdogan labelled the movement as a Terrorist organization and by this way he has succeeded to isolate the Gülen movement from the Turkish society and as an crucial effect of this, the GISs left their Turkish identity outside of Turkey. Ex3 explained this issue as follows:

> "I think that the coup changed our school profile. Because the GIS schools were mostly known as 'Turkish schools' and I think that this understanding changed, and this Turkish identity was left. I think it was the biggest impact of the coup Attempt." (Ex3)

Indeed, before the failed coup attempt, the movement already changed the name of the contest and presented it as "International Festival of Language and Cultrue – IFLC" in which the dominant role of the Turkish was removed and the other languages and cultures are also presented, but the event and political pressure accelerated this transformation.

In this point, Erdogan saws the opportunity and this gap and he presented the Maarif Schools as a the new "Turkish Schools" to the Turkish society that promote Turkish language and culture to the world. This point is highlighted as "To carry out comprehensive educational activities throughout the world based on the common values of humanity and Anatolian tradition of wisdom" in the Mission part of the foundation in a close manner, but it is clear to see that in the publications of the foundation that teaching Turkish to foreigners program (*Türkçenin Yabancı Dil Olarak Öğretimi Programı*) takes a crucial activity of the foundation (Maarif, 2020). In this way, Erdogan gains the support of the especially nationalist part of the society and tries to decrease the power of the movement outside of Turkey.

Inarticulately, it is difficult to find out any specific educational concept of the Maarif schools rather than emphasizing good quality education and combining friendly relations between Turkey and the host countries. Actually, because of the mentioned two reasons, such as breaking cooperation between the Gülen Movement and host countries by transforming GISs to Maarif foundation schools, and taking the support of the Turkish society by promoting Turkish language and culture worldwide, the Maarif foundation and their educational activities are part of Erdogan's political war against the movement. Therefore, it is very difficult to analyze these schools from educational sciences perspectives. Besides, neither the Foundation itself, nor the Turkish media give detailed information about how this foundation works, how the staff in these schools are hired or attended to these jobs and what are the features of their educational concept in these schools. (See webpage of the Foundation: www.turkiyemaarif.org)

Some other activities of the Erdogan regime also supported this point. As a concrete example, on 28 July, 2018, the manager of the GISs in Mongolia, Veysel Akcay, who has been living for 24 years in Mongolia, was kidnapped by the Turkish secret service spies (Reuters, 2018). He was brought to the International Airport of Ulaanbaatar, the capital city of Mongolia. However, his wife and other eyewitnesses informed the police and important authorities of the government through social media. The plane which had been sent by the Turkish government to take him back to Turkey was not allowed to leave the airport and he was rescued that day by police officers. A similar attempt was successful in Moldavia (Reuters, 2018). On 6 September, 2018, Turkish secret service agents kidnapped seven Turkish teachers who were working at GISs in Moldavia and brought them to Turkey against their will (Stockholm Center of Freedom, 2018). 24 similar kidnapping activities were also reported in the other parts of the world against the Gülen followers (Schoene, 2020). However, in developed countries like in the U.S. or Europe, where the Turkish Secret service could not conduct such kind of illegal attempts easily, the Erdogan regime uses different strategies to fight against Gülen Inspired Schools. As a concrete example, on the one hand Erdogan tries to open schools to compete against the movement and expand it is influence like in Germany (Schoene, 2020) (Köhne, 2020), on the other hand the regime hires Amsterdam Law Company (Amsterdam, 2019) or pays 530,000 € to Mike Flynn, advisor of the Ex-US President Trump, for lobbying activities against the movement in the U.S. (Grimaldi, Nissenbaum & Coker, 2017). USAM1 mentioned an event, which he had experienced during the application for a new charter school in their state and explained how this company works against the movement in the US.

"The board there decided to discuss it (the application) and I joined that meeting. The state of the Republic of Turkey has directly held a lawyer company called Amsterdam here, just because they have tried against the schools. [...] These guys came to this rally, they wanted to have a word, they were given the right to speak, they came with several our old parents and with several people from Turkish minority there and they said negative things about us to the board. But there are board members who are constantly asking, what is the relationship between your stories and this school? "(USAM1)

Mainly because of the poor argumentation of the Amsterdam Law company, that application was approved by the board according to the participant of the study. In addition to mentioned events, Turkish consulates also refuse to work on passports of teachers or management of the Gülen followers' and thus force them to immigrate when their passports expire.

Conclusion

Consequently, from an educational perspective, the Maarif foundation and their schools do not have a special educational concept, except promoting Turkish culture and language outside of Turkey and increasing Erdogan's influence in foreign countries. That is why the foundation has two type of publications such as teaching Turkish to foreigners program books, and nine bulletins of the foundation where social and political cooperation between Turkey and these foreign countries through these schools are emphasized in detail. Indeed, the aim of the foundation does not have any educational aspect; instead it is part of Erdogan's political attack against the Gülen movement and their schools outside of Turkey. (Köhne, 2020) The goals in this strategy are on the one hand breaking the collaboration between Gülen Inspired Schools and host countries, which is part of political war of Erdogan against the movement. On the other hand, it is an internationalization activity of the Erdogan administration that targeted the Turkish societies support, especially conservatives and nationalists in Turkey. Therefore, despite the huge financial support of the Turkish government, on the poorly designed webpage

of the foundation in three languages such as Turkish, English and French, there is no detailed information about the Foundation, their staff, educational concept or vision. Similarly, in Turkish media, the news about the foundation only consists of where and when the foundation takes the control of a Gülen Inspired School in country X or Y.

In contrast, in German media it is highlighted that the German politicians and administrators are very suspicious about the foundation and even though they allow the foundation to found a school in Germany, under German laws of course, they are afraid that such a kind of school will increase the adaptation problems of Turkish minority to Germany (Köhne, 2020) (Schoene, 2020). Therefore, it seems that local states resist against such an activity and, despite the pressure of the Erdogan regime, the foundation could not found a school in Germany until today. Besides, in the long term, it is difficult to predict the future of the foundation, because its consistency depends on the current Erdogan administration. It is not clear if the foundation will be supported again by the state if the political order in Turkey changes in the future. From these aspects, it is clear that the Maarif foundation and educational activities of the movement have a political meaning, rather than educational, and they have to be more researched by political and educational scientists together.

Acknowledgment

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Contact email: mehmet-evrim.altin@iu.org

Adapting Active Learning in Presence to Distance Education:
Effective Strategies from Four Cases in Higher Design Education

Ingrid Calvo Ivanovic, Politecnico di Milano, Italy
Francesca Mattioli, Politecnico di Milano, Italy
Silvia Deborah Ferraris, Politecnico di Milano, Italy
Lucia Rampino, Politecnico di Milano, Italy

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Abstract
From 2020, education had to rapidly adapt to the massive employment of distance learning. The adaptation of design teaching at university level seemed to be particularly challenging because of its orientation towards project-based and active learning. Design students engage in learning by doing, being supported by the interrelation with teachers and classmates within the classroom. This approach is rooted in the art and craft teaching, historically hinged on studio pedagogy where the direct teacher-learner relationship is a key element of learning. Besides, design education strongly relies on peer learning, which naturally occurs within the physical space. Also, design learners deal with concepts related to the perception of forms, colours and spaces, which can be critical when mediated by a screen. All these disciplinary and relational implications defy design teachers to adapt to distant learning. Through action research, this paper presents four design-related courses that were adapted to distance learning. Being originally in presence, at different programme levels (i.e. Bachelor, MSc), in two universities and countries (i.e. Politecnico di Milano, Italy; UAHC, Chile), these courses implemented different teaching strategies that make them succeed in keeping the active learning approach. They possibly achieved even better results than in the previous years, in terms of participation, engagement and outcomes. An analysis of the four courses, the teaching strategies implemented, and results are described, with the aim of providing an aid to teachers from project disciplines, for the adaptation to distance learning of courses with a strong focus on practice and presence.

Keywords: Higher Design Education, Project-Based Learning, Active Learning, Distance Learning

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Introduction

In 2020, due to the global contingency arising from the COVID-19 pandemic, most productive and training activities were strongly affected. Higher education institutions, in particular, had to react promptly to this crisis for the continuation of teaching, which, until then, had relied on face-to-face activities or laboratory work that required physical interactions. Most higher education institutions suddenly embraced remote education, rarely considered in the pre-2020 context, and therefore not consolidated in its implementation, infrastructure, and academic culture. Consequently, this teaching modality created unprecedented challenges for educators to adapt their didactic strategies, which had to be rethought in terms of teaching activities and assessment methods. Moreover, instructional designers had to consider the influence on the learning experience of two new phenomenons: the massive employment of technologies in education and the social distance.

Researchers (Dewstow et al. 2000; Guangul et al. 2020) have documented some of the most common difficulties of teaching online: (i) there are more inter-group problems; (ii) the drop-out rate is higher than usual; (iii) access to technology and internet can vary greatly between students; (iv) there can be many differences between students concerning technological skills; (v) the technological infrastructure problems of faculties; (vi) lack of students' commitment to submit assessments; (vii) academic dishonesty regarding assessment. Additionally, Kebritchi et al. (2017) have integrated most of these considerations into three main critical aspects related to instructors, students and content issues. Learners' issues included expectations, readiness, identity, and participation in online courses, while instructors issues comprise changing faculty roles, transitioning from face-to-face to online, time management, and teaching styles. Content issues encompassed the role of instructors in content development, integration of multimedia in content, role of instructional strategies in content development, among others.

These aspects are particularly challenging in design higher education due to mainly two issues: (i) the discipline orientation towards design-based learning (DBL), an approach founded on the active learning philosophy, and framed into the broader approach known as problem-based learning. Design-based learning is a hands-on learning activity. It engages students in solving real-life design problems or tasks, facing the detection of specific needs of potential users, studying the context of the proposed issues, and using design activities to solve the problems (Gómez Puente et al., 2013). Design students learn by doing, supported by the physical interrelation with teachers and classmates, mainly within the classroom space. In design schools, DBL has a strong social dimension, as it often includes collaborative learning tasks; it is not rare that students develop their design projects through teamwork, exploring alternatives, making use of multiple solution methods, selecting the criteria, and providing feedback to each other on their assignments (Chang et al. 2008; Denayer et al. 2003). A design studio course or lab space with collaborative, project-based research drives many reputable design programmes worldwide.

The second challenging issue (ii) regards direct perception and materiality. Design is fundamentally an activity aimed at shaping informed perspectives and approaches on the creation of artefacts. For this reason, design knowledge is constructed through experimentation by testing theories in some materially manifested form (e.g. concepts with tangible outcomes for evaluation: a device, an app, a system model, a video). In DBL, students and teams are encouraged to deeply investigate materials, visual resources such as colour, texture, perspective, motion, behaviour, and ergonomics. When teaching is provided

from intangibility and mediated by a screen, the effective delivery of quality content might be threatened since students (and educators) are distant from the direct perception of visual or physical phenomena.

From all of the above, the following research question was posed to address these relevant issues: what didactic strategies can be implemented to adapt design courses to the new distance education scenario? How might design educators preserve an active learning and project-based learning approach in their teaching strategies?

As the researchers are highly involved in teaching activities of design courses and had a first-hand experience of these issues, this paper aims at answering the questions by analysing their developed teaching strategies to overcome them.

The Context: Four Design-related Courses

The teaching strategies implemented during 2020-2021 in four design-based courses were analysed (Scheme 1), including remote active learning. The analysed courses are part of design curricula in two higher education institutions of Italy and Chile. Two courses were delivered at the bachelor level, while the other two at the master level (see x-axis in the scheme). The courses analysed at the fundamental or bachelor level were *"Colour"* and the *"Visual Elements Design Studio"*; those considered at the advanced or master level were *"Design Theory and Practice" '*and a *"Seminar on Teamwork"*.
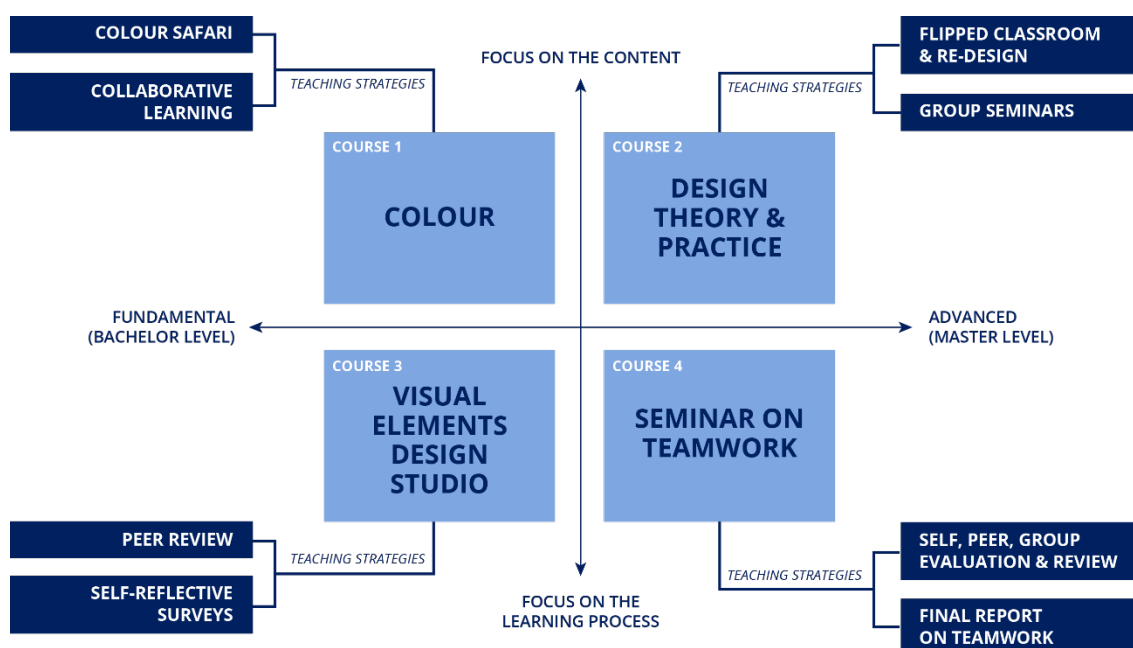
Figure 1. The Research Context, Courses Cases Study and Teaching Activities

If the x-axis represents the level of the program where the course was delivered, the y-axis represents the considered teaching activities focus. "Contents" and "learning process" were identified as two distinct types of focus of the activities under examination. Indeed, active-learning strategies implemented in courses 1 and 2 (on the upper part of the scheme) had a strong focus on improving the delivery of the disciplinary content. On the other hand, the strategies selected within courses 3 and 4 (on the lower part of the scheme) focused on improving the learning process. This distinction is particularly relevant in project-based learning since the specific disciplinary knowledge is just as crucial as being acquainted with

the design process. With all of the above, the specific case study regards two teaching strategies for each course.

Case Study: Courses Activities

Course 1: Colour

The Colour course is a shared course for the Arts & Crafts programme and the Design in Performing Arts programme of Universidad Academia de Humanismo Cristiano, in Chile. Ingrid Calvo Ivanovic is the responsible teacher, and 35 students were enrolled on the 2021 spring semester. This course focuses on recognising the colour phenomenon, from its observation to its inclusion in design practice. The course introduces learners to a methodology for the professional application of colour, starting from design needs, colour conceptualisation, and colour assessment within the final product. The teaching strategies analysed were *Colour Safari* and *Colour Semantics through Collaborative Learning.*

Activity 1 – Colour Safari

The "Colour Safari" is a series of exercises that consisted of the students playing at "capturing colours" within the everyday environment of their homes. Students received a commission for each course's content, hunted the required colours with their smartphone cameras, and then shared the results in an online folder with their classmates. Before 2020, instead of collecting colours by taking pictures, students had to reproduce with coloured pencils the hues they observed by walking outdoors and observing the city's landscape. As human urban mobility was considerably reduced during the pandemic lockdown, and it also affected the access to buy colour materials (pencils, paints, canvases), this didactic activity was highly affected.

Some of the pros of teaching online were:
•   Equalising previous skills (while using coloured pencils require some practical skills that not all students may have, the use of photo cameras lowered the technical difficulty without affecting the acquisition of the content)
•   Enhancing the students' perception of their environment (by proposing the appreciation of home environment *"with renewed different eyes"*)
•   Sharing materials online, making classmates results available for all
•   Recording lectures helped students with intermittent access to the internet
•   Students perceived exercises as "catching game" instead of assessment (the perception of *learning by playing*)

Some of the cons of teaching online were:
•   Not seeing the physical work of students or seeing colour with different light and screen conditions (colour relativity as a critical issue)

The Lessons Learned for the Future were:
•   The further realisation of the activity (in presence) will consider a mixed approach between photos and physical materials collected in the home environment
•   Rising students' awareness of colour relativity and motivating reflection on the matter

Activity 2 – Colour Semantics Through Collaborative Learning

The second activity regards "Colour Semantics". As colour associations and meanings strongly depend on cultural agreements and collective consciousness, an increase in group work was proposed for this content unit during the course's redesign and adaptation. The inclusion of a collaborative task aimed at actively engage students in learning theoretical-based content. During the activity, students discussed with their teams the individual and collective associations of specific colours with emotions, concepts, moods and cultural identification. The inclusion of free digital tools or apps favoured online collaboration and mutual support among teammembers. Some of the tools used for the activity were: Google Jamboard, Socrative, Kahoot, and Canva. Before 2020, this course did not consider group work in any of its activities.

Teaching Online Pros
•   Using free digital tools and apps to grant inclusive activities
•   Optimising time management (in the arrangement of group work)
•   Allowing students to share their environment despite the distance

Teaching Online Cons
•   Missing the value of being together physically

Lessons Learned for the Future
•   The further realisation of the activity will still consider working in teams in presence with the aid of free digital tools and apps

Course 2: Design Theory and Practice

Design Theory and Practice is part of the Master of Science in Design and Engineering at Politecnico di Milano, Italy. Lucia Rampino is the responsible teacher, and 108 students were enrolled on 2020 fall semester. The course aims to stimulate critical reflection by understanding how design has evolved from its birth to nowadays, going through four perspectives: technical, human, digital and social. To this extent, the course heavily adopts active learning through seminars, flipped classrooms and group discussions.

The teaching strategies implemented in this course analysed here were *Flipped Classroom and Re-design*, and *Students Seminars*.

Activity 1 – Flipped Classroom and Re-design

Students were required to prepare for the lesson in advance in this activity, reading the contents before class time. During class, the main contents of the lesson were recalled and openly discussed with the teacher. Then a project-oriented group activity was done by students to connect theory with practice. Before 2020, these activities were paper-based, and the outputs were collected physically.

Teaching Online Pros
•   Sharing materials online
•   Optimising time management
•   Reducing problems regarding physical space (for such a large number of students)
•   Optimising students' organisation in groups

-      Optimising the visual quality of students' outputs

Teaching Online Cons
-      Face-to-face interactions were missing
-      Some internet or connection issues were informed

Lessons Learned for the Future
-      The further realisation of the activity (in presence) will prefer gathering students in the same room, but materials (e.g. inputs, outputs) will be shared online
-      Groups will present their outputs through materials delivered in advance through a shared folder

Activity 2 – Students Seminars

Specific lectures were dedicated to thematic seminars where groups presented a critical discussion on a topic given by the professors. Before 2020, students decided groups and communicated them to the professor, who often had to manage the inclusion of students left out from communicated teams. Moreover, the groups delivered the presentation slides as they present them in class.

Teaching online Pros
-      Setting a delivery folder reduced organisation issues on the day of the seminars
-      In order to optimise the organisation in teams, professors decided the groups based on students' previously declared interests.

Teaching Online Cons
-      There were no cons reported in the remote teaching of the activity.

Lessons Learned for the Future
-      The further realisation of the activity (in presence) will keep both improvements (shared delivery folder and students' groups decided by interests)

Course 3: Visual Elements Design Studio

This course is part of the Bachelor Program in Product Design at Politecnico di Milano, Italy. Silvia Ferraris is the responsible teacher, and 55 students were enrolled on 2021 spring semester. The design studio develops in-depth the use of visual languages and related tools and techniques to represent a design project through the development and interpretation of perceptual mechanisms and chromatic systems. The aim is to integrate communication skills with the ability to translate elements of design analysis and synthesis visually.

The teaching strategies implemented in this course were *Peer Review & Self-Reflective Surveys*.

Activity 1 – Peer Review

Before 2020, this activity consisted of displaying the student works on the classroom desks, then walking around and leaving a ballot close to the student's preferred work. From 2020, students vote online after looking at their classmates work in a shared folder.

Teaching Online Pros
•   Optimising time management
•   The voting process became anonymous
•   Sharing materials online, making classmates results available for all

Teaching Online Cons
•   Not being able to see the materiality on the physical work of students
•   Seeing with different light conditions to those from the students
•   Not being able to see the physical work from different angles or perspectives

Lessons Learned for the Future
•   The further realisation of the activity (in presence) will prefer presenting the work in the classroom, but voting online
•   Photos of the results will always be shared online from now on

Activity 2 – Self-reflective Surveys

The second activity was the performance of self-reflective surveys, where students were encouraged to reflect on their learning process by writing down some notes about the experience they had while doing their homework; their achievements in terms of theoretical, practical and soft skills; their critical insights about any failure or disappointment they had. Before 2020, these notes were collected in individual envelopes named by student's nicknames.

Teaching Online Pros
•   It was easy to manage students' responses (through digital documents)
•   The whole process became more effective than before (time, assessment, management)

Teaching Online Cons
•   Access to the internet is mandatory

Lessons Learned for the Future
•   The further realisation of the activity will continue to be digitally conducted by using smartphones inside of the classroom and supported by institutional wi-fi

Course 4: Seminar on Teamwork

This course is part of the Final Project Work Design Studio of the Master of Science in Design and Engineering at Politecnico di Milano, Italy. Francesca Mattioli is the responsible teacher, and 55 students were enrolled on the 2020 fall semester. The seminar aims at fostering the development of collaborative competencies. Since the course approach is project-based and collaborative learning, the seminar activities aimed to foster awareness and critical reflection on teamwork.

The teaching strategies implemented in this course were *Self, Peer and Group Evaluation & Reviews,* and a *Final Report on Teamwork.*

Activity 1 – Self, Peer, Group Evaluation & Review

After mid-term presentations, students individually perform a self, peer and group evaluation which is later on shared and discussed with the rest of the team. After this moment of group discussion, a review is organised with the professor to report emerging group issues and future strategies to improve teamwork. Before 2020, these activities were non-structured.

Teaching Online Pros
•   Optimising time management
•   Less physical materials to manage
•   A more formalised path and planned reviews were implemented
•   Providing recorded guidelines and instructions to students made understanding easier

Teaching Online Cons
•   Direct teacher observation and establishing relationships with the teams and students were missing
•   Informal or not-structured student-student and teacher-student interactions were missing

Lessons Learned for the Future
•   The further realisation of the activity (in presence) will continue to be a formalised path with dedicated reviews.
•   Recorded explanations and evaluations will be kept

Activity 2 – Final Report on Teamwork

The activity was first included in the online edition of the course and consisted of students' delivery of a final group report to assess and present the way the team worked throughout the semester.

Teaching Online Pros
•   Formalised moments for groups assessment were implemented
•   Groups were autonomous in managing their time and deciding when / how to do the activity
•   It was possible to monitor teamwork even from a distance

Teaching Online Cons
•   Direct observation and establishing relationships with the teams and students were missing

Lessons Learned for the Future
•   The further realisation of the activity (in presence) will keep the delivery of a digital report and will integrate it with the direct observation of students during class time

Emerging Considerations and Discussion

Distance learning showed a considerable advantage on time optimisation in all courses analysed. The use of clouds services provided a valuable space to share materials and recorded lessons online, which helped improve the organisation and give students more permanent access to knowledge.

Without any doubt, two of the most critical points in the distance learning of design are the impossibility of:
• observing the students' work physically (prototypes, models, materiality)
• observing students while working together

However, adopting a blended learning approach for future realisation of the courses analysed could be key to match this critical point and the significant support of digital tools used for the teaching activities.

The current distance learning scenario has forced teachers and students to observe how specific processes and digital tools can support classroom teaching, accelerating the consolidation of digital literacy in educational environments, which began at the end of the 20th century. By working on this study, the researchers found themselves surprised about how easy it was to implement these changes, but, interestingly, the limits of the courses' previous activities before online teaching had not been noticed before the remote teaching situation. The process of being forced to adapt these activities to the current scenario has now disclosed the opportunities that may help to improve the quality of design teaching.

In the four courses analysed, teachers adopted a proactive and understanding attitude towards the difficulties that the new context could mean for the students, and they looked for ways to facilitate their learning, thinking about their needs and interests. This attitude could be vital to creating a supportive and inclusive environment within the virtual classroom.

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Contact email: ingrid.calvo@polimi.it

Mission Impact: Higher Education as Catalysts for Sustainability Transformation

Bas Van Den Berg, The Hague University of Applied Sciences, Netherlands
Thomas Wissingh, The Hague University of Applied Sciences, Netherlands
Gabriela Bustamante Castillo, The Hague University of Applied Sciences, Netherlands

Abstract
Higher education has the potential to act as ecosystem catalysts, connecting with the places our institutions which they are a part of, for learning-based changes with wicked (sustainability) challenges. This, however, calls for reorienting and rethinking of the higher educational narratives and subsequent practices towards more ecological and relational ones. In this study, a pilot aimed to connect a course at The Hague University of Applied Sciences (The Netherlands) to an industrial park next to the university which is undergoing transition towards a sustainable living space. The pilot, which ran from September 2020 to February 2021, included 17 students from 9 nationalities and 12 different bachelor programmes, and was designed according to the concepts of an 'ecology of learning'. In this semester long course, called Mission Impact, students reflected every five-weeks, to capture their learning experiences using a combination of arts-based and narrative reflection methods. Two questions guided the analysis: (1) *what are the key design characteristics of an ecological approach to higher education that connects to sustainability transformations* (in times of COVID-19) and (2) *what does this type of education asks from to learners*. The reflective artefacts were analysed using Narratives of T-Mapping and juxtaposed with auto-ethnographic insights maintained by the first author for triangulation. Preliminary results of this pilot include the *structure in chaos*, s*pace for transformation, openness for emerging futures & action confidence* as components of such an ecological education that connects to and co-creates sustainability transformations.

Keywords: Ecologies of Learning, Narrative Mapping, Societal Learning, Relational Education, Qualitative Inquiry

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Introduction

The ongoing COVID-19 crisis, while difficult in many aspects has put a magnifying glass on our unsustainable ways of living. The sustainability crisis that we collectively face poses a severe long-term threat for life to thrive (Kopnina, 2020). If business-as-usual continues, damage to natural eco-social systems could be catastrophic (e.g., Brandt et al., 2013; Markard et al., 2012). To prevent this systemic failure, we must transition towards more sustainability-oriented futures where eco-social systems are designed to balance human activity and natural ecosystem integrity (Raworth, 2018; Wahl, 2018). In other words, we must transform towards more sustainable realities. Higher Education (HE) has the potential to act as catalyst, through a transformation of educational praxis, to co-create these futures (Poldner, 2020; Wals, 2019a). As education is linked to all issues presenting the Sustainable Development Goals (SDGs) (Tafuni & Heß, 2019) rethinking and reorienting education towards sustainability by co-creating sustainability transformations (STs) could be a way for HE to contribute more meaningfully to the public good (Wals, 2019a).

While we know that STs require fundamental changes in complex adaptive systems, these systems cannot be controlled by traditional top-down or bottom-up approaches. STs can however, be facilitated through deep learning-based processes (Burford, 2015; Lotz-Sisitka et al., 2015). As such, the importance of learning as a basis for these STs is frequently mentioned in literature (e.g., Beers et al., 2016; Geels, 2018). Furthermore, the discourse on learning-based STs, - sometimes referred to as learning ecologies for sustainable transformations (Barnett & Jackson, 2019) - acknowledges the highly contextualized and place-based aspects of STs (Pisters et al, 2020). This discourse and practice have so far however, remained (largely) outside the frameworks of formal HE (Barnett & Jackson, 2019, Wals, 2019b). Their role as catalyst for STs additionally requires a combination of external transitions (e.g., changes in systems, businesses, technologies) and internal transformation (e.g., changes in our values, mindsets, worldviews) (Ives et al. (2020)). This reorientation towards more ecological approaches could be seen as rewriting the narrative of HE, made tangible through designing educational processes, structures and cultures that connect to and co-create STs (van den Berg, 2020).

This re-narration builds on an ecological understanding of education (e.g., Barnett & Jackson, 2019; van den Berg, et al, *in press*) that normatively seeks to balance ecological and societal wellbeing (Raworth, 2018). In this way, learning-based change towards more sustainability-oriented futures is seen as an emergent property of the interrelations between people, places and educational praxis. Where ecological approaches to HE act as 'innovation ecotones' or learning-based liminal spaces for a dialogic process through which more sustainable realities can emerge (Pendleton-Jullian, 2009). While the potential for ecological approaches to learning, and HE, for STs is philosophically clear, and innovations in practice that engage with this transformative work are dawning (e.g., the proliferation of living labs, design labs and challenges labs), persistent conceptual and empirical gaps remain (Barnett & Jackson, 2019). In this paper, we connect to this starting movement and dive into the action-knowing gap by presenting a pilot study in The Hague, The Netherlands. This pilot focussed on learning-based change for STs within the Binckhorst region near the institution, The Hague University of Applied Sciences. This area is currently in transition from an unsustainable, industrial past, towards a regenerative and circular urban living future. In this pilot, an experimental course (Mission Impact), was run to engage students with facilitating societal learning for the complex issues that arise in such place-based STs. This course was inspired

by the Challenge lab at Chalmers University of Technology (Holmberg & Larsson, 2017) as well as transformative learning in general (e.g., Litz-Sisitka et al., 2015).

The aim of this project is discovering what a more ecological approach to HE which acts as catalyst for STs could look like. This practice engages with an educational reality where the complexity of transition challenges, and the messiness of their contexts around the physical spaces of our institutions, guide educational praxis instead of simplifying complexity to fit within educational structures (Wals, 2019b). In this paper, the following questions guide us: (1) *what are the key design characteristics of this ecological higher education?* And (2) *what does this type of education offer ask from the involved learners*? A (post)qualitative analysis of the resulting data was conducted through a combination of abductively analysing autoethnography (coordinator/teacher), narratives of 'T'-mapping (students) & design workshops (students, teachers & region representatives). The results include three main educational design propositions (*related to community, structure, and content*) and five (personal) design qualities (*balance, reflexivity, action confidence, vulnerability & openness*).

1.   Background

1.1.   Ecologies of Learning

Ecologies of Learning build on an ecological (and deeply relational) (e.g., Walsh et al, 2021; West et al., 2020) perspective on education and learning that '*involve us interacting with the world and the people and things in it, by experiencing and perceiving situations, trying to understand them, and responding in ways through new meanings emerges*' (Barnett & Jackson, 2019; 2). From this ecological perspective, the purpose of HE is to create the structures, processes and designs that connect and facilitate learners to collaborate towards more sustainability-oriented futures, within innovation ecosystems, and to guide collective action to bring these into being. Or as Laininen (2019; 187) says '*The main goal of education would be to give future generations tools for thinking and seeing the world differently, constructing their own worldviews, and acting to create a sustainable future. Learning would be embedded in creating change.* This transgression of existing reality requires an education that welcomes, and nurtures risk (Biesta, 2013), invites genuine vulnerability (Brown, 2018) without the fear of negative judgement of competence (Leah et al., 2019) and links learning strongly to place (e.g., Pisters et al., 2020). These are markedly different than most HE practices now and call for a transformation of how education is designed and enacted towards a more ecological approach (Wals, 2019b; van den Berg et al., *in press*).

This more ecological approach entails that education is a (co)-creative process that inherently carries a 'beautiful risk' (Biesta, 2013). For educators, this risk emerges from designing and enacting an education that connects to and co-creates STs in the innovation ecosystems of which they are embedded. Thus, leveraging the societal position of students, and higher education more generally, as (relatively) a-political agents of change (e.g., Holmberg & Larsson, 2017) to make a positive impact. For students, this risk is presented in the intense nature of this type of learning, which combines working on external changes (Ferrer-Balas et al., 2009) and internal transformation (Ives et al., 2020). Thus, calling for t-learning[1] (e.g., Lotz-Sisitka et al., 2015).

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[1] Transformative, Transcendent, Transgressive & Transdisciplinary

1.2.   Transition Design

Transition Design (TD) is an emerging transdisciplinary field of design practice that attempts to tackle the complexity and wickedness of contemporary challenges such as climate change, biodiversity loss, and social injustice (Irwin, 2015, 2018). TD is a collection of approaches centred around working towards more sustainable futures from a relational perspective. And highlights the importance of inviting a multiplicity of approaches and perspectives to this designing (Scupelli, 2015). Additionally, TD is marked by focussing on long time horizon's and the use of (participative) mapping (visual storytelling) to facilitate multi-stakeholder engagement making complex and wicked problems more accessible. Thus, the approach engages with the broader learning ecology, or innovation ecosystem, involved with a particular wicked problem and place.

This gives TD potential for ecological forms of education, as an approach to facilitate societal learning. Where the TD approach shines, is at challenging underlying societal assumptions and proposing alternative stories for more sustainable futures and making these tangible for a broad audience (e.g. Dunne & Raby, 2013, Candy & Kornet, 2017). In this sense, TD approaches could be seen as participatory or transgressive approach to learning-based change for STs (Andriessen, 2008, Macintyre, 2019).

In this way, both the ecological approach to HE and TD are inspired by Buckminster Fuller's perspective on teaching '*if you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking.*'. Where the ecological approach to HE consists of the broader educational structures and processes and TD as a collection of methods for students to engage with wicked problems in the region. This engagement with TD can also serve as context for personal T-learning. Because of this potential complementarity, TD served as the main approach for the pilot of the Mission Impact course.

1.3.   Applied Narratology

The power of narratives in shaping our collective experience, as well as education, is well known. And narrative methods are used relatively frequently in education and t-learning sciences (e.g., Pisters et al., 2020; Macintyre 2019). There are also links between future-oriented studies, such as design, and applied narratology (Raven & Elahi, 2015). However, insights and practices derived from narrative studies are often uncritically translated to interdisciplinary practices of professional storytelling (Moenander, 2018), including in education (Gallagher, 2011). There is also strong emphasis on the power of stories in shaping our collective action in the discourse on sustainability-oriented futures (Wahl, 2016), e.g., in reference on alternative meta-narratives to organizing society such as the doughnut-, circular- or regenerative economies (Raworth, 2018, Poldner 2020). This then presents a twofold opportunity for the inclusion of applied narratology with ecologies of learning and TD. On one hand, applied narrative approaches can be powerfully leveraged to facilitate t-learning as well as societal change. On the other hand, engaging with practice-based storytelling approaches to facilitate societal learning may contribute to the further conceptual understanding of the role of narrative in STs.

As TD navigates multiplicity of relational co-constructed desirable futures. Of both a personal and societal nature. The task of ecological forms of HE includes both the telling and shaping of better stories (those that are more conducive to STs) and supporting in the

processes of (personal) transformation that accompany such praxis. It is in this nexus, between university, place, and story that a potential for these deep transformative learning processes can be. We explore one such nexus in the form of Narrative T-Mapping (NTM) in chapter 3. Simultaneously, this combination of narrative, TD and ecological education is limited and deserves further (academic) inquiry.

2.   Methodology

2.1.   Research Setting

To test this more ecological approach to HE that acts as catalyst for STs in the regions around our institution. A course (minor) of 30 ECTS was created called Mission Impact. This course was a semester-long educational that explored more ecological approaches to higher education, which combined working on external transition challenges (such as the transition towards a circular region) with internal transformation (the way we feel, perceive, and are in the world). The minor/course ran from September 2020 to February 2021 and was co-designed and conducted in close partnership with the Binckhorst region, next to our university in The Hague, to leverage the potentiality of higher education as catalyst of learning-based change. In this pilot, 17 students from 9 countries and 12 educational programmes joined to develop their regenerative leadership capacity — *the ability to connect to and guide collective learning towards sustainable future realities*. The participants were all near the end of their bachelor studies, with a majority coming from the Technology, Innovation & Society department (STEM). This included students from spatial planning, industrial design engineering as well as the applied mathematics programmes. In the course, they tackled transition challenges, such as sustainable homes of the future or the vulnerability of circular businesses in the face of rapid urbanization, in small transdisciplinary teams of three to four over a fifteen-week period.

To support the process of engaging with these challenges, externally oriented courses (such as on complexity and regenerative design) were combined with inner oriented workshops and sessions. These latter sessions were hosted bi-weekly and initially were highly scripted activities that included *storytelling*[2] *exercises*, *guided meditations*, *drawing*, and other forms of *arts-based learning* (Pearson et al., 2018). As the semester unfolded, these sessions became increasingly less scripted as it became clear that the students primarily needed a safe space (in the sense of a space where they felt they were able to be vulnerable) to share about how they were doing, feeling, and becoming in this process of inner transformation. Every fifth week of the semester, the students were asked to submit visual and written narratives of their reflections about their subjective lived experiences. The first two of these, weeks five and ten were open format. The last (week 15) purposely engaged with the Living Spiral Framework (Macintyre, 2019) as a method for reflection on relational processes of learning-based transformation through arts-based and story approaches.

2.2.   Data Generation

For this research, a multi-method approach to data gathering was applied. Which included: (1) the recordings of the collective reflective sessions described above, resulting in seven recordings lasting between one and four hours in length respectively. (2) The narratives and

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[2] For a great example of some of these materials please see: https://www.thehagueuniversity.com/docs/default-source/documenten-onderzoek/expertisecentra/mz/impact-magazine-1-february-2021.pdf?sfvrsn=2df593cd_4

arts-based reflective assignments submitted every fifth week of the course, which resulted in 49 documents. (3) An auto-ethnography conducted by the author over the duration of the semester (Ellis & Bochner, 2016, Le Roux, 2016), and (4) through three co-design workshops conducted after the end of the minor. These design workshops were hosted on three subsequent days focussing on engaging with a representative of a new region that we will be adding for the next run in September 2021. Consisting of representatives of the Binckhorst (n=3) and a selection of the teachers and students involved in the pilot (n=5). In these workshops, a series of questions based on the insights derived from the student's work were posed. Participants were asked to sketch out their response, as a form of photo-elicitation (e.g., Atkins & O'Brien, 2009; Glaw, 2017) before engaging in a group dialogue. In the background, one research assistant was visualizing the dialogue as a sketch while two others were putting them on a Miro board. Towards the end of the sessions both modalities were presented back to the participants to corroborate the findings.

2.3.　Data Analysis
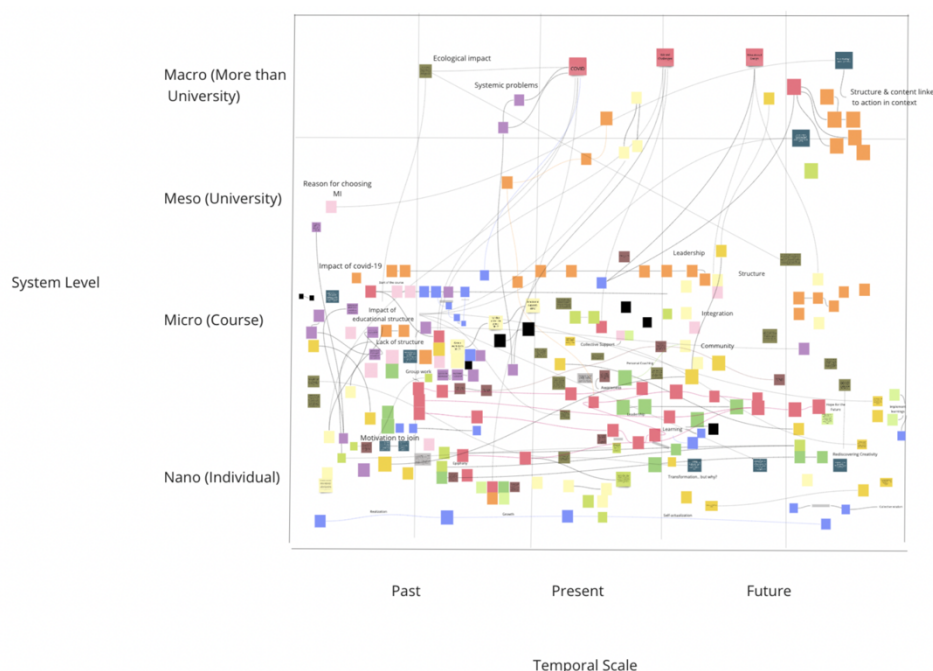
Figure 1: Transition/Transforming Narrative Mapping

2.4.　Narratives of T-mapping

Fig 1. Example of one of the NTMs, where each colour post-it represents a different subjective viewpoint. The horizontal axis represents the temporal dimension, and the vertical axis represents the system levels axis.

The NTM, builds on a framework developed for TD (Irwin, 2018) but combines this with a narrative focus (temporal). Based on our proposition that stories act as subjective representations of lived-experience and that by mapping relationships across a multitude of viewpoints in a system can identify relational patterns which can be leveraged for change. This approach zooms in on patterns that emerge across and between time and system levels by mapping out the gathered materials from a narrative perspective. In this analysis, the included system levels were the following:

System Level	Scope	Examples
Macro	Relationships with elements, forces, events, or items that influenced the experience beyond the scope of our university.	Covid-19, financial crisis, municipality, entrepreneurs
Meso	Relationships with elements, forces, events, or items within our university but outside the Mission Impact course.	University policy, departmental policy, colleagues.
Micro	Relationships with elements, forces, events, or items at Mission Impact level.	Assessment, educational structures, group dynamics, courses
Nano	Relationships within individual students and their experience	Feelings, thoughts, phenomenological experience.

Table 1: Overview of the System Levels Used with the NTM in the Context of this Pilot

This abductive analysis (Tavory & Timmermans, 2012) was done by mapping the elements of the materials, as narratives. Each item was mapped by two people independently, and a team of six met each day during the analysis period to discuss and debate placings and interpretations of these placements on the NTM. Additionally, the auto-ethnographic insights (from the lead author), were not discussed until the NTMs were completed. In total, three NTMs were created (one for each of the five-week intervals in the semester) to identify if, and why, patterns related to the research questions shifted and/or emerged over time.

The results of the NTM were juxtaposed with the autoethnographic insights, as well as those from the design workshops for triangulation. The results have been collated and are presented in the next chapter. In the spirit of post-qualitative inquiry, the results also include educational design and ethical considerations that warrant further exploration.

3.   Results, Discussion & Ethics

3.1.   Educational Design

3.1.1.   Community

Community building as well as engagement came back strongly across each of the NTMs. Both in the sense that facilitating community-based activities and learning is an educational design element that requires active work from educators (connecting to each other). As well that larger collaborative activities are (sometimes) required because of the scale and complexity of the work involved (connecting to place) (Pisters et al., 2020). This demands from an educator to act as connector, connecting students with (key) stakeholders in the place they are working with. Both of which were identified as a key consideration for educational design, particularly in times of COVID-19. During one of the workshops, it was also mentioned that this community engagement need may have been larger because of COVID-19. For the next iteration of the course, '*spider in the web*' people that can act as connectors between students and places will be recruited.

The side of community building (within the course) was strongly highlighted in the narratives as essential to co-creating a safe space for engaging with the complexity of the challenges. The collective reflective sessions were particularly identified as '*a moment of general vulnerability that wasn't only experienced by me but by most of [the] Mission Impact students'*. As a response the course was adapted by switching from individual tutoring to collective coaching, the incorporation of game nights, the co-hosting of a research workshop, and a reduction in structure in favour for open dialogue in the bi-weekly reflective sessions. This adaptation for more personal interaction was considered valuable '*A huge positive of the minor was the amount of support that was shown. By the tutors, by my teammates, by the other students, and even some of the lecturers. I felt very supported when I needed it and I tried to support others when they seemed to be in need. I hope to keep this up.'*

3.1.2. Content

The Mission Impact pilot, like many other educational innovations, suffered from over ambition and limited resources. This resulted in the amazing charity of over 30 guests who contributed workshops and lectures. But because of this widespread generosity, these were all over the place (from eco-psychology to sustainable entrepreneurship) and rarely connected to the process of engaging with wicked problems in the region as it was unfolding. This variety and disconnection, as well as varying degrees of complexity, resulted in (frequent) confusion. As one student commented '*During some lectures, I feel empowered and motivated to make a change. I feel eager to contribute for a better world. There are lectures, which make me feel confused and as if I do not belong'*.

This presents a difficult design challenge, as on the one hand, ecologies of learning perspective build on relational self-guided learning and seeing education as living systems (Barnett & Jackson, 2019, Wals, 2019b), which requires just-in-time response that is potentially an unreasonable ask for external guest contributors. On the other hand, (most) students do not come from an educational system that operates as an emerging living system, and have in the case of transdisciplinary courses (wildly) differing degrees of knowledge and competence for transdisciplinary collaboration. They are still coming to grasp with a relational approach to their own learnings. Resulting in a difficult design problem where you as an educator must simultaneously educate towards a base level to engage with wicked problems and its complexity. While allowing as much possible space for (self-guided) learning to emerge from the living system as it unfolds. Through the analysis, three learning lines (*leadership for regeneration*, *creative research doing* & *personal sustain-abilities*) that constitute this baseline for our specific educational context were identified. These lines will be incorporated as courses based on t-learning (Sisitka et al., 2015) representing a relatively small percentage of the total course load.

3.1.3. Structure

As preliminary research showed (van den Berg, *in press*) structure and complexity conflict with this ecological form of HE. In this first pilot, this led to a conscious decision to shy away from structure. This was done explicitly to create space for context-dependent emergence. However, in embracing complexity we have gone too far. The data highlights a need for improving the (supporting) structures, or processes of guiding students through engaging with the wicked problems. As many references to (lack of) structure were found in the narratives such as 'o*verall, the first couple of weeks felt hectic. Like too many online classes for one day, too little human interaction, too much sunshine to spend the whole day fixed behind a*

screen inside. Juggling work, classes, and projects in the first five weeks, I probably dropped more than just one ball. But somehow, it turned out fine.' This was also identified auto-ethnographically.

When working with complexity, uncertainty, and unclarity of context, such as with wicked problems, having some structures that acts as a place you know you can come back to if you get lost in complexity is vitally important. While lacking structure is not necessarily a bad thing for the facilitation of learning (Wals,2019b), in this pilot (almost) everything was unstructured. Adding this additional layer of chaos, presented a barrier for the students to engage with the unknowingness of the transition challenges. While the importance of structure was made clear, the form of it is not yet so. For example, if assessments and assignments are predefined (which is often the case) this may add structure but also robs away adaptive space for contextual complexity and the learning that can unfold from this. This dichotomy presents both a design and ethical challenge, an ethical dilemma between protecting (psychologically) by shielding from complexity of context (by adding structure) to reduce anxiety and stress. And creating the educational space for them to embrace complexity and the t-learning that this can facilitate (externally and personally). The educator's challenge for this dichotomy is, depending on the context in which you are educating, to identify and facilitate the minimum amount of structure required to facilitate (psychological) a safely embracing complexity while remaining adaptable to changes in (external) contexts. A way to explore this tension could be through the metaphor of a sailing ship where the hull represents safety and structure and the sail and environment represent dynamism and learning (see the work of Scott Barry Kaufman on transcendence for example). It is the architect's job to balance structure and dynamism because if there is a leaky hull, the boat sinks, but if the sails are faulty, you don't sail anywhere. Well, at first, the sails were flowing freely but our hull was leaking.

3.2.   What does this education offer to learners?

The results presented here do not differentiate between learners (e.g., students and educators) for engaging with these more ecological approaches to higher education. They do, however, exclude other learners involved in the ecology such as policymakers and entrepreneurs due to lacking quality data from these agents. In future iterations, integrating these ´*spider in the web*´ individuals more strongly as researchers-practitioners in designing, running, evaluating and researching the course aims to resolve this lack of data. The resulting categories are presented below, including links to existing literatures, the changes from this iteration of Mission Impact, and the design and ethical considerations that this involves. Where it is important to note that these response-abilities when seen from a relational perspective on human development (Faulkner et al, 2018; TESF, 2020) can only be nurtured in becoming-with the broader ecology of learning in which the course is embedded (Haraway, 2016).

Component	Description	Changes for Mission Impact v0.2	Ethical & Educational Design Considerations
Balance	The ability to recover from the stresses placed upon learners on an ongoing basis.	Stronger inclusion of mindfulness and contemplative practices, ongoing dialogue about the degree of stress and more individualized adaptability of the programme to accommodate different stressors across personal learning ecologies.	What content elements of the course should be reduced or adjusted to create space for more mindfulness practices? How can fairness of education be safe guarded while providing individualization in the name of balance? When is it okay to push beyond balance in the name of facilitating t-learning for sustainability transformation?
Reflexivity	The ability to critically (re)engage personal worldviews, perspectives, feelings, and thoughts based on lived experience.	Being more explicit about the goals of this ecological education and highlighting the ways that the course is designed to invite reflexivity.	Who are we to judge which specific worldviews are just, and which are not? How can the conditions that facilitate learners to be reflexive be facilitated?
Action Confidence	The ability to engage with the unknown with courage, through practices and action.	Clearer communication from the start that it is okay to be uncertain, and that it takes a lot of courage, vulnerability, and openness to act regardless of that fact. Strong integration in the learning journal that will be used throughout the semester. Inclusion of workshops on this topic.	How can the (psychological) safety of the learners be protected without losing complexity? How much courage can be, or should be, expected from learners within a single semester? How do we create supportive structures of assessment to reward risk taking inherent with acting in confidence?
Vulnerability	The ability to engage with uncertainty and risk from a place of strength.	See above	See above

Openness	The ability of being in service to emerging futures without being too attached to any particular outcome.	See above	See above

Table 2: Internal Response-abilities Required for Engaging with Sts That Emerged from the Ntms.

The above components should be seen from their relationships with community, structure, and content, and it is precisely in that relationality that we can identify further opportunities for more ecological approaches to higher education. The central question for educators engaging with this type of education then is: *how would your educational practice look like, based on the uniqueness of the place and wicked problems that you engage with taking the above internal qualities into consideration?*

Conclusions

This pilot, as well as this research, represent an empirical step towards a more ecological higher education that connects to and co-creates sustainability transformations. We have hoped, through this (post-)qualitative analysis and presentation of personal narratives that were generated during the pilot, to provide a sketch for designing and enacting this type of education. With the first steps taken and many ethical and empirical questions remaining, a few of which have been shared in table 2, higher educational narratives and subsequent practices need to continue evolving towards more ecological and relational ones. Starting with the next chapter of the minor Mission Impact. Besides warmly inviting more practitioner-researchers to engage with this type of education, we would like to stress the highly contextual nature of this type of ecological higher education. We see this form of education as a relational narrative that is currently being co-written by multiple people, times, and places, and while we are not able yet to articulate the conclusion of this ecological education as narrative. We look forward to the next chapter.

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Contact email: B.vandenberg@hhs.nl

Indonesia National Education Response in Covid-19:
A Policy Analysis Approach

Desi Saragih, School of Government and Public Policy, Indonesia

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Abstract

Since the Covid-19 outbreak in March 2020, the Indonesia Ministry of Education had formulated, released, and adjusted numbers of policies responding to the national priority agenda of public health resilience. This paper discusses the dynamics of education response at a policy level, focusing on stakeholders role and involvement at central and subnational levels. During the Covid-19 pandemic, The Joint Decree of Four Ministries (Minister of Education and Culture, Minister of Religion, Minister of Health, and The Minister of Home Affairs) coordinated with the National Task Force for Covid-19 had been the major framework for education policymaking. Two policies for education delivery methods during the pandemic are; (1) *Belajar Dari Rumah (BDR)* or Learn from Home; (2) *Pembelajaran Tatap Muka (PTM)* or Face to Face Learning. As an archipelagic country with a decentralized government system, the policy decision had been through challenges and dynamics indicated by numbers of revisions in published guidelines by GoI. The Guidelines for Implementation of Learning in the New Academic Year and Academic Year during the Corona Virus Disease (Covid-19) Pandemic Period initiated in June (3 months after the Covid-19 outbreak), then published in July 2020. Within this four months' time, the subnational government experienced a limp in handling the education delivery. The top-down policymaking approach in Indonesia's education policy response leaves space for innovation in local government's practical adaptation. However, the capacity to deliver within that space is yet to be successfully performed by the subnational government.

Keywords: Joint Decree of the Four Ministries, Belajar Dari Rumah (BDR), Pembelajaran Tatap Muka (PTM)

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I. Introduction

During Covid-19, school closure was due to swift priority to public health resilience. Data from UNESCO Global monitoring of school closure due to COVID-19 indicated that in Indonesia, education delivery, the design of learning activities (method, instrument, and platform) used to support teaching and learning activities required to achieve the intended learning outcomes, subject to adjustment and relies on a distance-learning system as a modality.[1] (see Figure 1).
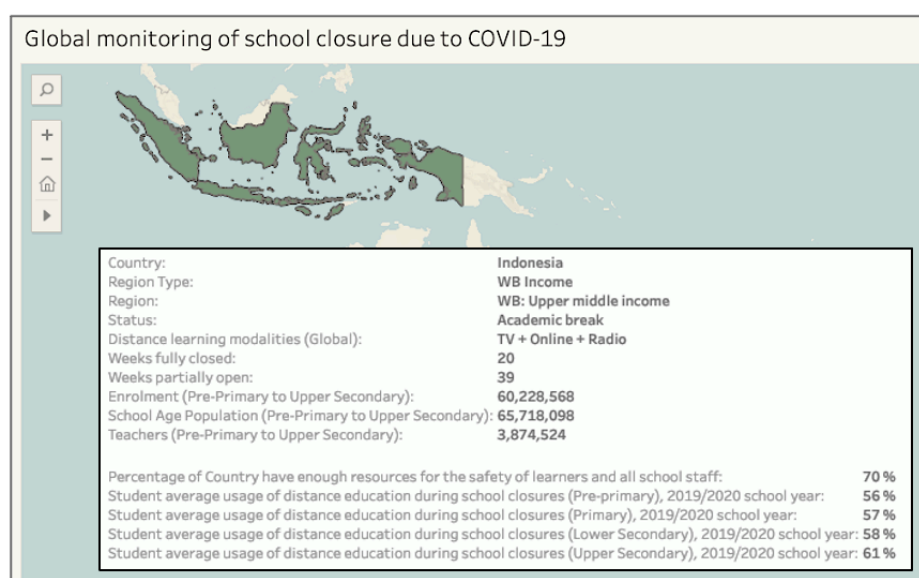
Figure 1: Indonesia Status on School Closure Due to Covid-19.
Source: UNESCO Global monitoring of school closure due to COVID-19.

A preliminary survey from the Indonesia Ministry of Education Research Technology and Culture (MoECRT) in April 2020 reported approximately 68,729,037 students studying at home, with a significant percentage coming from Primary School (28,6 million), followed by Junior High (13,1 million), Senior High (11,3 million), and Higher Education (6,35 million).[2]
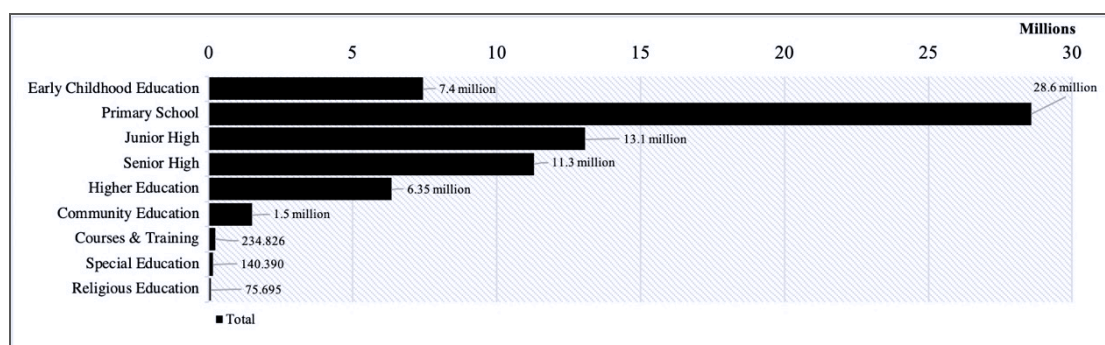
Figure 2: Number of Students Studying at Home.
Source: MoECRT, April 2020

Since January 2001, Indonesia has implemented policy decentralization. In a decentralized policy system, decentralization is a management technique to increase the effectiveness and

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[1]UNESCO (2020). UN Disclaimers. *Global monitoring of school closure due to COVID-19.*
[2]Indonesian MoECRT. (April 2020). Published in Databoks.

efficiency of an organization in the form of delegation of authority from higher levels of organizational structure to lower ones (Wicaksono, 2012). In Indonesia, with the adoption of the principle of decentralization, it then realized in the form of Regional Autonomy policies enshrined in the Law of The Republic Of Indonesia Number 32 the Year 2004 concerning Regional Government defines decentralization as *"concurrent government affairs between the Central Government, Provincial Government, and Regency/City Governments."*

With a decentralized-policy system like Indonesia, taking inventory on policymaking dynamics during Covid-19 is particularly important. Because of the complexity of its policy system, taking the inventory on policy dynamics will contribute to the insight of fluctuating in the policymaking process and the landscape of the policy itself, including the coordination among policy actors. On March 6th, 2020, when the Indonesian government announced the first case of Covid-19 in Indonesia (Ramadhan Tosepu, R., Savitri, D., & Ahmad, 2020), since then, upon the emergency status enhanced across the sectors, its influence observable on occurring swift of plan and priority within and across the technical ministries/units, from central to local government.

This research's domain is in *research about a policy*, meaning it analyses the process and dynamics in the policy formulation process, with education delivery during covid-19 as the limitation or scope of the policy study, in response to the Covid-19 situation from the typology of Central Government to Local Government. According to Nugroho, R. (2014), research about policy is a form of research within a particular policy dimension, including the formulation process and the dynamics therein; how policy is governed, monitored, evaluated, including policy performance and outcomes. Research about policy is scientific-driven, and researcher analysis will stand neutral, roots from scientific findings despite the dynamics behind the decision-making process. Hill (2005), through Nugroho (2014), further differentiates between policy analysis and policy analysis. Analysis of policy studies about policy contents, policy outputs, and policy process. Meanwhile, analysis for policy focuses on policy evaluation to provide information for policymaking and improve both process and policy advocacy.

This study revolves around two objectives; (1) to identify the policy operationalization approach from Indonesia's education policy response in Covid-19 from Central Government to Local Government level, and; (2) to take inventory on dynamics in Education Policy Response.

II. Research Method

This study is grounded research using Stakeholder Mapping as framework of analysis focusing on Policy Actors' role, output, and dynamics synthesize from relevant research and practices as substantial insight. The Data Domain in this study adopted from research by Nugroho (2018). Primary data source in this study coming from formal policy products of Indonesia Government, with secondary data from input on Convention or Speech of relevant Policy Actors on Education Delivery during Covid-19. During Covid-19, government publication on policy decision does not always exclusive to rule and regulation. To understand the dynamics in policy response, this study uses documentary analysis of minutes and meeting papers published by government. As adjustment from Nugroho (2018), this study decides not to use Behavior aspect as domain of data collection considering it will be high in subjectivity, subject to changes without clear scientific justification and basis.

Therefore, this study attempts to limit subjectivity consideration as much as possible and focus the data that have scientific/policy justification.

Table 1: Data Domain. Adjusted from Nugroho (2018).

Types	Derivatives (Nugroho, 2018)	Derrivates of data domain in this study
Formal	1. Legislation 2. Law 3. Regulation	1. MoECRT National Educational Law and Regulation, Circular Letter, Decree, related to educational response in Covid-19. 2. Related Technical Ministry formal policy response to govern point (1) at national and/or subnational level related to educational response in Covid-19. 3. Discourse on Regional Government Formal Policy Response for point (1) and (2).
Convention (General Agtreement)	1. From State/country 2. From Society	1. MoE Convention related to educational response in Covid-19. 2. Regional Educational Government Body Convention related to educational response in Covid-19.
Speech	1. State officials 2. Government officials 3. Community Officials (Community Leaders, Religious Leaders)	1. MoE official statement/speech (Press Release, Video Dissemination, other related speech) concerningceducational response in Covid-19. 2. Nadiem Anwar Makarim (Indonesia Minister of Education) speech concerning to educational response in Covid-19. 3. Related Technical Ministry responding or related to MoE policy speech concerning to educational response in Covid-19 4. Discourse on Regional Government Educational Government Body for point (1) and (2).
Behavior	1. Personal 2. Family 3. Group	Excluded in this study.

III. Findings and Analysis

a. Relation from Public Policy in National and Regional

Under the decentralized policy system, Indonesia governs the educational affair through a joint effort between Central and Local Government stipulated under Law No. 32/2004 concerning Implementation of Regional Autonomy at a macro level and Law No.20/2003 about National Education System at Sectoral level. As part of the national development plan, Education through the joint effort conducted to achieve the goal of Basis of all Indonesia's Public Policy, The 1945 Constitution of the Republic of Indonesia, to advance general prosperity and develop nations' intellectual life. Nugroho (2008) visualized the relation between Indonesia's national and regional educational policy, as seen in Figure 3.
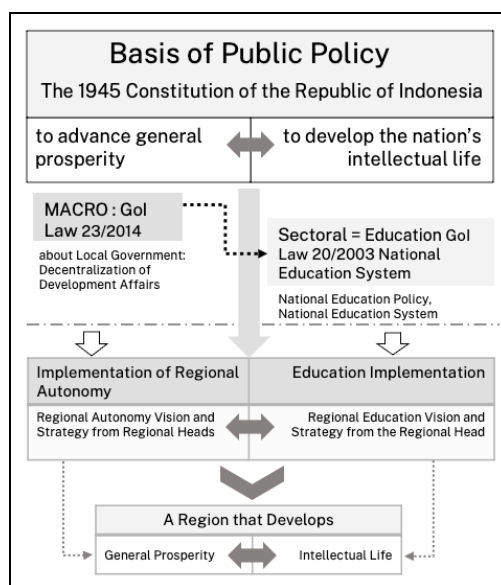
Figure 3: Ideal Relation Between National Public Policy and Regional Public Policy.
Source: Nugroho (2008).

b. General Typology of Education Policy Response in Covid-19 (Early Outbreak)

Since Indonesia's early Covid-19 outbreak in March 2020, the public's health resilience towards the pandemic has been prioritized and depicted from The Presidential Decree No. 11 of 2020 clauses the Corona Virus Disease 2020 (Covid-19) *Public Health Emergency*. Later on, the Government of Indonesia (GoI) issued Government Regulation (PP) No. 2 the Year of 2020 concerning *Large-Scale Social Restrictions (PSBB)* in Accelerating the Handling of Covid-19.
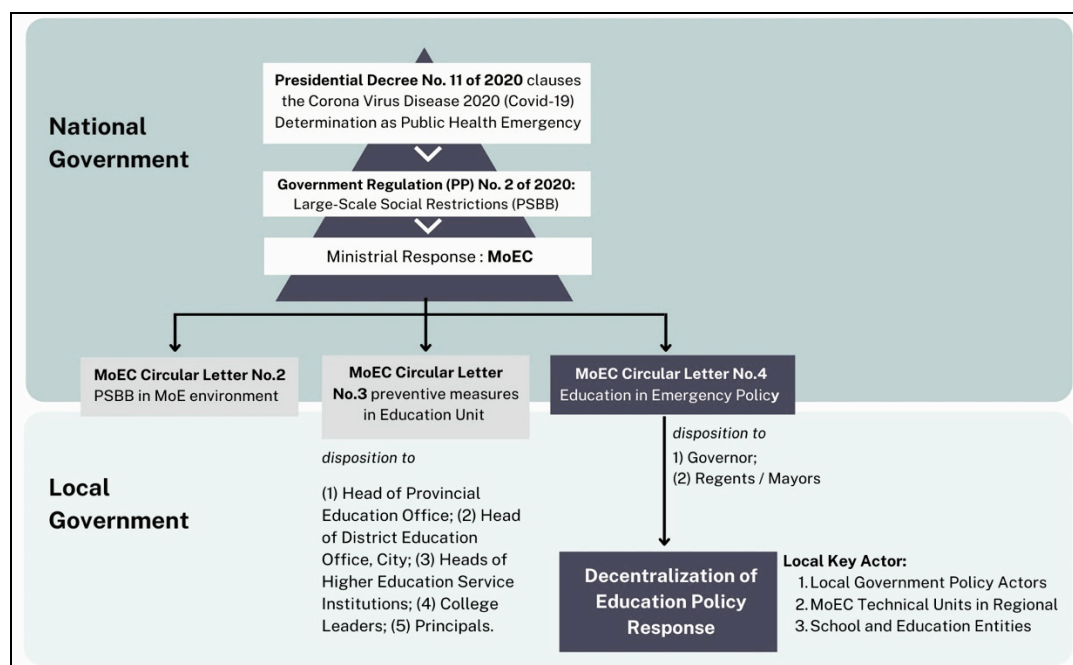
Figure 4: General Typology of Education Policy Response in Covid-19 (Early Outbreak).
Source: MoECRT 2020 Policy Letter. Visualized by Saragih, D. (2021).

Upon compliance to a national priority, the Ministry of Education and Culture (MoEC), who acts as a National Government that governs the policy response for national educational delivery during this time, formulates, releases, and adjusts numbers of policy accord to the recent findings and national priority agenda. At the beginning of the policy response, the Ministry of Education focuses on enhancing the emergency status and outbreak prevention from its internal unit through MoEC Circular Letter No.2 and No.3 the Year of 2020. The framework for education policy response and its decentralization to the regional government began to be stipulated through MoE Circular Letter No.4, with a disposition to Governor and Regents or Mayor as stakeholders in the regional level (Figure 4).

c. Adjustment in Education Delivery (Early Outbreak)

At the initial phase of policy response, MoEC policy focuses on a short-term, immediate management approach by adjusting educational activities contrary to the regulation of Large-Scale Social Restrictions (PSBB), which is the epicenter of national policy. As the first policy stipulating education delivery during Covid-19, MoEC Circular Letter No.4 Year of 2020 concerning *The Implementation of Education Policies in The Emergency of The Spread of Corona Virus Disease (COVID-19)* informed six decisions; (1) Cancellation of National Examination; (2) Learn from Home or BDR Policy in Indonesia's Education Policy nomenclature; (3) Adjustment on School Examination; (4) Adjustment in Class Promotion Test; (5) Adjustment in New Students Admission Program (PPDB) 2020 procedure, and lastly relaxation on; (6) School Operational Fund (BOS) and Education Assistance Fund for Covid-19 handling in Education Unit.

This policy letter instructs regional policy actors: Heads of Provincial Education Offices, Heads of District/City Education Offices, and Heads of Education Units. From the goal of the MoEC Circular Letter No.4 the Year of 2020 and regional policy actors it was targeted to, key policy directions from MoEC Circular Letter No.4 the Year of 2020 are to enhance emergency awareness and preparedness in the Regional Education Unit and to preparing an institutional framework for further education policy response in Covid-19 Emergency. As the bedrock of Educational Policy implementation during Covid-19, the MoE Circular Letter No. 4 the Year of 2020 Governed under two principles; (1) The health and safety of students, educators, education staff, families, and communities is a top priority in setting learning policies; (2) The growth and development of students and psychosocial conditions are also a consideration in the fulfillment of educational services during the COVID-19 pandemic.

d. Policy Formulation and Coordination

To provide an insight into the landscape of policy coordination, through Figure 5, identifiable patterns of policy responses are: (1) Central Government formulated and published the national response that acted as a standard of compliance for all ministries/sectors; (2) Each ministry/sector complied by adjusting existing policy or formulated new policy to adhere to a national standard of compliance; (3) Each ministry/sectors decentralize their sectoral response to the regional government.

As stated in point (1), the national policy response initiated from Central Government, with Presidential Decree No.11 the Year of 2020 with Corona Virus Disease 2020 (Covid-19) Determination as Public Health Emergency. This state of health emergency translated into Government Regulation (PP) No.2 the Year of 2020 concerning Social Restriction (PSBB). Then, Ministries at the central government comply and respond at a sectoral level to

operationalize it by decentralizing their sectoral affair into regional sub-sector through regulation instruments.

On Education Policy Landscape, MoEC decentralizes the educational response through MoEC Circular Letter No. 4 the Year of 2020 and Joint Decree of The Four Ministries. MoEC Circular Letter No. 4 the Year of 2020 then translated into Governor Regulation at Provincial Level then followed by Mayor at City/District Level. Using North Sumatera Province as a case example, the emergency status was initially enhanced through Governor of North Sumatera Circular Letter No. 440/2666/2020 concerning Enhances The Alertness to The Risk of Transmission of Corona Virus Disease (Covid-19) Infection in North Sumatera. The first decision stated in this Circular Letter; Distance learning agreed to become a modality in learning with a specific target to High School level effective from March 17th, 2020, until April 03rd, 2020.

At the City/District level, Medan City Mayor Regulation Number 11 of 2020 concerning Health Quarantine in the Context of Handling Corona Virus Disease (Covid-19) in Medan City was published on April 30th, 2020. At each regional-sectoral affair, this regulation is complied by the Regional Education Office who governs the technical operation until each Education Unit as stipulated in Secretary-General Circular Letter No.15/2020. The education unit itself consists of Headmaster, Teacher, Parents, School Committee, and Students.
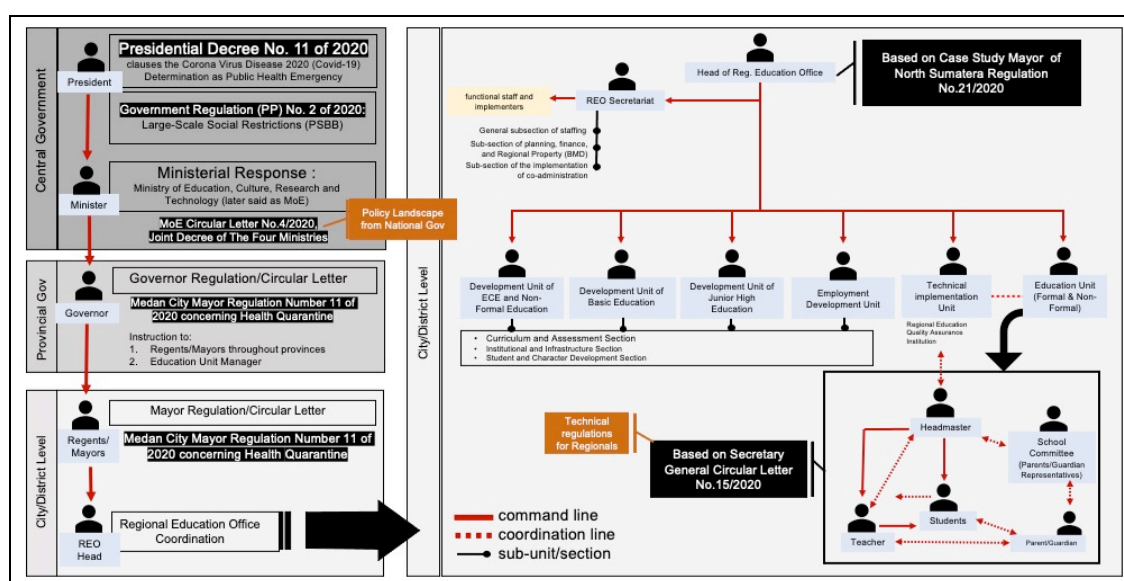
Figure 5: Education Delivery in Covid-19 Coordination Line.
Source: MoEC Circular Letter March 2020-November 2020.
Visualized by Saragih, D. (2021).

On regular technical coordination of BDR, for example, for incidental needs of technical supports, headmaster coordinates with Technical Implementation Unit of Education Regional office.

e. Policy Dynamics from March until November 2020.

From March 2020 until November 2020, a form of dynamics in Indonesia educational policy response observable through; (1) formulation of new policies; (2) amendment or adjustment of existing policy; (3) reduction or strengthen of institutional authority and function; (4) Joint

inter-ministerial agreement. The exploration of policy dynamics from March 2020 until November 2020 (in chronological order) as seen in Table 2 below.

Table 2. Policy Dynamics of Indonesia Educational Response in Covid-19

Date Issued	Identification	Digest
09/03/2020	**MoEC Circular Letter No.03/2020:** Prevention of Corona Virus Disease (Covid-19) in Education Unit	focuses on enhancing the emergency status and formulating the bedrock of education policy response
24/03/2020	**MoEC Circular Letter No.04/2020**: Implementation of Education Policies in Emergency of Corona Virus Disease (Covid-19) Widespread	
13/04/2020	**Regulation of Minister of Education and Culture No.19/2020:** Amendment to the Regulation of the Minister of Education and Culture Number 8 of 2020 concerning Technical Guidelines for Regular School Operational Assistance (*School Operational Fund Relaxation*)	The insertion of an additional article between articles 9 and 10, namely article 9A which governs School Operational Fund (BOS) allocatable for financing; 1. Subscription of power and services for paid online education for educators and/or students in the context of implementing learning from home;
13/04/2020	**Regulation of Minister of Education and Culture No.20/2020:** Amendment to the Regulation of the Minister of Education and Culture Number 13 of 2020 concerning Technical Guidelines for Non-physical Special Allocation Funds for Operational Assistance in the Implementation of Early Childhood Education and Equality Education for Fiscal Year 2020 (***Non-Physical Special Allocation Fund Relaxation)***	2. School Safety: for the purchase of liquid or hand sanitizer, disinfectant, masks or cleaning support; 3. Salary of non-government official (*ASN*) honorary teachers. 4. Adjustment of transfer mechanism: Directly to school
18/05/2020	**Secretary General Circular Letter 15/2020:** Guidelines for Organizing Learning from Home in an Emergency Period for the Spread of Corona Virus Disease (Covid-19). Disposition to: (1) Governor; (2) Regent/Mayor, across Indonesia	1. Objectives, Principles, Methods and Media for the Implementation of Learning From Home (BDR) Policy. 2. Implementation Guide for Learning From Home (BDR) 3. Structured guidance to 3 Actors; Teachers, Parents/Guardians, Students. 4. Covid-19 Task Forces in the regions are encouraged to form Education Posts consisting of; elements of government, community organizations, business institutions and the media and in carrying out their functions/duties coordinate with; Task force for handling COVID-19, Local Health Service Regional Disaster Management Agency Social services, Office of Communication and Informatics Community, media & business organizations. 5. Two Modes BDR Learning: *in the network* (gadgets and laptops through several portals and online learning applications) and *off the network (*using TV, radio, self-study modules and worksheets, printed teaching materials, teaching aids and learning media from objects in the surrounding environment).

Date Issued	Identification	Digest
15/06/2020	**Joint Decree of The Four Ministries No.01/KB/2020** : zonation status of GREEN, YELLOW, ORANGE, and RED ZONES in all districts/cities in Indonesia.	1. Determination of the 2020/2021 New Academic Year at the education level 2. Regulation of Face to Face (PTM) and Learn From Home (BDR) zoning; a. YELLOW, ORANGE, RED; prohibited from conducting PTM (Face-to-Face Learning) to continue learning from home (BDR) activities. b. GREEN: PTM gradually during the transition period for education units that have fulfilled all the checklists and is ready. 3. Setting the learning mechanism during the New Normal and Transition Period.
17/06/2020	**MoE Press Release Number 140/sipres/A6/VI/20202020:** Coordination of Emergency Curriculum Preparation.	The Ministry of Education and Culture (MoEC) accepts proposals from the Indonesian Child Protection Commission (KPAI) and the Indonesian Teachers Association (PGRI) to implement emergency curriculum in Covid-19 pandemic situation and said being reviewed by Cultural and Book Research and Development Agency of MoEC.
10/07/2020	**MoEC Assessment and Learning Center:** Publication of Cognitive Diagnostic Assessment Handbook	Preparation includes three steps: 1. Making an Assessment Implementation Plan 2. Identification of Assessment Materials 3. Compose 10 Simple Questions Assessment questions are given to all students in the class, either Face-to-Face or Learning from Home.
04/08/2020	**Decree of The Minister (MoEC) No. 719/P/2020:** Guidelines for Implementing Curriculum in Education Units in Special Conditions	Provide flexibility for the Education Unit to determine the curriculum according to the learning needs of students. 3 OPTIONS: (1) continue to refer to the national curriculum; (2) using the emergency curriculum or; (3) make curriculum simplification independently Exception: 12 SOPs on Emergency Curriculum covering for Face-to-Face (PTM) learning specifically for practicum (Vocational School at all zones are allowed to conduct PTM) Standard of Compliance.
05/08/20	**Decree of The Head of Cultural and Book Research and Development Agency of MoEC Number 018/H/KR/2020 :** Stipulation of Core Competencies and Basic Competencies in the Emergency Curriculum based on the Decree of the Minister of Education 719/P/2020	Analogy-wise **Decree of The Minister (MoEC) No. 719/P/2020** acts as *Regulatory Guidelines* or Compliance Standards while the *contents* of the curriculum itself launched through Cultural and Book Research and Development Agency of MoEC.

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Date Issued	Identification	Digest
07/08/2020	**Joint Decree of The Four Ministries No.03/KB/2020:** Amendment to Joint Decree of The Four Ministries No.01/KB/2020 for Learning Policy Adjustments. Basis of Consideration: Responding to recent evaluation result on Covid-19 situation Pre-Conditions: 1. Based on the Risk Map based on the Covid-19 Task Force including the Yellow or Green zone 2. Meet the prerequisites on the School Readiness Checklist 3. Obtaining a Limited PTM license from; Local Government, School Committee 4. Schools are ready to implement Limited PTM	1. GoI's evaluation indicate that there is a dire need for Face-to-face (PTM) from students --> BDR learning difficulties, Exacerbating negative impact to students. 2. Permission for Limited PTM extended to the YELLOW ZONE (area with low level of risk of transmission) based on the results of the mapping of the national task force for handling COVID-19 Focus of The Policy: Limited PTM expansion to YELLOW ZONE (originally only green zone) Procedures and Pre-conditions for Limited PTM.
20/11/2020	**Joint Decree of The Four Ministries No.04/KB/2020:** Learning Implementation Guide in the 2020/2021 Academic Year during the 2019 Coronavirus Disease Pandemic (Covid-19) Basic consideration**:** *The determination of learning policies must be regionally focused to suit the context and needs.* 1. Local government is the party that knows best and understands the conditions, needs, and capacities of the region 2. Conditions, needs, and capacities of sub-districts and/or villages/in the same regency/city can vary greatly from one another; 3. Policy making in the education sector in the regions must go through holistic considerations and in line with policy making in other sectors in the regions .	1. Strengthening the role of Regional Government in granting of PTM permit 2. Zoning Relaxation: Zoning or regional risk maps from the national Covid-19 handling task force no longer determines the granting of PTM permits 3. The Regional Government may stipulate the granting of a face-to-face (Limited PTM) learning permit in one district/city simultaneously or gradually per sub-district/village.

f. Overview of Governance Discourse in Local Level

From March-November 2020, the framework for a policy response is still centralistic. After eight months of limps in central-local coordination on disrupted communication in Covid-19, politically, the independence of local government was acknowledged and demanded through the Decree. The practice, however, still use the previous Standard of Compliance like health protocols, zonations ruling, and PTM pre-condition, but the authority to exercise final policy decision rendered fully to Local Government. The discourse on educational governance at the regional level during Covid-19 indicates several shortcomings. From the perspective of public service responsivity, bureaucratic challenges are unable to address strategic Covid-19 issues indicated by shortcomings in terms of speed, quality, and community satisfaction. This is also influenced by overlapping policies that take a long time to implement (Arfan et al., 2021).

According to Nugroho (2008) Factors that influence the transferability of education policies in the regions are; (1) *Environmental factors (Regional Leaders or Heads; Regions):* region that is successful in developing education have regional heads who have a vision of regional education, prioritize human development, have the courage to defend the vision and values that have been believed, and have managerial skills in implementing them; (2) The *existence of a superior policy;* contains clear and firm provisions, with policies that are favorable to objects and subjects that are important in the element of educational development; (3) *Implementation Consistency;* put forward a management approach (values of efficiency, effectiveness, and optimization) rather than politics.

IV. Current Decision Tree and Policy Direction

a. Current Decision Tree

The current Decision tree on ruling the PTM-BDR Policy still reflect based on The Fourth Joint Decree of The Four Ministries. According to this decree, Yellow and Green Zone can conduct PTM Learning. Upon fulfilling the Preconditions like vaccination, declared as Eligible or Ready based on Daftar Periksa Kesiapan Satuan Pendidikan or Readiness Checklist, and Stipulated as Eligible or Ready by Regional Government, Education Unit can choose to continue PTM if they are ready, or opt the BDR program. The final decision maker, however, still Parents and School Committee.
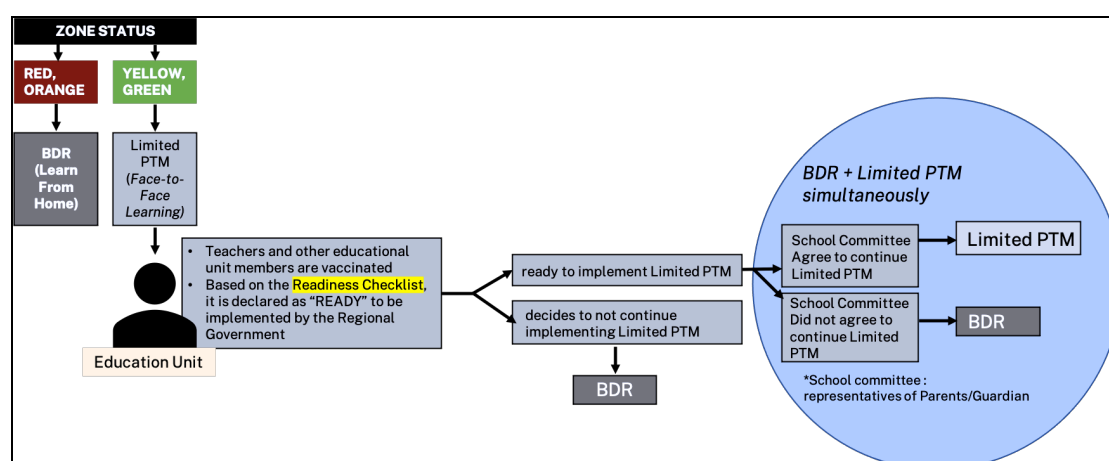
Figure 6: Current Decision Tree on Indonesia PTM & BDR Policy.
Source: MoEC Circular Letter March 2020-November 2020.
Visualized by Saragih, D. (2021).

From the decision tree above, even if the Education Unit fully ready to conduct PTM, if Parents decide BDR as best option for their children, education unit cannot enforce them to join PTM.

b. Policy Prospect

On Policy Prospect viewpoints this study divide the prospect into four areas of policy prospects. On Framework of Policy Response, since early outbreak on March until September, the pattern is still centralistic with predetermined standard of compliance. On November, until recently on July 2021, the Local Government rendered full authority to assess the readiness in conducting Face to Face (PTM), with reduction of National Task Force role to Risk-Mapping and Coordinative function. Despite PTM is not mandatory, the

direction of the policy moving towards PTM as mode of learning. Both on Limited PTM & Swift Ruling, and Launch of Regulatory & Non-Regulatory Guidelines, several adjustment, launches of new policy had been formulated following the fluid situation of Covid-19 and under the Two Principles of Education Policy in Covid-19. With this principle in mind, health resillience measure still act as an axis in the Limited PTM policy as stipulated in Joint Decree of The Four Ministries No.03/KB/2021. On Fiscal Allocation viewpoint, Constitutional Mandate of 20% Budget Allocation from National State Budget (Mandatory spending) has secured educational funding in Covid-19, Fund Relaxation & direct transfer to school unit to accelerate Covid-19 have been implemented as best practice and further continued in 2021 year.

V. Conclusion

Since the early outbreak, emergency distance-learning policies have been implemented as part of the Government's effort to ensure education delivery continuation in Covid-19. Ministry of Education as representative of the national Government in handling National Educational Affair at the early outbreak of Covid-19 indicated inadequate political trust to Local Government in governing regional affairs for Educational policy response, this also depicted from the pattern of policy framework at the beginning of the outbreak that is centralistic with a disposition to Local Government to adopt and operationalize it at a local level.

BDR and PTM Policy have been adopted and operationalized as a joint effort from both National and Local Governments to ensure education delivery in Covid-19 and operationalized at the Local Government level through regulatory and non-regulatory instruments. However, Digital Divide is still a concurring challenge. Research results from the MoE Policy Research Center in 2020 stated that 77.78% of 3501 respondents experienced internet access & device ownership problems during the Learning From Home (BDR) program. From a Fiscal Allocation perspective, the school and education unit must ensure the Regular School Operation and Physical Allocation Fund 2021 policy, in line and per the Covid-19 fund relaxation policy from GoI, must ensure the acceleration of BDR accessibility through internet and gadget availability/ownership.

Based on the study on policy dynamics, MoEC had taken the right path in enhancing emergency status since March 9th, 2020, through Circular Letter No. 3, the Year of 2020, started from Educational Institution. However, the rendered of regional decision for PTM & BDR policy could be institutionalized at early outbreak to allow local Government exercise their autonomy and provide a timely response before a fluid situation in the region. Emergency Curriculum as critical elements in Teaching-Learning adjustment during BDR published four months after cost a limp at regional governance. From the curriculum's standpoint, it is suggested to formalize a National Minimum Standards for Education Quality in an Emergency to strengthen educational resilience in an emergency.

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Contact email: desi.saragih@sgpp.ac.id

ECE Leadership: Developing Resilience During Periods of Uncertainty in Hong Kong

Anika Saxena, The Education University of Hong Kong, Hong Kong
Betty Yau, The University of Hong Kong, Hong Kong

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Abstract

The current COVID19 pandemic has required several, mostly at short notice, school modifications. School leaders and educators have always worked in a complex world to ensure continuity for students, families, and communities. This notion has contributed to controversies about when schools should be closed; what actions, protective measures school leaders should take to benefit the school community without stopping teaching and learning opportunities for students. In this study, we explore how leadership in the early childhood education sector in Hong Kong is coping during this period to build resilience. This paper uses constant comparative analysis to illustrate the role of school principals' immediate reaction, short-term recovery, and time for reflection. The data collected from surveys and interviews are organised through coding, and themes were generated and further supported by case studies from the field to develop conceptual understanding. The article closes with a conceptual analysis that focuses on three sets of factors: dispositional, emotional, and contextual, to explain the changing role of ECE principals in uncertain times to develop resilience in teams and the ECE community.

Keywords: Early Childhood Education, Organisational Crisis, Leadership, Emotions, Resilience, Teams, Health Care

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Introduction and Literature Review

Globally, the COVID-19 epidemic has affected education, alleviating regional and global inequalities before the pandemic's onset. This disturbance manifests itself in various ways, from widespread withdrawal in some countries to unequal access and a strong dependence on others' parental efforts. The pandemic's disruption of our educational system revealed its inherent chaos, a product of the system's capitalist philosophy. However, the disruption also offers a once-in-a-generation opportunity to reimagine global education. Further global threats to educational provisions, such as extreme climate disasters, are likely soon. Thus, it is essential to understand how we can foster resilience, continuity, and equity in education in calm and crises.

Periods of Uncertainty and Their Effects on Schools (Protest and Covid19)

School leaders and teachers in Hong Kong endured a couple of unprecedented school years in 2019–2021, marked by widespread civil unrest and the COVID-19 pandemic. Leaders faced significant stress as they navigated these events, with the school community having both face-to-face and virtual learning environments. School teams developed a crisis management system and built their resilience to overcome these challenges. It is noticed that even these circumstances increased leaders' and teachers' motivation by demonstrating a more significant commitment to teaching by taking care of everyone's wellbeing, team building, a strong desire to journey with students through adversity, and a desire to equip students with tools to navigate uncertain future circumstances that are building resilience (Wong and Moorhouse, 2020). These crises demonstrate how critical emergency preparedness and cooperation are for global communities. In times of such insecurity, clear and calm communication is critical.

Characteristics of Early Years Leadership in Hong Kong Kindergartens

In Hong Kong, most research on school leadership and resilience has concentrated on primary and secondary schools, with only a few examining leadership in early childhood education. The purpose of this paper is to share the results of a study on strategic leadership in Hong Kong's kindergartens. It discusses the difficulties kindergarten leaders in Hong Kong face and the importance of strategic leadership practice. The article then discusses the findings of a study on practices deemed valuable by kindergarten leaders in Hong Kong. Apart from the ability to plan and manage effectively in school, this study demonstrates that leaders' reflective, flexible, and systems thinking abilities, as well as their willingness to engage in ongoing professional and network development, are critical for leading today's kindergartens. Additionally, this study demonstrates the critical role of contextual intelligence in strategic leadership. The significance of this study is in its contribution to the investigation of leadership practices in early childhood education, the need for additional research into how well kindergarten leaders practice strategic leadership, and the implications for the development of principal preparation programs.

Leadership at Times of Crisis

Leaders from different industries were forced to make difficult choices: companies were closed, workers were laid off, and projects were left unfinished, among other dramatic changes to combat the virus's spread. Amid the crisis and school closures, education was supposed to continue in a virtual model. Yukl and Mahsud (2010) assert that resolving this crisis and

sustaining education in these difficult times will require strong, astute, adaptive, and innovative educational leadership.

Educational leaders' work is inherently complex. It entails policy, community, partnerships, management, activities, and dynamic decision-making involving numerous moving parts and often divergent stakeholder perspectives. Schools and school systems are also adapting to rapidly changing situations, the increasing complexity of the lives of those they represent, and external narratives throughout the COVID-19 pandemic. School leaders are judged by public, political, and media opinion. During this emergency, distance learning and teaching in ECE was not a well-planned and deliberate paradigm of best practice that we have shifted to – or "pivoted to," as common terminology suggests – but a temporary solution to a crisis. We are doing the best we can under the conditions, with little lead time and limited upskilling, and the majority of it is less than ideal. Through research and in our own lived experience of leading a teaching and learning team in a Hong Kong school, we examine the tensions that school leaders are currently experiencing in this state of global emergency.

In these crises, leadership knowledge alone is insufficient to foster resilience in the school community. Sensitivity to global change, cultural awareness, reflection, the capacity to ask critical questions, and compassion are also required of school leaders (Kochan and Locke, 2009; Lumby et al., 2009). School principals must be sensitive to changing school contexts and knowledgeable about a variety of 'non-traditional' leadership perspectives, behaviours, and skills to effectively address the challenges of globalisation and fluid social situations and to lead a school toward improvement (Ewington et al., 2008; Southworth, 2002; Wong, 2011). Meanwhile, it is believed that the prevalent leadership styles in schools are problematic as well (Bottery, 2001). Transactional leadership, which emphasises offering various forms of rewards contingent on members' performance (Blau, 1964; Burns, 1979), has been criticised for two reasons: first, it presupposes a stable and predictable environment in which the only variable is leadership. Second, it ignores the people-oriented mechanism by which employees may depart from their beliefs and culture.

Additionally, *transformational leadership* has been criticised for its association with a non-rational charismatic leadership style used in anti-educational ways to gain followers' commitment (Bottery, 2001; Nye Jr, 2014). The vision for an organisation may be determined solely by senior management rather than through a democratic decision-making process. The concept of transformational leadership has omitted the possibility of followers participating actively in the leadership process, and "there is a risk that transformational leadership will be abused, with followers encouraged to adopt a vision that is not right or appropriate" (Leeson et al., 2012: 228). Pisapia et al. (2009) emphasise the importance of school leaders having a firm grasp that traditional practices of 'looking in' should be replaced by an awareness of 'looking out' as the educational environment develops the complexity. Principals should be strategic leaders capable of strategically leading their schools in response to external changes and challenges. There is no one-size-fits-all definition for strategic leadership. The majority of theoretical and empirical work on strategic leadership has been conducted in non-educational settings over the last decades, and scholarship on strategic leadership in education remains exceptionally scarce. Numerous researchers have questioned what competencies strategic leaders should possess in addition to the necessary abilities of information retrieval, developing shared visions, teamwork, strategic planning, driving to excel, and improvement (Aydin et al., 2014; Carter and Greer, 2013; Eacott, 2011; Freeman and Wilmes, 2009; Gu and Johansson, 2012; Russette et al., 2008).

According to Pisapia, *strategic leadership* is related to a leader's capacity and wisdom in making "significant decisions about ends, actions, and tactics in ambiguous environments" (cited in Aydin et al., 2014: 3). Gibney et al. (2009) distinguish strategic leadership for a knowledge-based economy from traditional hierarchical leadership by emphasising collaboration, interdisciplinarity, integrated vision, bringing diverse networks together, time-consuming, holistic, people-centred, and openness. College leaders must "satisfy a diverse range of stakeholders in an increasingly complex educational arena" and take into account "not just curriculum and attainment goals, but broader community issues," according to discussions of strategic leadership in college management (Iszatt-White, 2010: 414). Eacott (2011: 40) emphasises the importance of examining how cultural, social, historical, and political forces interact in a given context. Strategic leaders must develop an understanding of how different groups conceptualise the organisation and overcome the challenges posed by divergent and sometimes conflicting stakeholder expectations by seizing opportunities as they arise, carefully considering external factors, and carefully planning the pace and scale of change wherever it is appropriate for their organisation (Carter and Greer, 2013; Eacott, 2011; Papastephanou et al., 2020). Apart from opportunities for reflection and networking, studies on leadership preparation indicate that contextual intelligence, or awareness of societal and organisational culture, is another critical competency of influential aspiring school leaders (Lumby et al., 2009). Caldwell (2009) asserts that strategic leadership in school administration is defined by the leaders' ability to identify megatrends and stay current on threats and opportunities in educational settings. Nye Jr (2014: 121) also believes that, in addition to the conventional soft and hard powers, effective leadership requires 'the skills of contextual intelligence, an intuitive diagnostic ability that enables a leader to align strategies and tactics with objectives in order to create smart policies in new situations.' Contextual intelligence is thus critical for strategic leadership because it entails the ability to "distinguish trends in the face of complexity" (Nye Jr, 2014: 121). Contextual intelligence implies that leaders should view their organisation and its problems holistically when exercising strategic leadership. This is a reference to the application of systems thinking to organisational leadership.

Systems thinking can provide a new perspective on problems and objectives by viewing them as components of larger structures rather than isolated events (Senge et al. 2000: 78). Eacott (2011: 41–44) concurs with Senge that "the individual significance of any event or action is but one element in a continuous continuum of historical events and actions and future events and actions," and that "a single snapshot is an unreliable predictor of future success..." Strategic leadership places a premium on viewing the organisation holistically, and strategic leaders must connect the dots between the parts and the whole and the present and the past and future when confronted with problems and changes. Apart from systems thinking, Pisapia et al. (2005) and Pang and Pisapia (2012) argue that reframing and reflection are the cognitive processes required for strategic leadership practice. Reframing is the process of examining the same situation from a variety of angles, while reflection is the process of unpacking the assumptions and values that underpin practices. It is necessary to stand sufficiently apart from existing values and beliefs to engage in reframing and reflection. Strategic leaders must engage in reflective dialogue with themselves and others to uncover hidden assumptions, think creatively, and contextualise scenarios to gain a clear picture of the situation.

Lumby et al. (2009) emphasise the importance of *maintaining connections* to the field when developing leadership preparation programs. The establishment of networks is a form of social capital development that contributes to the sustainability of a business, and thus the establishment of networks for managing external relationships is critical for strategic leadership (Maak, 2007). Improved social networking will increase knowledge sharing,

exposing leaders to alternative perspectives and broadening their horizons (Cheuk, 2007). Connecting with a broader field of practice and other leaders stimulates new thinking about the issues and challenges confronting leaders. Consistent with this view, Hitt and Ireland (2002), believe that strategic leadership contributes to the development of social capital and thus contributes to an organisation's value creation. As a result, developing a professional network that facilitates leaders' communication and connection to the outside world would become another aspect of strategic educational leadership.

Literature Conclusion

Contemporary research on leadership in schools is also beginning to emerge in the aftermath of the COVID-19 pandemic. While it is still too early to make sense of schools' responses to the pandemic, scholars are attempting to comprehend the crisis's early stages. However, a substantial portion of this work has been theoretical or conceptual rather than empirical. Bagwell (2020), for example, noted that the pandemic is "rapidly redefining schooling and leadership" (p. 31) and urged leaders to lead adaptively, build organisational and individual resilience, and establish distributed leadership structures to ensure optimal institutional response. Similarly, Netolicky (2020) identified numerous tensions faced by school leaders during the pandemic. These tensions range from the need to quickly and slowly balance equity with excellence and accountability to consider human needs and organisational outcomes.

The resilience of a leader and members of an organisation is critical to its success during crisis times. Resilience can be described as the capacity to revert to a state of normalcy (Holling, 1973) or as an emergent property that occurs when an entity learns to adapt to adversity and, in doing so, enhances its capacity to resolve future challenges (Wildavsky, 1988). In times of organisational crisis, leadership is essential and is often conceptualised as the process of exercising social authority (Mumford, Freidrich, Caughron, & Byrne, 2007). Apart from mounting an effective tactical response to an organisational crisis, leaders must also meet a symbolic need for direction and clarification on their constituents (Boin, Kuipers, & Overdijk, 2013).

Research Questions

RQ1: What are some potential *challenges and opportunities* that ECE leaders have experienced during uncertainty in Hong Kong?
RQ2: What *leadership strategies* do ECE leaders use during class suspension to develop the entire team and community's resilience?

Research Methodology

This study used a mixed-methods approach. The study collected data quantitatively and qualitatively, including case studies, survey questionnaires, and semi-structured interviews. The case study method is generally utilised to collect more in-depth field experience. The case study technique was chosen to comprehend a phenomenon or event (Merriam,1998). Individuals, students, or staff members of schools who are members of a school community may be chosen as cases (Creswell, 2011). Case study data is utilised to completely describe a case in real life (Yin, 2012). Case studies were triangulated with data from interviews and open-ended survey questions to enhance reliability and validity. The data collection process was staged, beginning with online questionnaires and semi-structured interviews to elicit more

detailed information. The data were examined using established standards for evaluating observation objects and indications (Braun & Clarke, 2006).

Participants

Participants in this study were 16 kindergarten leaders and 63 teachers from local and international kindergartens in Hong Kong. Figure-1 indicates that these participants are appointed in different roles in the kindergarten leadership team.
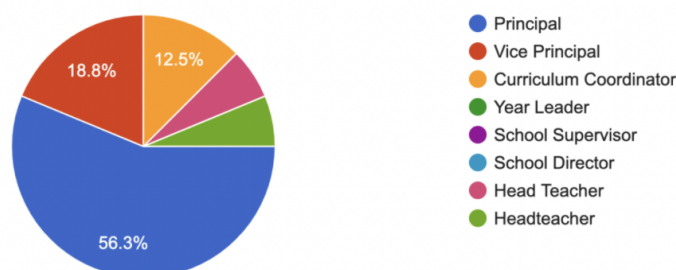
Figure 1: Participants Role in Kindergarten

Figure-2 indicates the equal distribution of classroom instructors of local and international kindergarten types, i.e. eight local and international kindergarten leaders participated in filling the survey questionnaire. The questionnaires were distributed online using a Google Form.
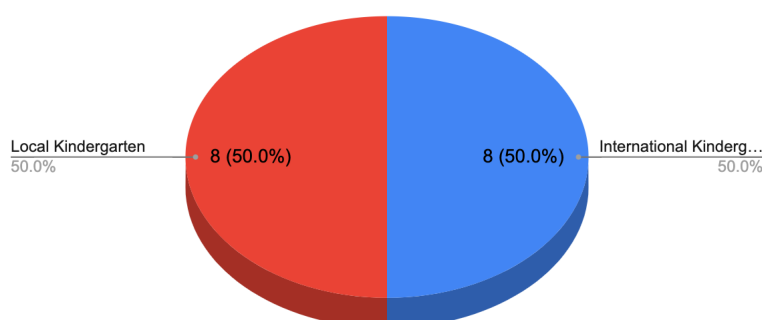
Figure 2: Participants Distribution Through the Type of Kindergarten

Figure 3-4-5 indicates demographic characteristics such as gender, length of teaching experience, and teacher's education level. Figure 2 indicates that 93.7% of female and 6.3% of male respondents participated in the study.
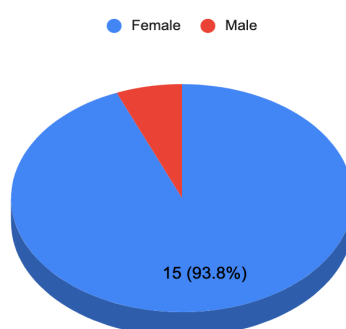
Figure 3: Gender Distribution

Figure-3 indicates that most teachers have 11-15 years of teaching experience, with over 65% of participants having more than 11 years of teaching experience. Figure-4 indicates that most of the teachers who participated in this study hold a postgraduate degree.
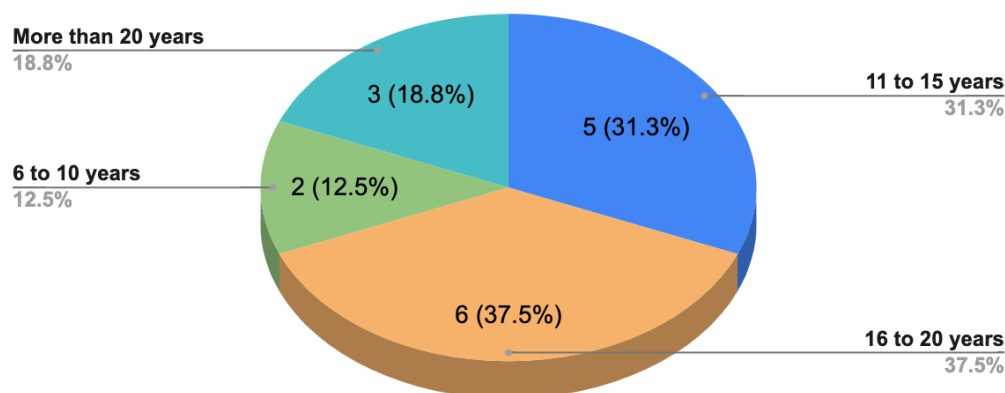
Figure 4: Length of Teaching Experience
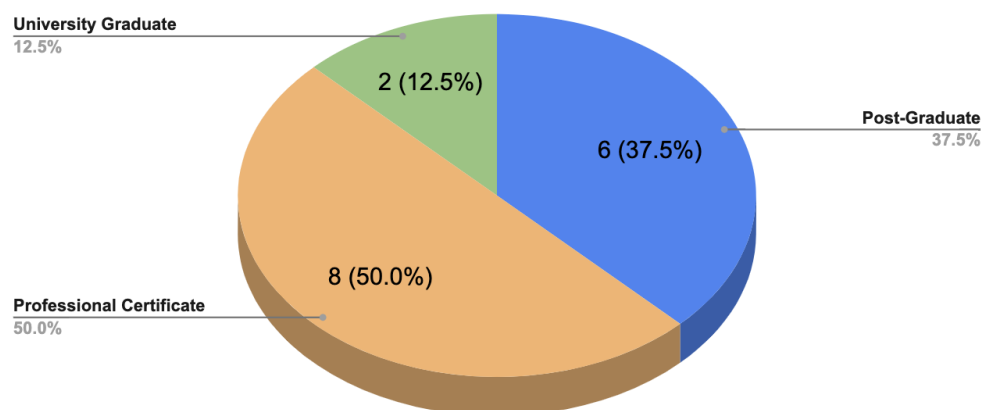
Figure 5: Leaders' Educational Level

Data Collection

The data collection process was divided into two stages. The first part involved surveying kindergarten leaders in Hong Kong. The survey consisted of twenty questions, ten of which were demographic, and ten were research-related. It was administered via a Google Form. The questions were structured per the appropriate literature and the research's purpose: to study the educational, psychological, and social dimensions of the classroom instructor. The survey was conducted with 16 respondents from December 15, 2020, to March 23, 2021. Following collecting survey data, a transcript of each respondent's responses with initial codes was created.

The second data-gathering stage was interviewing 12 kindergarten leaders who answered semi-structured, open-ended questions in the survey. The researchers developed interview themes based on the primary code collected from the findings of the first stage. Online Zoom interviews were performed online for 30-45 minutes for each respondent.

Data Analysis

To define, appraise, and establish a theme shared by participants, we used inductive and thematic analytics ((Fereday & Muir-Cochrane, 2006). Each participant's responses, particularly in the initial stage, were coded using keywords to avoid recurrence. The NVivo 12 software was used to assist researchers with coding and categorization. Nodes and cases were used to organize the data from surveys and interviews. Thematic maps depict the organization of concepts at various levels and then examine possible connections between concepts. The study team then considered both codes and categorizations and the possibility of combining codes to streamline them. This inductive approach enabled the identification of themes from participants' responses to the research questions (Liu, 2016).

Findings and Discussion

The findings are divided into two sections following our study questions. The next part addresses the difficulties and possibilities ECE leaders have encountered and highlights the instructional practices leaders have utilised to build the resilience of their school community. Additionally, findings will be compared and contrasted between behaviours in kindergartens that follow domestic and international curricula, prior use of technology-integrated lesson delivery, and practice during the class suspension.

RQ 1: What are some potential challenges and opportunities that ECE leaders have experienced during uncertainty in Hong Kong?

Figure 6: Themes from Data (Word Cloud)

1.   School-Wide Challenges for Leaders

Figure 7 outlines the fourteen school-wide challenges for school leaders. Maintaining quality teaching and learning, and partnerships with parents are the main categories that were highlighted amongst survey and interview findings and will be referred to throughout both of our research questions. Business sustainability, staff morale and motivation, and financial instability were also very common perceptions of leadership challenges in given crises. It is a common problem discussed by leaders that looking at school closures parents often withdrew

their children from kindergarten. Some leaders reflected that parental understanding to develop online learning is also a challenge.

"Parents have a misconception that understanding online learning means teachers are not doing much. However, the reality is that teachers have to do a lot of preparation to make this online learning accessible and productive for young learning."

88% of leaders were convinced that social interaction within the staff, parents through online meetings and in online lessons was very time consuming and was a cause of stress. Staff training to use new platforms was also a challenge. However, schools conducted many online and face-to-face workshops to train teachers. The other major areas of the challenge were to provide a consistent learning and teaching environment for students; to enhance parental participation as they might also be struggling with work-family life balance situations. Digital devices and software was not a major concern raised by leaders but in some schools that was also a problem. The last but not least challenge was to deal with logistics and handle everyday situations, to solve problems that were new to everyone. The frequency of themes and related words and phrases can be seen in Table 1.
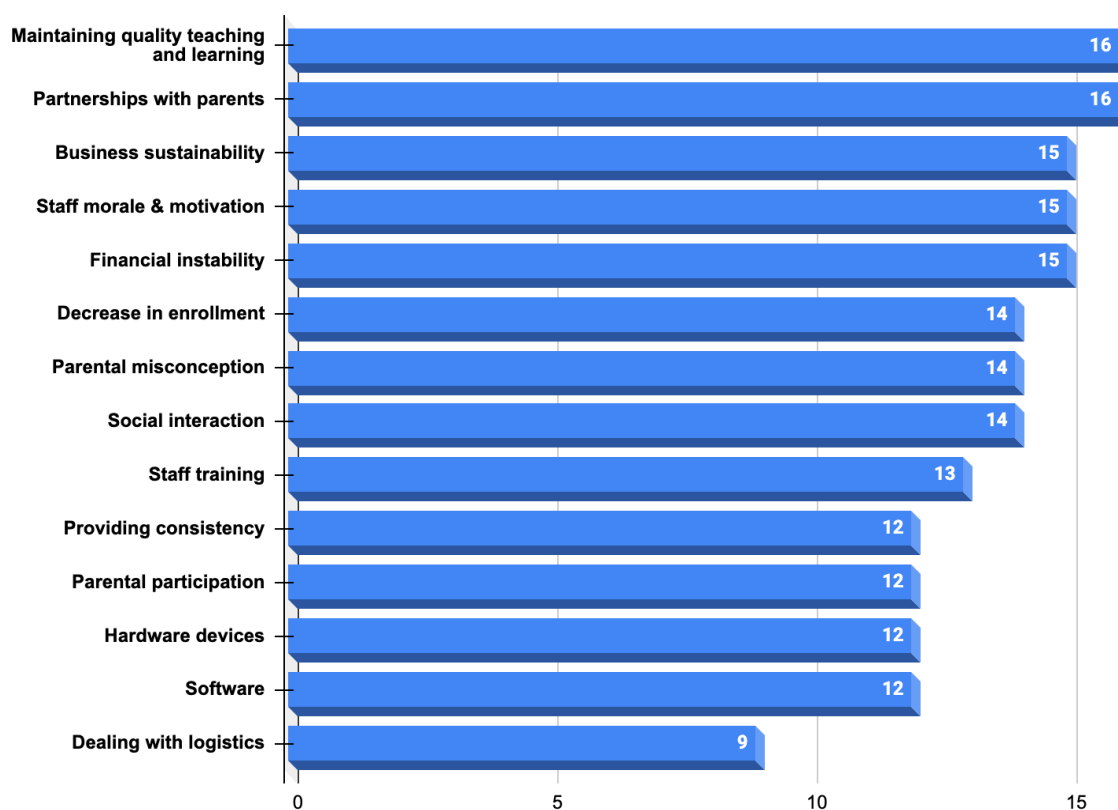
Figure 7: School-Wide Challenges for Leaders

Table 1. School-wide challenges for leaders		
Main Category	**N, ~ %**	**Representative words, phrases, statements**
Maintaining quality teaching and learning	16,100%	Provision of online learning, whilst also providing in-person child care; managing expectations of stakeholders; supporting teachers workload in delivering online and offline learning engagements.
Partnerships with parents	16, 100%	Working to lead and support parents to deliver online learning activities at home; Finding innovative ways to enhance teaching resources available to parents during a pandemic situation - availability of library books for borrowing and learning packs of materials sent home.
Business sustainability	15, 94%	Decreased enrollment, maintaining a positive facade whilst battling for the survival of the school; Student withdrawal and decrease in enrollment.
Staff morale & motivation	15, 94%	A huge challenge, especially when the team were required to take some unpaid leave; constant changes made it difficult to keep staff positive as every aspect of life was subject to new adjustments.
Financial instability	15, 94%	Survival of school sustainability given constantly falling enrollment; unpredictable cash flow; need to keep staff on payroll.
Decrease in enrollment	14, 88%	As families moved overseas to avoid the Covid virus, there was a steep decline in enrollments, which had a huge impact on school sustainability, as well as team morale; dark times were unprecedented.
Parental misconception	14, 88%	The parent community were very much reliant on social media streams to find information; schools were reactive to the changing situation, rather than proactive.
Social interaction	14, 88%	Strictly limited and controlled due to social distancing regulations, even parents waiting outside schools to collect children was deemed as a 'gathering' - impact on school operations, as well as consistency for children, parents and school staff.
Staff training	13, 81%	Creativity required to maintain ongoing professional development; new modes of delivery of online learning required staff training for use of platforms such as Zoom, Google Classroom and video call etiquette.
Providing consistency	12, 75%	Social routines being maintained was essential to children's development; schools provided a care model over an education model, to best provide routines and consistent relationships for young children.
Parental participation	12, 75%	A high level of parent support was required to ensure children had ongoing learning experiences in home settings; parents had to multitask and support children's home learning, as well as work from home - extremely challenging.
Hardware devices	12, 75%	Families with siblings had limited access to electronic devices to support remote learning, and timings were tight - older siblings had priority to access hardware to support their learning.
Software	12, 75%	Software provision in place was a real benefit - online applications were quickly adopted to facilitate communication and provision of ongoing learning - teachers were creative with different means of utilising software to make a positive impact on teaching to support learning.
Dealing with logistics	9, 56%	Changing circumstances made this all the more challenging, flexibility and transparency in decision making were key to finding ways to continue operations.

Table 1. School-Wide Challenges for Leaders

2.   Personal Challenges for School Leaders

Figure 8 outlines the seven personal challenges for school leaders. Personal fatigue and stress and work-family life balance are the main categories that were highlighted amongst survey and interview findings and will be referred to throughout both of our research questions. Maintaining positive communication with different stakeholders; balancing the role by being empathetic at the same time maintaining agility, and time management were issues raised by 87% of school leaders. Keeping things up to date and flexibility required to fit in various situations were leading to the deficit in morale and motivation added by 81% of the participants. 75% of leaders agree that the impact of dealing with day-to-day situations is unhealthy for the well-being of school leaders. The frequency of themes and related words and phrases can be seen in Table 2.
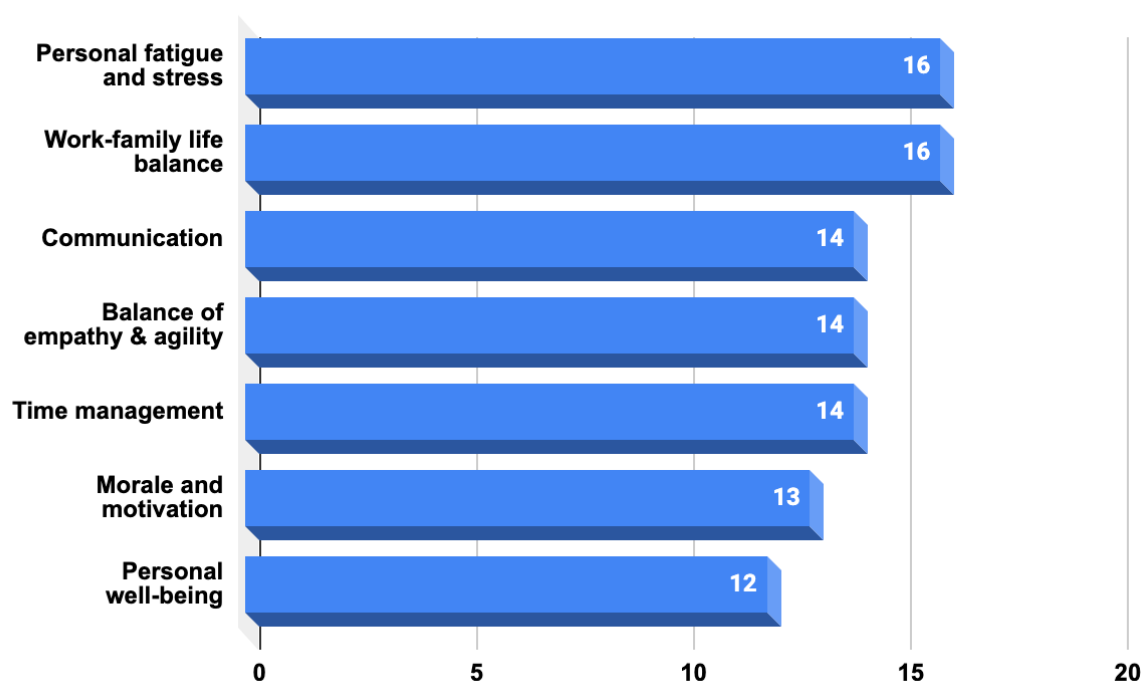
Figure 8: Personal Challenges for School Leaders

Table 2. Challenges: Leadership and me		
Main Category	**N, ~%**	**Representative words, phrases, statements**
Personal fatigue and stress	16, 100%	Unprecedented pressure to maintain a positive facade at times when everything was constantly changing. As a leader, it was extremely tough, yet there was no choice but to continue moving forward for the sake of the team's morale and motivation.
Work-family life balance	16, 100%	As part of a very digital era, continued access to news streams and being available online meant the work-life balance was constantly skewed towards work. Personal decision taken to reduce exposure to certain news channels, otherwise overkill on negative data and information.
Communication	14, 87%	Clear communication - transparent and decisive decision making were all key to delivering news during the pandemic. Open door policy is vital to maintaining strong communication channels.
Balance of empathy & agility	14, 87%	Empathy to different stakeholder interests is vital, different perspectives to be understood, with consequences of decisions made requiring flexibility - team and management agility were vital for school survival.
Time management	14, 87%	Maintain work-life balance; necessity to check news sources, and to manage various demands on time; very stressful times!
Morale and motivation	13, 81%	Keeping self-motivation high was hard, finding ways to stay mentally strong when social and physical outdoor opportunities were severely limited; leaders needed to lead, failure was not an option.
Personal well-being	12, 75%	Supporting myself and others, checking in with peers to connect and support each other. Taking time to 'take a mental break' by having a change of scenery, such as a walk outdoors, or having treats - coffee, cake, and volunteering.

Table 2. Personal Challenges for School Leaders

RQ2: What *leadership strategies* do ECE leaders use during class suspension to develop the entire team and community's resilience?
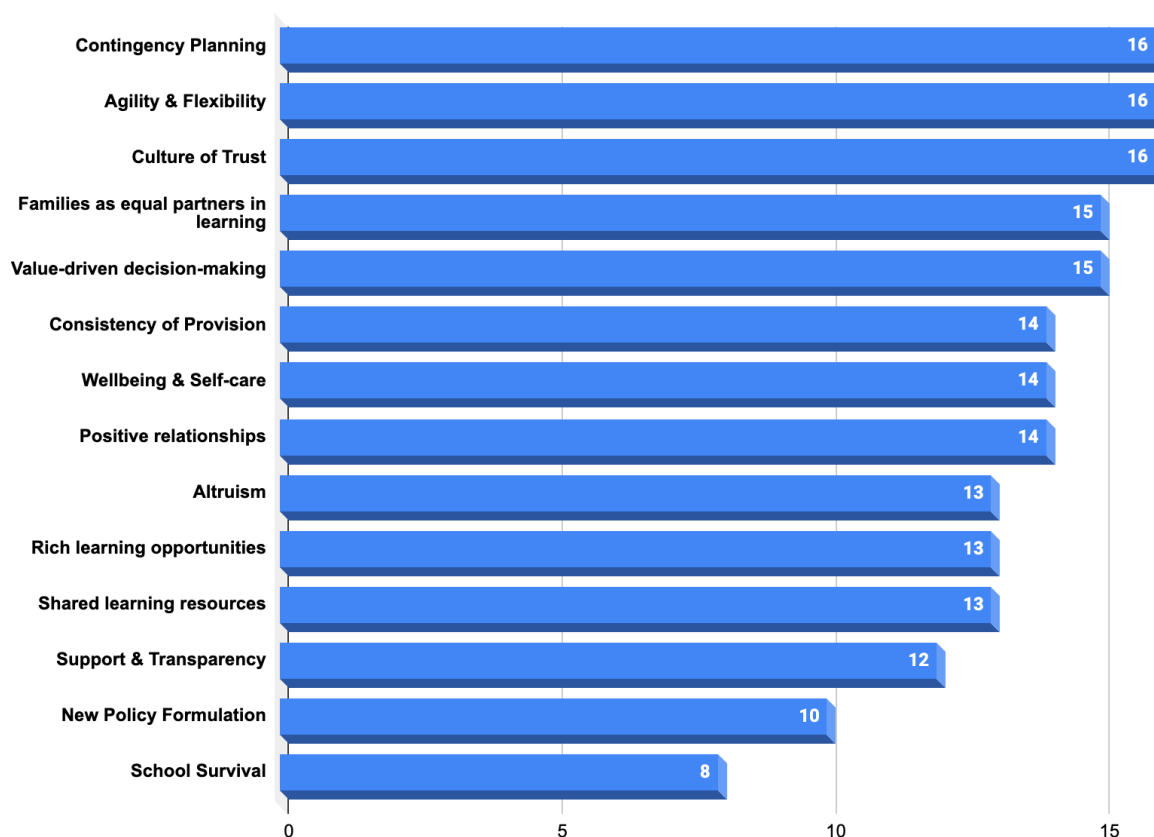
Figure 9: Leadership Strategies to Develop Resilience

Findings from frequency chart figure-9 indicate that 100 % of participants indicated that leaders should have contingency plans; agility & flexibility, and a culture of trust developed in their school. 94% of participants indicated that families should be treated as equal partners in learning and leaders should adopt value-driven decision making during crisis situations. 88% of participants indicated that leaders should develop positive relationships from the school community; develop consistency of provision in order to develop shared trust through interactions and shared values and vision, and should adopt strategies to support the well-being of self and others. Altruism, rich learning opportunities with respect to the shared learning culture of the school community and sharing of learning resources in terms of staff, students need to conduct online teaching and learning is recognised by 81% of participants. 75% of participants stated that support and transparency entail staff and parents to be well informed to share positive and negative feedback. Some participants 62% shared that the formation of the new policy can lead to a strategic implementation contingency plan so new policies needed to be put in place in order to cope with the changing situation. 50% of the participants indicated that it was hard for schools to survive as there is a large dropout rate with reduced enrollment compared to 'normal' times. Table 3 shows leadership strategies to develop resilience and explains real themes, with a number of participants, percentage and short description of themes.

Theme	N, ~%	Description
Contingency Planning	16, 100%	The purpose of contingency planning is to position an organization to respond effectively to an emergency and its potential humanitarian consequences. Creating a contingency plan entails making advanced decisions about human and financial resource management, coordination and communication procedures, and being aware of a range of technical and logistical responses.
Agility & Flexibility	16, 100%	Flexible leaders have the ability to change their plans to match the reality of the situation. As a result, they maintain productivity during transitions or periods of chaos.
Culture of Trust	16, 100%	Trust is a highly effective leadership skill. Indeed, leaders who earn their employees' trust are more likely to implement changes that improve organizational performance. Establishing a culture of trust begins at the top and necessitates a candid and transparent leadership style.
Families as equal partners in learning	15, 94%	Family Engagement is a collaborative effort between families, educators, and community partners to advance children's learning and development.
Value-driven decision-making	15, 94%	Values-based decision-making helps ensure that everyone in the organization understands why a particular choice was made and how it refers to the company's overall mission.
Consistency of Provision	14, 88%	Consistency in provision refers to the process of establishing and reinforcing individual and organizational trust through interactions, structures, and strategies that demonstrated alignment with values and vision and resulted in success. It has been achieved through distributed leadership, where those share responsibilities and accountability with relevant skills and expertise.
Wellbeing & Self-care	14, 88%	Leaders should take care of their health and well-being and their team's, as it will impact the effectiveness and engagement. Instead of working to exhaustion, leaders should start developing a self-care strategy to manage the job's demands.
Positive relationships	14, 88%	Building strong work *relationships* with both the people leaders manage and get directed is essential to be *healthy and* efficient. Positive relationships within the team, parental community and territory wise kindergarten community is essential.
Altruism	13, 81%	Altruistic leadership is defined as the act of guiding others in order to improve their well-being or emotional state. The Altruistic Leadership style is founded on empathy, kindness, active listening, and selflessness. An Altruistic Leader should possess these abilities or characteristics, in addition to general leadership characteristics.
Rich learning opportunities	13, 81%	Effective schools are communities of learners with a collaborative culture and shared responsibility for developing effective teaching practices and increased student achievement at their core. Teachers cannot be expected to foster vibrant learning communities among their students if they lack a parallel professional community to nourish them (Department of Education & Training, 2004b).
Shared learning resources	13, 81%	Leaders think about resources not only to conduct online learning but also on the other side if students have access to the learning and teaching online and other resources to perform learning tasks.
Support & Transparency	12, 75%	Transparency in leadership entails keeping employees informed, sharing positive and negative feedback (but not excessively), and accepting sincere feedback from team members.
New Policy Formulation	10, 62%	Strategic implementation of any new company policy or program requires the involvement of all affected stockholders and clear execution guidelines.
School Survival	8, 50%	School leaders today face two necessary questions: how to survive and how to capitalize on new opportunities.

Table 3. Leadership Strategies to Develop Resilience

Discussion

This research aims to examine how a small sample of ECE leaders based in Hong Kong attempt to develop a model of resilience in the face of the current crisis. In response to the first research question, the findings indicate that resilience-building is critical for leaders professionally and

personally. Despite the apparent overwhelming nature of these challenges, the leaders who participated in this study demonstrated that the more time and effort they devote to resolving them, the more opportunities for practical resilience-building approaches they create.

The study observes various strategies used to develop a solid and robust school community in response to the second research question. These strategies are based on success stories and amplify the ability to provide practical and high-quality Early Childhood practice and 'wellness & care' for the school community. Leaders' strategies provide opportunities to deliver educational content while maintaining a healthy level of contact with students, shared opportunities and resources, sustainability through peer learning opportunities even in the absence of training, and almost no prior experience dealing with remote or distance education while remaining confident as a team to support one another and the community.

The research establishes conclusively four key themes: construct, create, mentor, and engage. All educational leaders must implement these in order to strengthen the school community's resilience. Table 4 summarizes the theme, its components, and the dimension's description.

Theme	Components	Related Leadership Resilience Dimension (Specific to ECE)
Construct	Building Blocks - Contingency Planning - Agility & Flexibility - Culture of Trust	***Re-design and redefine building blocks in crisis situations:*** ● Identify and re-design a plan designed to take account of possible pros and cons or circumstances ● use available resources to teach remotely as well as provide child care services ● Respond to the rapid change of practice, including planning and delivery ● Incorporate a 'leadership framework for building resilience' when supporting the community and responding sensitively to the changing circumstances of individual families.
Create	Create is to put new dimensions into existence -New Policy Formulation -Consistency of Provision	***Implementation of new procedures to support school community;*** ***provide rich learning opportunities*** ● Implement policies that provide equal opportunities ● Pedagogy: Play into practice through a virtual lens ● Curriculum coverage, including ongoing assessment ● Routines and protocols to provide safe learning settings

Mentor	Provide constructive support and advice - Support & Transparency - Wellbeing & Self-care	***Reflect and share good practice; families as equal partners in learning*** • Reflect on teaching practices and provide flexibility to the team • Check-in regularly with teachers, parents, children, peers • Enhance two-way communication from parents, staff and other community members
Engage	Involve school community - School Survival - Altruism	***Embed learning within caring communities and cultural contexts.*** • Ensure stability for the school and the team • selfless concern for the well-being of others.

Table 4. Leadership Strategies to Develop Resilience
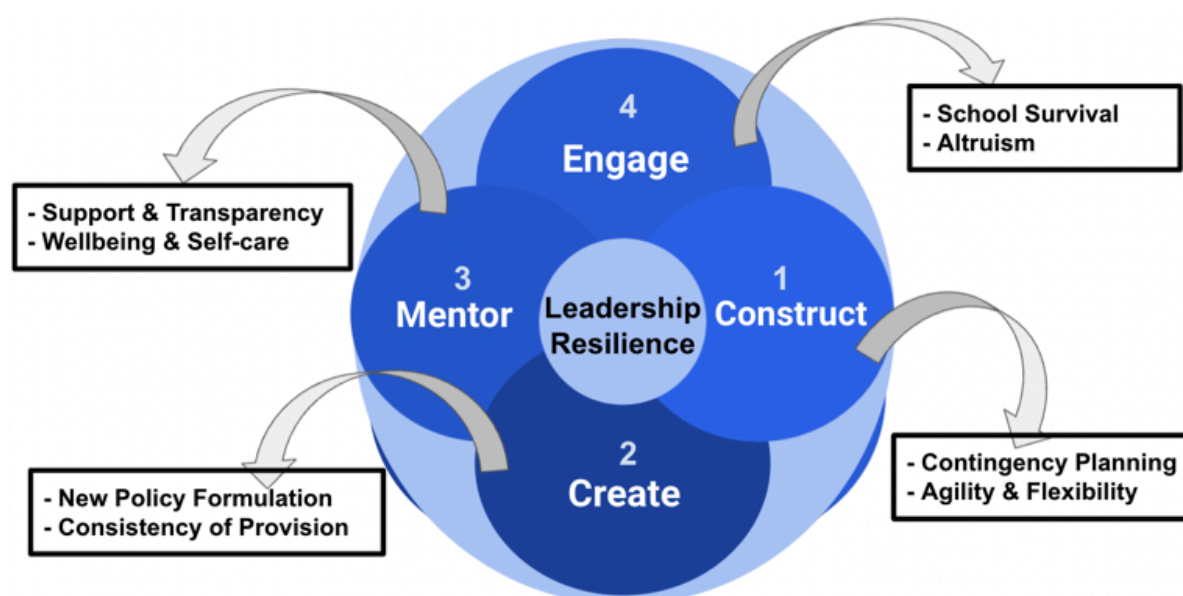
Figure 10: Leadership Framework for Building Resilience (CCME)

Conclusion

A theoretical framework termed the 'Leadership framework for Building Resilience (CCME)' (Figure10) emerged and was established due to the data and extended findings from both the research questions. It is critical to note that the 'Leadership Framework for Resilience (CCME)' evolved from progressive leadership strategies used during the school suspension period. Nonetheless, the validity of this framework can and should be extended to include resilience-building during times of crisis and as a routine leadership practice in general.

Future Directions

Given the small sample size used to generalize findings, it is proposed that future research focus on eliciting more detailed findings from educators across a variety of disciplines in order to address issues (such as those caused by a pandemic) that appear to be beyond our current perceptions and experiences. Such in-depth research may provide a helpful lens through which to view our educational trajectory in the future.

Additionally, the study proposes that leaders' primary focus should be on community resilience-building rather than external challenges. In other words, effectively addressing unexpected change brought about by external factors such as this pandemic will eventually accelerate resilience-building leadership practices in schools.

It is critical to involve the entire school community in the process of change management. In that regard, the study emphasizes the importance of flexibility and an openness to new practices in successfully guiding learning through unpredictable times. Additionally, such a response must include functional partnerships with families and other stakeholders.

Finally, prioritizing relationships, developing instructional leadership strategies, building organisational capacity and giving attention to self-care and care for others should be employed during such times and must serve as the foundation for future dealings with similar external uncertainties. That is to say; this is unlikely to be the last crisis or educational challenge educators face. In that regard, the sustainability of new strategies must be ensured.

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Contact email: Anikareena@gmail.com

Dislexya and the English Language: Contributions to the Education in Regular Schools

Silvia Maria do Nascimento, SESI / SP, Brazil

Abstract

People with dyslexia need their teachers to have enough knowledge about the subject in order their learning can be effective. The "spelling, writing and reading area learning disorder", as defines the Dyslexia Brazilian Association (DBA), does not impede learning, as it is not an impairment; but the teachers should take some differentiated attitudes. This paper aims to contribute with the teachers with some suggestions for activities and adaptations for the tests. English classes and activities, besides the manner as the teacher used to deal with a 9th-grade dyslexic student, were analysed. We have also observed whether the Pedagogical Coordinator has provided some direction to the educator to develop his work along with the pupil. Through reflexive conversations with many teachers of this particular school, these professionals got the conclusion that is not possible just to wait that all guidance and upgrading comes from the Pedagogical Coordination; it is very much important that each one can be the responsible for their continuous updating so that their pedagogical practice be more efficient. It is also desirable to confirm, with the results of this paper, whether the teaching-learning activities results reflect better the subject learning when the educator is not worried about the questions related to spelling, that are the biggest problem of dyslexic students.

Keywords: Dyslexia, English Language, Teaching and Learning

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1.   Introduction

The classroom of an elementary school has an average of 30 students, and this number can be much higher. Each of these students is a different person. With different problems, afflictions, anxieties, desires, facilities and difficulties to a greater or lesser degree. It is part of the teachers' job to realise and understand these particularities so that they can guide and assist the students in their learning in the best way possible.

In recent years, the subject of "dyslexia" has been much discussed. Most of the time, however, it is related to the Portuguese language. However, even with regard to this language, we have noticed doubts among some teachers about how to deal with dyslexic students, how to work on their contents, how to evaluate them properly, without facilitating or simplifying their tests.

When we think of a dyslexic student, who wants or needs to learn a foreign language, the problem seems to be even greater because of the much smaller amount of sources and resources for teachers to seek.

We can then ask a few questions: how is this teacher trained and oriented to work, in English language classes, with students who present dyslexia? Does he need to take any specific courses? And the students, how should these students act?

Before answering these questions, however, we need to make some clarifications: What is dyslexia? Is it an illness, abnormality, disorder or dysfunction? What are its characteristics? Are students, children or teenagers able to learn the English language at the same pace as "normal" students? What would be an appropriate teaching sequence for such students?

With the intention of helping to clarify these questions we will do our research by observing some English Language classes and activities, in an elementary private school in Santo André, São Paulo. We will analyse the classes, reflect, point out some situations and propose suggestions to solve problems, if any. We will also make suggestions for didactic sequences and answer these questions based on renowned authors that we will use as bibliographic reference.

2.   Literature Review

2.1   The Importance of Information

In this article we will investigate some ways of working with dyslexic students in English language classes, as some difficulty is noticed on the part of the teachers in conducting these classes and also on the part of the students in accompanying the English classes because of (but not only) phonetic and orthographic issues. It is then discussed what would be the real reasons for the difficulties of these teachers and pupils.

It is then hoped to find out:
- ✓   Is the teacher informed before receiving the student?;
- ✓   How should he start work?;
- ✓   What is a child with special educational needs?
- ✓   Is dyslexia a special educational need?
- ✓   Will the didactic sequence be the same for all students in the class?;

✓   Is there a need to make any kind of change?;
✓   How does the evaluation take place?

We do not intend to judge this teacher's classes, but to take an objective look at them and help this professional to perceive situations that he/she may not be aware of because of his/her involvement in the teaching and learning process.

We will reflect critically, investigate and point out solutions to the difficulties raised by both the teacher and the students.

2.2   Dyslexia?

Dyslexia means difficulty (dys) with words (lexia). It is a disorder that affects the skills of reading, writing and spelling. It is the alteration of a neurological process that leads the child to have difficulty reading and understanding what he or she reads despite his or her intelligence being normal.

According to teacher Me. Marcia Regina Zemella Luccas, (2014) a dyslexic person "possesses adequate intelligence and cognition to develop learning and has no intellectual deficit. She is not 'disabled', she only learns in a different way".

The National Association of Dyslexia, in its question-and-answer section informs us of the following about the regular school and the bilingual school:
> "The dyslexic child must attend regular school. It is important that school staff know the characteristic aspects of dyslexia, the reader function of the dyslexic and are ready and available to meet these special needs. A bilingual school is not suitable for a child with language difficulties as he or she will have to deal with several languages simultaneously, with different phonetic and grammatical structures, which will make learning the written language more complex".

Some difficulties, however, are related to understanding (listening) and writing, presented by dyslexic people are the exchange or non-identification of letters. For example, the brain can understand XENTE or CHENTE instead of GENTE, GADO instead of GATO; the letter W can be confused with the letter M; the letters D - B, B - P can be seen with the same format or heard with the same sound and the same can occur with the letters S, SS, C, Ç, X and Z.

These (and other) obstacles that already occur in the mother tongue of the learner, will certainly occur in English language classes, because it will be necessary for him/her to read, listen, pronounce, remember, sequence and write in English.

This is when the teacher's role becomes very important. Depending on how these barriers are worked out in the family and school partnership, the development of this young person will take place progressively without having emotional distresses, because another issue faced by dyslexic students is low self-esteem due to circumstances in which humiliations happen, even in unintentional ways.

2.3   Special Educational Needs?

According to LDB nº 9394/96 in its Chapter V, article 58:
Special education refers to the type of school education "offered preferably in the regular education network for students with special needs" (Ministry of Education).
And Resolution No. 95, of November 21, 2000, based on the provisions of the Federal and State Constitutions, the Law of Guidelines and Bases of National Education, the Statute of the Child and Adolescent and Indication No. 12/1999 and Resolution No. 5/2000 of the State Council of Education, considers in its Article 1st that:

> "Students with special educational needs are those who present significant physical, sensory or intellectual differences resulting from innate or acquired factors, of a permanent or temporary nature, which result in difficulties or impediments in the development of their teaching-learning process". (Mario Covas Reference Center)

In this way, we can confirm that dyslexic students do not need to be considered as having special educational needs, but they should have special attention during classes so that their disorder does not impede their intellectual evolution.

2.4   Specific Reading Disorder

The definition of reading difficulty according to the International Classification of Diseases (ICD) is the following:

> "The main feature is a specific and significant impairment in the development of reading skills that is not solely accounted for by mental age, visual acuity problems, or inadequate schooling. Reading comprehension skill, reading word recognition, oral reading skill, and performance of tasks requiring reading may all be affected. Spelling difficulties are frequently associated with specific reading disorder and often remain into adolescence even after some progress in reading has been made. Specific developmental disorders of reading are commonly preceded by a history of disorders in speech or language development. Associated emotional and behavioural disturbances are common during the school age period." (WHO, 2010).

2.5   The Teacher

It is more common these days for undergraduate courses to comment on, or actually study, class situations with dyslexic students experienced in regular schools by undergraduate students.

There are many more teachers who are interested and concerned about the subject and how they can improve their practices so that these students are not left on the sidelines; to this end, they seek out and carry out on-site and distance learning courses, exchanging experience with professionals, often from different states and even countries.

Nevertheless, the universe of teachers who are unaware of dyslexia or who prefer to remain out of date on the subject is enormous. There are several reasons, but they are not our goal in this article.

All students need the full attention of the teacher. Those who have some special need, even more. In the case of dyslexia, but for any disturbance or disorder, it is the teacher who is close to the student, analysing and evaluating their progress and difficulties.

It is not for the teacher to diagnose, he/she is not a health professional. But according to the Brazilian Association of Dyslexia (2019, page 01)

> "It is at school that dyslexia, in fact, appears. There are dyslexics who reveal their difficulties in other environments and situations, but none of them compare to the school, a place where reading and writing are permanently used and, above all, valued".

And it is in daily work with his students that the teacher's gaze is always attentive to the behaviour, advances and difficulties of the students that distrust may appear and then ask the family for a referral to a specialist to determine whether the child or young person really has dyslexia.

In class, it is up to the teacher to look for ways to vary his classes to include this student with others in the class, not to separate him, as Vygotsky mentions (1991, pp. 86/87) "Many educators, recognising that the speed of learning can vary from child to child, isolate the 'slow learners' from their teachers and companions through the use of programmed and often mechanised instruction".

Not to feel sorry, but to be open to dealing with differences, keeping in mind that students with some special need may have slower learning. In addition, their attitudes should be positive and constructive, as well as a valid appreciation of the strengths of the dyslexic learner - since the feeling of inferiority can always be present, because they have more difficulty than their peers.

2.6   Tips for the English Language Teacher

The following suggestions could benefit all students in the class, not just dyslexics. It is not necessary to do everything together. We are presenting some possibilities which the teacher will use as he/she sees fit. All age groups are covered.

- ✓ use of flash cards – help in memorizing the spelling of the new vocabulary;
- ✓ activities that activate memory and reasoning;
- ✓ activities on coloured and/or printed sheets – draw attention, highlight certain points;
- ✓ diverse and fast activities – prevents the student from being embarrassed by being further behind than the other students;
- ✓ activities where movement is necessary – helps with content retention;
- ✓ oral repetitions – orality involves the student during learning;
- ✓ music;
- ✓ use of simple fonts in sentences or texts – makes it easier to attach;
- ✓ sitting at the front;
- ✓ sitting away from doors and windows;
- ✓ short and simple instructions – so that the student doesn't get lost in the instructions and keep doing the activities;;
- ✓ clear and achievable objectives;
- ✓ encouragement – to develop self-confidence, since it is possible that they have low self-esteem;
- ✓ adaptation of activities: - more time, or
  - o fewer alternatives, or
  - o fewer questions, or
  - o assistance in reading statements.

✓   treat them naturally;

✓   in oral reading, that it is only the teacher and the student, so that there is no embarrassment – or indication in the previous class of which stretch the   student will read, or even a smaller excerpt.

Activities involving interaction between colleagues, in which one helps or explains the subject to the other, are also very beneficial.

3.   Methodology

An action-research will be done in a class of an Elementary Private School in the city of Santo André, São Paulo. I will follow this class, with the authorization of the direction and the teacher responsible for the English language classes. The use of the school's didactic material and the didactic sequence will be observed, as well as the instructions received by the teacher from the Pedagogical Coordinator.

4.   Observation and Analysis of Some Lessons

With the permission of the School Director, the Pedagogical Coordinator and the English Language Teacher, some classes were attended during one semester. For the students it was said that the teacher's classes would be analysed and that, for this, I would need to check some notebooks at certain times. There was no problem at all.

The teacher would come in and greet the 9th grade students, make the call and put the class schedule, all in English. She was in the habit of explaining what would be done so that the students would know "how the class would go"; however, in some classes she reversed the events to surprise the students so that "they wouldn't always expect the same" - she explained.

During the explanations she looked at all the students to see if they were following her reasoning, she questioned them and when necessary she returned to the subject. In a few moments she spoke in English - a few moments - most were actually only spoken in Portuguese.

At no time did the dyslexic student ask questions, it was always the teacher who reached her. Sometimes repeating what she had just said, other times mimicking in her direction, or writing on the blackboard and looking to see if she was following the explanation.

The following detailed activities are not sequential and not all are evaluative, but each one was done at the end of a set of at least three classes, with the exception of the first activity, which was an initial diagnostic activity.

In figure 1 we have an individual interpretative diagnostic activity that the teacher brought along on the second day of class. The intention of the teacher was to confirm or not her forecasts for the initial subjects of that class.

It was not recorded in the evaluation, but the students could use the physical dictionary and the student did so. It was not necessary for the teacher to guide her to take it as it was necessary with other non-dyslexic students.

I have noticed that in questions 3, 4 and 5 the teacher highlights the points to be answered in different ways, although she did not capitalise on what was desired in question 4. These

highlights help the dyslexic student, even though it may sometimes be that the student needs the help of a reader, depending on the degree of his/her dyslexia. There was no need for a reader for the observed student. She never asked and when asked about the need she refused, saying it was not necessary.

It is highlighted in the evaluation criteria that this evaluation is adapted with fewer questions; even so, the teacher, when verifying that the student made a mistake in question 5, registers that the same rephrases the question on the back of the exam (figure 2), which the student does; however, the subject (the difference between the verb tenses) has not yet been dominated by the student.

At this moment I notice that the teacher does not make any mark regarding the student's spelling mistakes, as she did in exercise 3. She only corrects the contents. As we have seen before, it is not interesting to mark the spelling mistakes of these students, because we know that it is not due to lack of study or intelligence that these mistakes happen, but due to the recognition that the brain does not do or does it in a wrong way.

In this activity the student achieves the established interpretative objective, despite having made a mistake in one of the questions. The other incorrect question was about the difference between the verb tenses that were used in the text. At the same time, in question 3 she is able to recognise the verb tenses used in the text.

By making these adaptations, the teacher allows the student to demonstrate whether she really understood the content without any vexing and discriminatory situations. Lina Knudsen, in her Master's Dissertation, page. 19/20 deepens the above written:

"They may need, for example, to be given more explicit instructions especially when it is given to them in written form, be it in their native language or the FL. Longer assignments may need to be divided up into smaller steps in order to help the student organize his/her time as well as to plan efficiently. Reading assignments should be given a day before the other students so that the dyslexic student will have adequate time to read and comprehend the text."

Figure 3 shows an evaluation exercise on Present Perfect tense, in which the physical dictionary and a list of irregular verbs could be consulted. The teacher's aim was to check whether the students had understood that they should look up the verbs in the Past participle. There were no other adaptations apart from the consultations.

The student had no difficulties in dealing with the dictionary and verb list sequences. She ended up missing two exercises, but did the activity on her own and was successful.

With activities 4 and 5 we can clearly observe what was described above in item 3 (Dyslexia?). The activity was to create sentences with the expressions used to, be used to and got used to from explanations and examples of exercises already done in class. The student did the activity, but it is noticeable that she forgets previously written words and makes spelling mistakes typical of her dyslexic situation. In this scenario, it is possible to notice that despite the spelling mistakes and forgetfulness of words, the student was able to understand the content taught.

Figure 1   Figure 2

Figure 3

Figure 4   Figure 5

5.   Conclusions

Some English language classes were observed at a private school in the municipality of Santo André, São Paulo, in order to check how the English language teacher is trained, how she is guided by the school coordinator and how this teacher works with students with dyslexia.

The answers we obtained to these questions, after conversations with teachers from Elementary I, II and High School, and in particular with the English Language Teacher from Elementary II and High School, were that teachers should seek for themselves the knowledge about dyslexia, although they can count on the Pedagogical Coordinator of this school unit. They should read articles, take courses and exchange experiences with other teachers and, as our suggestion, with health specialists as well.

It is possible to see clearly that from these studies, and the expansion of knowledge, the repertoire of diversified activities to be worked with dyslexic students will increase. In this way, the possibility that the teacher will be able to help this student towards his or her learning will be much greater.

The student, whether a child, adolescent or adult, who has dyslexia, will face several barriers in his or her life. It is necessary to avoid that their life is full of failures for the reason of not being able to read or write properly, because depending on the type and level of these barriers will be greater or lesser. When studying English as a foreign language this student will try to overcome an even greater barrier. On your own it is possible, but quite difficult.

In these situations it is common that moments of shame, humiliation and bullying happen. There are cases where the student no longer wishes to go to school. It is not possible not to think about the emotional aspect of students, who are evolving human beings and will need to

read at all times in their social or professional life. Poorly conducted classes can traumatise for the rest of their lives and prevent learning from taking place.

We reiterate, however, that the teacher should not diagnose, but always be attentive and when knowing or perceiving something in his students should inform the coordination and the family so that the appropriate arrangements with health professionals are made.

From these perspectives, we consider that the class teacher knew how to work with the dyslexic student, because she treated her naturally, not exposing her at any time, while taking care that she did not get lost or lag behind her other classmates. In fact, she was never treated in an inferior way, her classmates and the school never bullied with her; the teacher was always attentive to the needs of the student and in evaluations she used resources so that the student had full conditions of achievement, because she knew that the young girl did not have any disabilities, just a way of learning different from other students.

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Contact email: silvinhamarianascimento@gmail.com

Interdisciplinary Teaching at RWTH Aachen University - Project "Leonardo"

Ann-Kristin Winkens, RWTH Aachen University, Germany
Stefan Böschen, RWTH Aachen University, Germany
Carmen Leicht-Scholten, RWTH Aachen University, Germany

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Abstract

For coping with global challenges based on best available knowledge, the interdisciplinary training of scientists is seen as a key feature of academic education. Scientists educated this way – t-shaped scientists – are seen as being better prepared to facilitate problem-solving processes by combining different disciplinary views on the strong fundament of one discipline. In order to promote these competencies and to enable students to participate in shaping society in the sense of shaping competence, the interdisciplinary teaching project "Leonardo" was launched at RWTH Aachen University. A central characteristic of "Leonardo" is that lecturers from different disciplines offer joined courses focusing on global challenges, which are directed at students from all faculties. The goal is to discuss a guiding theme in an interdisciplinary perspective and to bring together both students and lecturers from different disciplines. Three selected courses, namely "Sustainable Development Goals", "Technology and Society" and "Resource Policy", offered since 2019, serve as case studies to show, whether this approach succeeds in reaching the goal of t-shaping scientists while the following research question is in focus: What are opportunities and challenges of interdisciplinary teaching, especially regarding the t-shaping focus? Results of analysing the evaluation outcomes and reflection papers of the students show that the main challenge is on both producing depth and breadth of knowledge in thinking. Besides, students appreciate interdisciplinary teaching and – independent of their disciplinary background – they reflect this as common knowledge in the context of social responsibility.

Keywords: Interdisciplinary Teaching, T-shaped Scientists, Sustainability, Responsibility

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1.   Introduction

Interdisciplinary teaching and research are increasingly important, especially at universities with a strong technical and engineering focus (Neeley & Steffensen, 2018). With regard to addressing global challenges in the face of sustainable development, the interdisciplinary training of scientists is seen as a key feature of academic education (UNESCO, 2014). By definition, interdisciplinary research "is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice." (National Academies of Sciences, 2005, p. 2). Accordingly, there is a need for creative and innovative problem-solving which goes beyond disciplinary boundaries, as "interdisciplinarity is supposed to integrate knowledge and solve problems that individual disciplines cannot solve alone" (Jacobs & Frickel, 2009, p. 47).

Especially with regard to global challenges, as formulated by the UN's 17 Sustainable Development Goals (SDGs) within the framework of the 2030 Agenda, interdisciplinary approaches and methods are needed to meet the central challenges of the 21st century (OECD, 2019; UN, 2015; UNESCO, 2014). One key aspect in this context is the concept of Education for Sustainable Development (ESD), which is internationally framed by UNESCO (Tilbury, 2011; UNESCO, 2005, 2014) and should empower "everyone to make informed decisions for environmental integrity, economic viability and a just society for present and future generations, while respecting cultural diversity" (UNESCO, 2014, p. 20). For this purpose, various relevant competencies are discussed in the context of ESD, including interdisciplinary thinking and working (Annan-Diab & Molinari, 2017; Barth, Adomssent, Godemann, Rieckmann, & Stoltenberg, 2007; de Haan, 2006; Lozano, Barreiro-Gen, Lozano, & Sammalisto, 2019; Lozano, Merrill, Sammalisto, Ceulemans, & Lozano, 2017; Parker & Fadeeva, 2010; Svanström, Lozano-García, & Rowe, 2008; UNESCO, 2005, 2014; Wiek, Withycombe, & Redman, 2011). And as UNESCO states: "No one discipline can claim ESD for its own, but all disciplines can contribute to ESD" (UNESCO, 2005, p. 31). Furthermore, interdisciplinary learning is identified as a relevant learning type for ESD alongside discovery learning, critical-thinking-based learning, problem-based learning and collaborative learning (UNESCO, 2014).

Higher Education Institutions (HEIs), such as Universities, are jointly responsible for educating these competencies for sustainable development. One approach for educating this way is described by "t-shaped" scientists or professionals, who combine depth and breadth of knowledge and expertise (Babatope A, Samuel, Ajewole, & Anyanwu, 2020; Conley, Foley, Gorman, Denham, & Coleman, 2017; Demirkan & Spohrer, 2015; Neeley & Steffensen, 2018). This concept is based on Leonardo da Vinci, known as universal genius of the Renaissance (Gadol, 1973). There are many different graphical illustrations of the t-shaped ideal, however, on the main idea and knowledge and competencies associated with it, a widespread agreement exists (Neeley & Steffensen, 2018). Scientists educated this way are seen as able to facilitate problem-solving processes by combining different disciplinary views on the strong fundament of one discipline (Conley et al., 2017; Neeley & Steffensen, 2018).

In order to promote these specific knowledge competencies and to enable students to participate in shaping the society in the sense of shaping competence and ESD (de Haan, 2006), the interdisciplinary teaching project "Leonardo" was launched at RWTH Aachen University. The goal of the project is to discuss a global guiding theme from an

interdisciplinary perspective and to bring together both students and lecturers from different disciplines. Teaching this way aims at showing the construction of interdisciplinary knowledge from different disciplinary sources in a real-time mode, meaning that the teachers from different disciplinary backgrounds are in the best case showing the process of co-constructing interdisciplinary knowledge directly and vividly while teaching.

However, the question arises whether this approach succeeds in reaching the goal of t-shaping scientists. Against this background, three selected courses, namely "Sustainable Development Goals", "Resource Policy" and "Interdisciplinary Perspectives on Technology and Society", will be analysed while the following research question is in focus: What are opportunities and challenges of interdisciplinary teaching, especially regarding the t-shaping focus? This question is answered by re-analysing the evaluations of the courses as well as the critical reflection papers of the students.

2.   Project "Leonardo"

In the following, the project, its goals and development are described. Based on this, the three courses are presented and discussed as case studies.

2.1.   Project Goals

Project "Leonardo" was launched in 2008 at RWTH Aachen University. It is part of the university's interdisciplinary Human Technology Centre "HumTec". Referring to Leonardo da Vinci as the "universal genius" of the Renaissance, the project aims to empower students to use their subject-specific knowledge in a broader context to tackle global and societal challenges. Students who take part in Project "Leonardo" should not only get to know different ways of thinking but also learn approaches of disciplines through joint, interdisciplinary work. In addition, they should also get into conversation with fellow students from other departments and fields of study. To this end, for the project three underlying principles apply:

Interdisciplinarity is fundamental to solving future challenges: In order to ensure interdisciplinarity, people from different departments at the university take joint responsibility for courses. It is particularly important that the different subject contents and cultures not only coexist but rather are constructively integrated into the conversation. Interdisciplinarity refers not only to the type of content students are confronted with, but also to the students' experience in the exchange with other students and lecturers from other disciplines.

Integrating responsibility for science, research and teaching into the university discourse: The responsibility of science is reflected in all courses. To this end, the work is always oriented towards a holistic as well as impartial consideration of relevant topics. Students are deliberately required to form well-founded opinions: fact-oriented and differentiated, based on the knowledge and competencies they learn during their studies.

Participation and co-creation of all students in order to solve global challenges: The idea of participation concerning the content of the project means that there is a conscious decision not to presuppose specialist knowledge and prior knowledge. Courses should have as few barriers as possible. Where specialist knowledge or background is necessary to a certain

extent to understand more complex contexts, this will be provided within the framework of the courses.

These principles are framed by the aforementioned SDGs, which address the relevance of a more sustainable future and formulate numerous global challenges (UN, 2015). Within this framework, global challenges are highlighted in "Leonardo" courses and all topics are aligned with the problems that are distinguished by the SDGs as relevant and in particular need of a solution.

A central characteristic of "Leonardo" courses is that – usually two – lecturers from different scientific disciplines offer a course that focuses on global challenges aims to reach students of all faculties. The aim is to discuss a central topic in an interdisciplinary manner under academic supervision and to bring together both students and lecturers from different disciplines. Sometimes, the project proposes topics, at other times, members of the faculty propose lectures to the project, which was the case with all three courses in question. Moreover, student initiatives can also offer "Leonardo" courses in cooperation with a lecturer. So far, courses have been offered on topics such as energy, climate change, world population and health, flight and migration, culture, medical technology, Sustainable Development Goals, human-animal studies and fake news.

It is important to mention that the "Leonardo" courses are voluntary for most students and are currently anchored in only a few study programs. Nonetheless, nowadays more than 1000 students per semester participate in "Leonardo" lectures, which is twice the number of participants five years ago. This correlates with an increasing course offer in the last years, the development of a public relations concept and the offer of larger courses that address global challenges. But, as RWTH Aachen University has about 45,000 students enrolled, only between ten to twenty percent of the students ever partake in a "Leonardo" lecture during their study. Each of the lecture series featured in this work regularly attracts between 150 and 200 students, including freshmen, graduate and post-graduate participants.

2.2. Course Descriptions

Three courses are presented below as examples, each of which regularly attracts between 150 and 200 students, including freshmen, graduate and post-graduate participants from all faculties. Each course took place twice in the time period we are analyzing, which is from 2018 to 2020, as the courses were introduced in 2018 and 2019. All three courses address sustainability and responsibility as global challenges in different interdisciplinary ways. The courses generally consist of a series of expert talks, anchored with an introductory and a closing session by the organizing lecturer. Each lecture consists of roughly 45 minutes of prepared talk and another 45 minutes of discussion with the students, who are frequently given preparatory reading assignments.

2.2.1. Course I – Sustainable Development Goals

Due to the variety of globally discussed topics, such as climate change, energy transition and gender equality, the SDGs are particularly well suited for conveying and understanding interdisciplinary perspectives, which also goes along with the concept of ESD. Thus, two colleagues within "Leonardo" launched a course named "Sustainable Development Goals – A scientific approach to 17 Goals for the 21st Century" which took first place in winter 2019 and since then is regularly offered in the winter semester.

In both years, seven SDGs were presented and discussed by experts. Since it is not possible to discuss all 17 SDGs in one semester, different SDGs were selected in each case. This addresses a breadth of topics that students should learn about from interdisciplinary perspectives. The following learning goals were intended: Students should be familiar with the SDGs and understand their role as political objectives and models for a worldwide development process. They should be able to differentiate between the Millennium Development Goals and the SDGs and understand the relevance of the SDGs, especially for Western nations. The students should be able to evaluate issues from their respective studies under the paradigm of sustainability. They should identify how the work in their subject areas contributes to solving the problems identified in the SDGs. In addition, students should learn to evaluate different career paths in terms of global sustainability.

2.2.2.　Course II – Technology and Society

As in the winter semester course, the SGDs form a conceptual framework for the summer semester course on "Technology and Society – Progress: Between Responsibility and Growth". However, in this course, the focus is more closely set towards promoting sustainable, innovative and future-oriented research and development. Learning goals include getting to know possible points of intersection between academic research and social issues and learning to identify potentially questionable avenues of research. Reoccurring topics include technology (impact) assessment, research ethics and responsibility, and gender and diversity integration. The course was first offered in 2019 and is since offered yearly in the summer semester.

It is important to note that the course mostly takes place on a meta-level. It is assumed that the students themselves use their own disciplinary knowledge and learn to contextualize it with humanities and economics frameworks. For this reason, assignments are geared towards getting students to apply interdisciplinary perspectives to their own expert knowledge.

2.2.3.　Course III – Resource Policy

Contrary to the other two courses, "Resource Policy" represents a concrete and practical approach to address the SDGs. Within the framework of the lecture series in both years, firstly, central concepts for understanding this complex of problems were presented in an interdisciplinary manner, secondly, the various forms of raw material extraction were examined. Big foci were also the comprehension of the interdependencies of different factors (economic, ecological, social) and their application to concrete examples as well as the complex issues of resource dependency of transformation processes regarding the energy transition.

In summer 2019, raw materials policy problems were analysed based on concrete fields, thereby demonstrating their complexity. These examples were energy, mobility, construction and perspectives for a sustainable raw materials policy. In summer 2020, challenges of a sustainable raw material strategy were dealt with based on energy transition. The following learning goals were intended: Students should be able to describe different types of raw material extraction and distinguish them from each other based on their respective requirements and framework conditions. In addition, they should be able to describe the importance of sustainable raw material extraction and explain the role of domestic mining against the background of a secure supply of raw materials. Apart from that they should be

able to discuss the background and elements of a raw materials strategy and put the raw materials strategy of the Federal Government into context.

Due to the global Corona pandemic, the lecture series of 2020 was offered via Zoom and pre-recorded video presentations. The digital realisation of the lecture series enabled a thorough insight into and exchange about the lecture topics, as the pre-recorded video presentations (of 45–75 minutes) were followed by the students at home, so that the 90-minute lecture duration via Zoom offered room for questions and discussions.

3. Empirical Results

The empirical analysis is based on two sorts of documents, which were generated during the courses: *evaluations* and *reflection papers*. These documents offer insights into opportunities and challenges of interdisciplinary teaching. Each was analysed as specified below with specific questions being: How do students reflect on interdisciplinary teaching? How can global challenges be taught in an interdisciplinary way and do students contextualize these challenges in their exams? Which role does the t-shaping play? After describing these two forms of empirical documents, the following sections compare the three courses by using the difference between the two forms of documentation as lens for describing specific insights about interdisciplinarity and its teaching in "Leonardo" courses.

At the end of each course, students do an *evaluation*. It is explicitly tailored to the interdisciplinary teaching format of the "Leonardo" project. Within free-text fields, students can provide information on the interdisciplinarity of the respective event ("Did the course enrich your (inter)disciplinary horizon? Were the lectures comprehensible to all of you? If not, to what extent did you see this as a limitation?"), on the respective contents of the lectures ("Which contents did you like particularly well, which less? Do individual dates stand out? How do you rate the level of the content?"), on their expectations and satisfaction with the event ("What expectations did you have of the course you chose and to what extent are/were these fulfilled?") as well as on organisational and technical aspects.

As graded work, students can hand in a *reflection paper* on a lecture of their choosing. These are up to ten pages and consist of a reproductive part and a critical analysis. Beyond the prescribed structure, the content can be chosen by the students themselves, as long as it contains some link to the lecture topics. The aim of the reflection papers is to relate the knowledge acquired in the lecture to existing knowledge and to reflect on the respective topics. In doing so it is possible, for example, to go into greater depth on an aspect of the lecture that was either not considered in sufficient detail or to place technical or professional findings in a broader social context and analyse their significance. We aimed at categorising those with regard to content and examined them with consideration on the following questions: Do the students introduce new points or do they address lecture topics? Do the students reflect on the course or the lecture in general?

3.1. Course I – Sustainable Development Goals

With regard to the *evaluation outcomes*, the students were generally satisfied with the course, its content and the interdisciplinary approach. The only criticism that can be found in both semesters relates to the level of detail of individual lectures. In some cases, students would have liked more in-depth discussion and more concrete approaches to solutions. Other students, however, emphasized the breadth of the content and the resulting general

knowledge as a major positive point. This discrepancy is a central challenge of interdisciplinary teaching, and a reoccurring theme when discussing the t-shaped approach (Jacobs & Frickel, 2009; Neeley & Steffensen, 2018; Vasilyeva, Samigullina, & Danilova, 2020). Since students from all disciplines participate in the "Leonardo" courses, for some many new aspects are addressed, while for others hardly any new content is taught. This is particularly relevant in the SDG course, as global challenges from different very large areas, such as climate change, water supply or sustainable urban planning are addressed. Accordingly, in a single lecture on climate change, the topic can only be covered in-depth to a limited extent.

For this reason, and also to address the criticism of the students, for the coming semesters it is planned to focus on individual SDGs with similar emphases, such as the topic complex "Reduced Inequalities", "Gender Equality" and "Quality Education". Through this focus, the individual SDGs can be studied in greater depth and interdependencies can also be analysed and discussed.

In view of the *reflection papers*, most students made use of the opportunity to introduce new aspects, which largely address concrete and also often local implementation measures, e.g, with regard to SDG11 ("Sustainable Cities and Communities"). The question "What does it all mean now and what can I do?" was often in the foreground. This aspect and accordingly approaches for practical solutions were missed by some students in the presentations, which often presented the respective SDG in general. This point was also formulated in the evaluations, as explained earlier.

Furthermore, it was found that global topics, such as climate change (SDG13), were frequently addressed by the students. Here, the contents of the presentation were usually further deepened, reflected upon and questioned. In particular, the question of climate justice and international cooperation with regard to climate change occupied the students. One person – exemplarily – concluded in her critical reflection on SDG 13 "Climate Action" that there needs to be an 18th Goal: "a common change in values that anchors compassion, connectedness, responsibility, solidarity in society and thus supports all other SDGs. In order to work towards this Goal 18, the training of engineers, for example, should also be addressed, so that they are strengthened in communication. Only together can we create a present and future worth living." (translated by the authors)

Notably and furthermore, the winter 2020 release papers frequently addressed the respective implications of the SDGs for the Corona crisis and vice versa.

3.2.   Course II – Technology and Society

With regard to *evaluations*, students frequently report the course to be a valued contribution to "democratic participation" and citizenship skills, with many students highlighting the applicability of the content to a wide range of interdisciplinary topics. Students value the interactive nature of the course and the approachability of the staff, both during and outside the lectures. As one student put it: "What I valued most were the direct interaction and the flat hierarchies, which give room to a safe space for respectful and appreciative debate." (translated by the authors). Moreover, the fact that discussion sessions regularly exceed the time limits set by the lecture periods is something that the students frequently describe as "conductive to the discussion".

However, each year there is a small number of students who criticize a lack of practical examples in the lectures of this course, too. Similarly to the SDG course, this has been grounds for frequent, inconclusive discussion. Due to the extremely heterogeneous nature of the participants from engineering, sciences, math, humanities and medicine, in-depth analysis of practical examples tends to quickly overwhelm non-experts while at the same time providing little to no new input for participants from the relevant subject areas.

Already in the summer semester of 2020, the Corona crisis was a topic frequently dominating discussions. While it was not deemed expedient to change the course outline during the semester, keeping in mind the reoccurring evaluation results regarding practical examples, for the summer semester of 2021 it was decided to put a special emphasis on local university research projects aimed at tackling the Corona crisis. However, a formal evaluation is currently outstanding and initial feedback is mixed. A few students positively remark on the relevance of the topic, yet many also miss the more generalist debates.

With regard to the overall topic of the lecture, a reoccurring theme is students' assessing or discussing technical innovations in their *reflection papers*. General issues such as digitalization and transformative change are common topics in the reflection papers, as are more specific subjects such as medical engineering (e.g. diagnostics, gene editing) and artificial intelligence (e.g. autonomous driving, big data). For the latter, a close link between the students' area of study and the topics of the analysis can be observed, whereas, for the former, the distinction is less pronounced.

Furthermore, each year a number of students hand in reflection papers that focus on discussing the nature of interdisciplinary teaching at RWTH Aachen University, both with respect to this course and in general, with the gist being that the course "[…] enables me to look at technology development from a different perspective, […]. I hope I have gained some measure of ability to identify possibilities and risks and their respective relevance to society.", as a student put it (translated by the authors).

3.3.   Course III – Resource Policy

Overall, the *evaluations* in the last two years were once again very positive and the interdisciplinarity was highly emphasized by the students. The tandem lecture by two professors was particularly well received. The pre-recorded videos in summer 2020 allowed a good introduction and were perceived as a very helpful low-threshold introduction. The wide range of questions due to the very different backgrounds of the students but also of the lecturers was also highlighted. Thus, the debates were never monotonous and the interdisciplinarity was highly emphasised. However, some students remarked that as the individual external lecturers represent specific perspectives, it would have been helpful if, in between, the focus was put again on an overarching analytical level, again illustrating the tension between generality and specialist knowledge.

Furthermore, the students wished for a political speaker or someone who stands for disruptive change in resource policy. For the future, the students asked to invite role models, who would also give them inspiration for their future professional activities. Both points are at least somewhat controversial, as in either case an invitation of speakers always implies implicit support and, at RWTH Aachen University, the political neutrality of the university remains a major principle. Some efforts have been made to address this tension through close cooperation with student initiatives and the student unions.

In addition, the students wished to specifically engage with global futures approaches such as post-growth theories and circular economy.

In their *reflection papers*, many students dealt with the lecture contents such as international raw materials policy, followed by energy production and mobility, in greater depth, new aspects were introduced only in isolated cases. Notably, issues such as the nationwide coal phase-out and its local dimension concerning the structural changes were considered. In particular, the social and environmental responsibility of large corporations, the challenges posed by the recultivation and rehabilitation of the opencast mines, but also the job losses caused by the coal phase-out were discussed. Regarding the latter, topics around climate change and sustainability were chosen, but also, in light of the Corona pandemic in summer 2020, the students addressed the dependence of states on the international market and more issues of equal access to goods and resources.

Finally, issues such as the nationwide coal phase-out and its local dimension with regard to the structural changes in the *Rheinisches Revier* were considered. In particular, the social and environmental responsibility of large corporations, the challenges posed by the recultivation and rehabilitation of the opencast mines, but also the job losses caused by the coal phase-out were discussed.

One student concluded: "Ultimately, it is the responsibility of national and European policies to create effective, market-based incentives that flank the energy transition in order to ensure a timely transformation to a cheap, secure and environmentally friendly energy supply. The need becomes clear in light of irreversible disruptive forces that humanity's activities threaten to unleash, […]. It is an interdisciplinary task of the century that deserves no simple answer and is rightly called the *Great Transformation*." (translated by the authors)

4.   Conclusions

The three selected and presented courses all address sustainable approaches in the context of the SDGs and social as well as individual areas of responsibility in different interdisciplinary ways. Nevertheless, they differ in their didactic approach and in the depth and breadth of the topics. Setting the goal of t-shaped scientists, the main challenge is bridging the gap between broad and deep knowledge. This is a recurring element in all three courses, which also became apparent in the students' reflection papers, most of which address practice-based and concrete solution strategies.

The SDG course, which can also be seen as an overarching course to convey the relevance of these topics, is characterised by a recurring discourse on depth vs. breadth of topics, which is reflected in the idea of the t-shaped approach. At the same time, the challenge of interdisciplinary teaching and learning becomes clear here, both in terms of producing both broad and deep knowledge and thinking (Vasilyeva et al., 2020). The same applies to the course "Technology and Society", where the evaluations diverge between the statement that general knowledge was gained through the course and, at the same time, the partial lack of showing concrete solution possibilities is criticised by the students. This is also reflected in the critical reflection topics, as most of them delve further into a concrete aspect and focus on practical implications. In contrast, the course "Resource Policy", which per se has a concrete delimited thematic area, has other implications. Here, some students wish for a stronger overarching analytical focus, i.e. wish for more breadth than depth.

We did not go into detail with regard to the didactic mediation (as mentioned before, the resource policy course is nowadays thought in a flipped classroom model), as this also gives rise to other perspectives, which in turn need to be examined scientifically.

In all courses, having some practical examples was useful and frequently students performed very well if they were given a general framework and the opportunity to employ this by discussing a practical example. Furthermore, if students are given more practical examples, as in the case of the "Resource Policy" course, they frequently, wish to lead more action-oriented discussions, which in some cases stress the mandate of a (German state) teaching institution. While no specific measures to that effect were taken in either of the analysed courses, in other courses this feedback was subsequently included. Cooperation with student initiatives has shown to generate positive feedback as those who wish further lecture topics towards a "call to action" can do so via the associated initiatives or student unions. There is no patent solution for this either, but what we have learned from the project perspective is that the involvement of student initiatives could be a solution to generate more practice and application-related content. This has been highlighted very positively by the students so far.

Another challenge is that students who take part on "Leonardo" courses mostly have different levels of knowledge and are from different fields of study. As the majority of students take the courses voluntarily, we observe a high intrinsic motivation. And, with regard to evaluation, "Leonardo" courses are highly appreciated by students. But how can we close the gap between "too much depth" and "too much breadth" for these students?

The above-mentioned intrinsic motivation may also be a reason why in general student feedback is excellent and why the debates tend to be very lively. However, this also points towards further challenges and implications for research: How can we motivate more students to participate and engage in lectures, the content of which does not immediately correspond to their regular disciplinary knowledge? And, as we consider large courses here, how can participation-based and interdisciplinary formats effectively be scaled up to address larger numbers of students?

In order to teach and learn about global challenges in the context of ESD in an interdisciplinary way, a clearly structured and competence-oriented curriculum design is required. It is necessary to raise awareness of the relevance of interdisciplinary thinking, especially with regard to ESD, as well as to integrate it meaningfully into study programs with different disciplines (National Academies of Sciences, 2005; Vasilyeva et al., 2020)

The "Leonardo" courses presented can serve as an example of teaching global challenges in an interdisciplinary way. While the courses being voluntary limits the number of participants, it also seems to be a main aspect for success. Beyond that, there is a need for further research. A next step is to establish correlations between the individual courses of study and the topics addressed in the reflection papers to identify possible differences between the individual disciplines and study programs. The courses examined here all have a high heterogeneity of students, but we would also have to look at courses that are more homogeneous in terms of study programs. We observed that this is especially the case in technical courses, such as energy or medical technology. Furthermore, it cannot be ruled out that the respective expert presentations in their different forms have an influence on the acquisition of interdisciplinary competences. A combination of different learning approaches, as formulated by UNESCO (2014), such as problem-based learning or collaborative learning, in addition to interdisciplinary learning, could further improve the acquisition of competencies (see also de

Graaff & Kolmos, 2003). Through the integration of student initiatives, attempts have been made to achieve this goal and to increase learning success.

Overall, the "Leonardo" project represents an interdisciplinary teaching and learning approach that is to be further developed and consolidated in the future for mainstreaming t-shaping activities at a Technical University – and beyond.

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Contact email: ann-kristin.winkens@leonardo.rwth-aachen.de

Why Students Plagiarise: Corrupted Morals or Failed Education?

Joseph Wu, City University of Hong Kong, China
Wing Hong Chui, The Hong Kong Polytechnic University, China
Ming Tak Hue, The Education University of Hong Kong, China
Anthony Yau, City University of Hong Kong, China

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Abstract
Why do students plagiarise and how can we tackle the problem? An accurate understanding of reasons for student plagiarism is a crucial step to successful formulation of effective solutions to the problem. To this end, a focus group study was conducted to collect information from an "insider" view on why Hong Kong university students might engage themselves in acts of academic dishonesty. A survey questionnaire was eventually developed and then self-administered by a sample of Hong Kong university students. Based on the students' self-report, among other forms of academic dishonesty, plagiarism is the most common type of academic misconduct and seems to be a "gateway behaviour" that might signify a "syndrome" of other academically dishonest behaviours. In addition, students in the focus group study generally opined that the plagiarism detection software currently adopted did not yield accurate detection and could be deceived. Regarding reasons for student plagiarism, the qualitative and quantitative data consistently show that that plagiarism is rooted in interactions between personal factors and contextual factors, such that when difficulty levels of academic tasks exceed student's abilities and when student learning is insufficiently-supported, students are more likely to plagiarise. Taken together, our data tell us that the problem of student plagiarism should be treated as a challenge to teaching and learning rather than merely an issue of discipline violation. For its solution, emphasis should be placed on education instead of punishment.

Keyword: Plagiarism, Academic Dishonesty, Higher Education

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Introduction

According to the Cambridge Dictionary, plagiarism refers to "the process or practice of using another person's ideas or work and pretending that it is your own" (Cambridge University Press, n.d.). It is regarded as an increasingly common academic misconduct among students in higher education. In a recent study with university students in Portugal, as many as 24.6% of students responding to the survey reported having copied text from the internet into their assignment without citing the source, and 45% reported knowing someone who did it. Likewise, 17.1% of students reported having copied text from printed sources into their assignment without acknowledging the source, and 40.2% reported knowing someone who did it (de Lima et al., 2021).

There are several reasons that institutions in higher education are bothered by plagiarism among students. Students in higher education are requested to write in their own words to express their own ideas. Engaging in plagiarism among students not only indicates a lack of moral among students, but also signifies failure in institutions' endeavor in delivering high quality education. It can also invalidate academic results awarded to the involved students and cause damage to universities' reputations (Ives & Guikin, 2020). Nowadays, many universities have set up institutional policies to regulate plagiaristic behaviours, adopt detection software to check potential plagiarism in student assignments, and carry out training to heighten awareness of students and faculties to the issue.

However, viewing plagiarism as a misconduct or lack of morals might merely be a perspective from teachers and administrators. Unlike cheating, not every meaning of plagiarism is necessarily linked to dishonest intention (Jiang, Emmerton & McKauge, 2013). In a digital age, googling and copying-and-pasting information are common behaviours in everyday life. From students' perspective, using resources from the internet could be just a normal act that they might feel nothing wrong. Understandably, if freely using publicly available resources becomes a habit and is regarded as a social norm, it will not be surprising that some students will apply these behaviours in completing their assignments.

The link between internet use and plagiarism has been noted by researchers. For instance, in a literature review conducted by Jiang, Emmerton, and McKauge (2013), "use of technology" and "academic pressure" were two identified factors that might drive students to plagiarise. More recently, Amida, Appianing, and Marafa (2021) reported that favourable attitudes toward plagiarism was associated positively with usage of electronic learning materials and negatively with understanding of university policies. Existing evidence suggests that availability of internet or advance of technology is by no means the sole factor in triggering plagiarism. External factors such as academic pressure and internal factors such as students' level of knowledge and competence in academic subjects are also pivotal.

In our view, the mechanism that will trigger plagiarism among students are likely to be contextual and/or cultural dependence. In a context where academic achievements are strongly emphasised and highly valued, barriers to achieve are possibly more influential in triggering plagiarism among students as a way of coping with academic challenges. In a study on university students in China, teaching factors (indicated by the extent that students felt insufficiently-supported in their learning and that assignments were too many for them to handle properly) was found to be the strongest predictor of favourable attitudes toward plagiarism (Fatima et al., 2019). Likewise, after conducting a series of statistical modeling, de Lima et al. (2021) found that difficulties in academic life significantly predicted plagiaristic

behaviours among European university students. This finding throws support on a view that plagiarism among students is a way of coping with academic challenges.

Given a rising trend and increasing severity of plagiarism, clarifying the nature of plagiarism has important implications for prevention and intervention. A rapid advance of technology enables convenience of information accessibility and thus makes plagiarism easier and more subtle. In addition, the nature of plagiarism may vary with cultures. For example, in a collectivistic culture, learning by copying is a common and legitimate practice in its primary and secondary education, so students are getting used to this practice since a very young age. This cultural factor may facilitate use of plagiarism as a coping means when students are encountered with academic difficulties. Therefore, for a deep understanding of plagiarism, its context-dependent nature cannot be overlooked. As such, a timely update on this issue is therefore necessary and meaningful.

A Mixed Methods Study on Academic Dishonesty

A mixed methods study on academic dishonesty was conducted among Hong Kong university students during the academic year 2019-2020. The study involved two phases: a qualitative focus group study in the first phase and a quantitative study in the second phase. In the latter phase, data were collected via an online survey with a questionnaire developed from analysis of qualitative data collected in the former phase. While the study originally aimed to focus on a broad issues of academic dishonesty, the returned data indicated that plagiarism was a major type of academically dishonest behaviours students being engaged in. As such, in this paper, only the data related to plagiarism are presented and discussed. The following questions were addressed:
• How prevailing is plagiarism among university students?
• Can plagiarism detection software prevent plagiarism?
• Why do students plagiarise?

In Phase 1 of the study, 50 Hong Kong university students were recruited. Students were invited to share their beliefs and experiences relating to issues of academic dishonesty in focus group study. When talking about academic dishonesty, most of the time participating students referred it to plagiarism. Data linking to students' common reasons for being engaged in academically dishonest acts were coded and thematically analysed. Eventually, a list of potential factors of academic dishonesty was thus constructed. Based on this list, in Phase 2 of the study, a 40-item questionnaire was developed to assess factors of academic dishonesty. In the survey instrument, another 26-item scale measuring academically dishonest behaviours that students might engaged in during their previous studying semester was also included (tapping plagiarism, cheating in exams/tests, unauthorised assistance, and falsification). The survey instrument was distributed online to students from eight government-funded universities in Hong Kong and a total of 508 valid responses were obtained.

How Prevailing Is Plagiarism?

From the survey data measuring prevalence of various types of academically dishonest behaviours, plagiarism was the most prevailing type of academically dishonest behaviours. Around 42% of respondents reported having engaged in plagiarism in the semester prior to the time of survey. Students reported having been engaged in at least one type of listed academically dishonest behaviours constituted 82% of the total number of responded

students. Further analysis on the data shows that, among the students who reported having plagiarised, a bit more than half of them had also been engaged in other academically dishonest behaviours, whereas for those who had not plagiarised, only a bit more than one-eight reported having engaged in other academically dishonest behaviours. In other words, students who had plagiarised were more likely to commit other forms of academically dishonest behaviours. As the other three types of academically dishonest behaviours are commonly regarded as more serious misconducts, these findings suggest a possibility that plagiarism may be a "gateway" behaviour leading to other more serious forms of misconducts.

What Are Students' View on Academic Dishonesty / Plagiarism?

In the focus group study, when asked to share personal experience or witnessed cases of academic dishonesty, almost always students talked about incidents of plagiarism. It reflects that, consistent with our quantitative data, plagiarism was the common most type of academically dishonest act in students' learning environment, or that in students' mentality academic dishonesty is mostly about plagiarism, or both. When students were asked about means of their studying universities in preventing academic dishonesty among students, quite often students' immediate response was to name a plagiarism detection software (or text-matching software). It all suggests that academic dishonesty is predominately about plagiarism within the context of Hong Kong higher education.

Interestingly, students' opinion about use of plagiarism detection software was mixed or even self-contradictory. While students generally agreed with the use of this tool, many commented that it would not really stop academic dishonesty. An observed consensus among students was that text matching did not validly indicate plagiarism (i.e., frequently leading to false alarm and missing real plagiarism), and that results could be easily manipulated (e.g., applying tactics to avoid being detected). A number of tactics were shared by participating students to escape detection from plagiarism detection software, such as modifying copied words, google-translating between Chinese and English, and adding tiny periods between words to confuse the software.

What the students were trying to point out was that detection of plagiarism had no impact at all on dishonest intention. Use of plagiarism detection software will only drive students to take "wiser" means to cheat as long as they have the intention or need to do so. As students shared, when one had a need to be dishonest, *"they would do it anyway"*.

Why Do Students Plagiarise?

As discussed earlier, students' perspective on nature of plagiarism is likely different from teachers' and institutions' perspectives. Thematic analysis on our focus group study data indicated that students attributed engagement in academic dishonesty to situations – in contrast to isolated factors – in which internal and external facilitative elements exerted its influences jointly. Particularly, students tend to choose dishonest means when:
•   The students prefer "shortcuts" in doing academic tasks AND dishonesty is a convenient way out
•   Task difficulty level exceeds students' abilities AND learning are insufficiently-supported

This finding suggests that academic dishonesty will be appealing to a student under an influence of his/her situated context. Translating this idea to a language of statistical analysis, it means that academic dishonesty would be better explained by a model with interactions between factors rather than the one depicting independent factors only. To test for this speculation, a 40-item questionnaire was constructed and administered online to a sample of university students. Exploratory factor-analysis of the quantitative data yielded four personal factors (Academic difficulties, Dishonesty-prone mindset, Lack of academic integrity knowledge, and Lack of learning motivation) and five contextual factors (Convenience of cheating, Support from teacher, Institutional support for academic integrity, Peer cheating norm, and Lack of teacher support.

Subsequently multiple regression analysis was carried out to test the hypotheses that (1) dishonesty-prone mindset interacted with convenience of cheating to predict plagiarism, and (2) academic difficulties interacted with lack of learning support to predict plagiarism. In the statistical test,. The two stated hypotheses were tested simultaneously in a single regression model with plagiarism tapped by the 10 items selected from the 26-item questionnaire measuring academic dishonesty. "Lack of Academic Integrity knowledge" and "Peer Cheating Norm" were also included in the tested model as covariates because preliminary bivariate analyses showed that they significantly associated with plagiarism. The overall regression model accounts for nearly 19 % of total variance of plagiaristic behaviours, $F(10, 474) = 10.85$, $p<.01$. "Lack of academic integrity knowledge" and "Peer cheating norm" no longer predicted plagiarism when other predictors were taken into account. Results of the regression analysis showed that the second hypothesis gained supported but the first was not. The quantitative data support a notion that students choose to plagiarise when difficulty levels of academic tasks exceed their abilities AND when student learning is insufficiently-supported. However, a mindset that prefers "shortcuts" over mastery learning and convenience in plagiarism in the context might not trigger actual plagiaristic behaviours when other factors were being controlled.

Conclusion

To summarise, plagiarism is a frequently reported behaviour among Hong Kong university students, and is also a very common form of behaviour that the authority would regard as a misconduct. A possibility that plagiarism functions as a "gateway" behaviour leading to other forms of academically dishonest behaviours should not be overlooked. While university administrators tend to see plagiarism as an academic misconduct that should be "disciplined", students may regard it as an inevitable consequence of unresolved difficulties of learning. The former view would drive administrators to impose surveillance and punitive measures, but if the root cause lies in inadequacy in the process of teaching and learning, such measures would be ineffective, and even counter-productive (as these actions from administrators can comprise trusting relationship between students and the universities).

Findings from this mixed methods study suggest that plagiarism may be a consequence of effect jointly by personal and contextual factors. It seems that intervention and prevention need to be in a multi-layer and holistic manner. Students need to be better supported for learning (e.g., nurturing some more positive attitudes towards learning, equipping them with more effective academic skills) and universities need to establish an enhancing learning environment (i.e., a learning environment that not only facilitates positive growth but also minimise needs for taking inappropriate means to cope with academic difficulties). Emphasis of intervention and prevention of plagiarism among students should put on education instead

of punishment. It includes focusing on continuous pedagogical improvement, constant review and flexible adjustment to the curriculum to fit students' unique and changing needs, promotion of more responsive teaching and learning, and, last but not least, provision of enhanced support to faculties to empower their capabilities to respond to students' learning needs.

Acknowledgement

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Contact email: joseph.wu@cityu.edu.hk

Home Education:
Reshaping Teachers and Parents' Responsibilities in the Era of Intensive Parenting

Anna Chinazzi, University of Milano-Bicocca, Italy

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Abstract

A growing number of parents are choosing not to send their children to school to educate them at home. This is also happening in Italy, where home education has started arousing scholars' interest. We cannot dismiss it as local vogue: it is an international and diverse trend that is likely bound to grow. Moreover, during the last months, the restrictions and the concerns related to the COVID-19 epidemic have been a catalyst for many families worldwide who were already sceptical of the traditional school system and started home educating their children. To better understand this many-sided phenomenon, a look capable of holding its micro-, meso-, and macro-levels is particularly needed. This paper provides an analysis of the homeschooling movement considering the international literature on the topic and an ethnographic study conducted on the parents' point of view in Italy. I will claim that the geo-temporal diffusion of home education bears witness to some characteristics of our contemporary society e.g. the emergence of intensive parenting, the reported loss of social prestige and authority of teachers, and the general narrowing of the epistemic gap between professional and lay visions. Lastly, it calls attention to the tension between mass schooling and the growing demand for more individualised learning paths.

Keywords: Home Education, Homeschooling, Contemporary Society, Intensive Parenting

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Introduction

Homeschooling or elective home education (EHE) is a growing global alternative to conventional education (Cheng & Donnelly, 2019; Gaither, 2017). This paper explores some of the socio-anthropological reasons for the diffusion of this educational choice in contemporary society, with a focus on the Italian context. The main purpose is to present a theoretical lens to the analysis of home education choice drawing from two main sources: a literature review and an exploratory ethnographic study I conducted in Italy between January 2019 and January 2020 (Chinazzi, 2020).

I will define the topic by highlighting its core characteristics, present the context of the empirical study, illustrate the methodology and finally trace a theoretical analysis.

The central thesis of this contribution is that EHE is not a fringe movement with no connection with the mainstream educational culture, even in some contexts—such as Italy—where it is little practised. I will argue that it is the ultimate expression of some wider trends of contemporary society that have contributed to reshaping parents and teachers' responsibilities. Specifically, I will refer to the intensive parenting ideology and the growing distrust in experts and institutions that is affecting the educational settings.

This analytical perspective supports the relevance of home education as a research topic, not only because it is a fascinating phenomenon itself, but also because—in a broader sense—it challenges modern conceptions of schooling, education, and the family (Kunzman & Gaither, 2020).

Topic and Context

During the school closures, which took place in most countries in an effort to limit the spread of COVID-19, a form of home-based distance education was adopted. By taking advantage of the Internet, it helped to mitigate the disruption of children's education. This situation has entailed a reconsideration of home-school partnerships and blurred the boundaries between teachers and parents' roles, demanding an increase of involvement to the latter (Thorell *et al.*, 2020), especially to mothers (Petts, Carlson & Pepin, 2020).

Nevertheless, this arrangement did not coincide with homeschooling or elective home education in the sense these terms have been usually defined in the scholarly literature in the last decades. Homeschooling or home education is the education of children ′within the home setting, independent of the formal schooling context, and usually overseen by parents′ (Hardin & Farrell, 2003, p.125).

Distance education during the school closures was not, as Gaither (2017) defined homeschooling, ′a deliberately chosen alternative to institutional school′ (p. 7), but the pragmatic and temporary use of the home to educate children.

In this paper, we are specifically referring to home education as a parent-led practice that mainly takes place at home, a controversial issue in our contemporary society (Dwyer & Peters, 2019) that is not universally recognised as a legal option.

In Italy, compulsory education starts at 6 years of age and lasts for 10 years up to 16 years of age. It can be fulfilled by attendance in a school or through home education. In this country,

home education is a legal and regulated instructional option, formally called *Istruzione parentale*. It is an uncommon choice since it has just begun to be known by some parents as a viable educational alternative. As a result, it has only recently started arousing Italian scholars' interest (see for example these recent publications: Chinazzi, 2020; Di Motoli, 2019; Giovanelli & Piromalli, 2021; Leonora, 2019).

Parents who wish to home educate in Italy must annually notify education officials of their decision and self-declare they have the technical and/or economic capacity to home educate their children (legislative decree 297/1994), while children are required to sit a non-standardised exam at a public school every year (legislative decree 62/2017).

Despite these regulations, it is not possible to determine the actual number of home-schooled students: the annual notification is required to all the families whose children are not enrolled in a public school but could perhaps attend private institutions that are neither *scuole statali* (State-run schools) nor *scuole paritarie* (non-State schools recognised by the State as having the same status of State schools).

The data reported in figure 1 show the increasing number of students formally declared in *Istruzione parentale* in the last four school years. Among those, there is an indeterminable number of home-educated children. Therefore, the graph does not shed light on the quantitative dimension of the specific phenomenon of EHE but bears witness to the growing distrustful attitude towards conventional education. It also shows there has been a steep increase from the last school year with a growth rate of 161% (while the average growth rate of the previous years was less than 19%). This boost must be contextualised in the pandemic. For some parents, home education could have been just a temporary solution to tackle the uncertainty they were experiencing; but the COVID-19 epidemic has also worked as a window of opportunity or a catalyst for many families who were already sceptical of the traditional school system and started home educating their children.
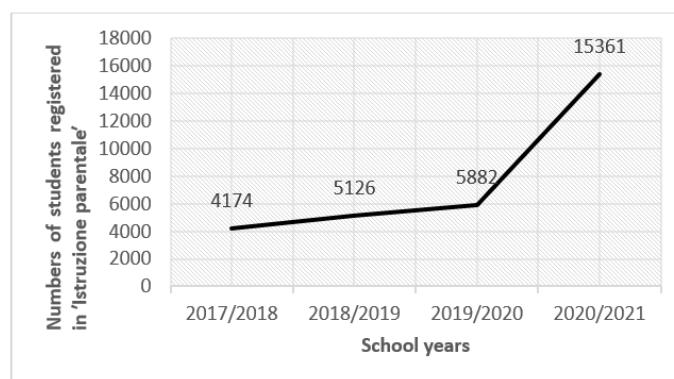
Figure 1: Numbers of Students (6-16 Y.O.) Officially Declared in *Istruzione Parentale* in Italy in the Last Four School Years. Elaborated from Data Gathered by the Statistical Office of the Ministry of Education, University and Research, Requested by Email by the Author

Methodology

The following theoretical analysis is based on the literature and insights from the fieldwork.

I have performed a non-systematic hermeneutic literature review (Smythe & Spence, 2012; Boell & Cecez-Kecmanovic, 2014; Efron & Ravid, 2019) on the international literature on

the phenomenon of EHE. The theoretical discussion will be supported through insights from an ethnography study conducted from January 2019 and 2020 on the parents' point of view in Italy.

An interpretive ethnographic approach was chosen in order to explore in-depth the reasons and the experiences of some families who chose to home educate in a specific context. The strategies used to carry out the study were netnographic observations (Kozinets, 2010) on an Internet community, participant observation at five homeschool gatherings, and ten unstructured interviews with home educators (eight mothers and two fathers). The main purpose of the study was to explore the *parental ethnotheories* (Harkness & Super, 1996), i.e., the beliefs of these parents on children, education, and family.

The fieldwork and the literature review provided the author with a *glocal* perspective, with a privileged viewpoint on a specific context that is conceived as a ′glocality′ (Meyrowitz, 2005): unique in many ways but also influenced by global trends.

Common Roots for a Complex Phenomenon

Homeschooling is an umbrella term since it refers to a variety of approaches, motives, and experiences. As Kunzman (2009) pointed out ′describing the typical homeschool family is not unlike describing the typical public school family – the range of demographics, philosophies and practices make such a generalization practically impossible′ (p. 312).

Parents' motivation to home educate has been one of the major issues in the scholarship on this phenomenon (Kunzman & Gaither, 2020). Empirical research has identified heterogeneous motives. The major motivations in the literature are, according to Gaither's analysis (2017), the following:

religious-grounded motivations, academic-anchored reasons, school environment-focused motivations, and family-based rationales. In Italy, conservative and religious parents tend to prefer the traditional school model (Di Motoli, 2019). In this context, parents are led to the decision to home educate more frequently by concerns about the school environment or academic preparation, the desire to provide tailored instruction, and special educational needs of the children that parents perceived are not being met by the teachers. Most of the motives declared by parents can be traced back to the general dissatisfaction with mainstream schools and the belief that home education is the best educational option for the child and the family.

As a growing area of scholarship has pointed out, not all parents are driven by an actual *a priori* conviction: some of them are ′second-choicers′ (Lois, 2017) or ′accidental home educators′ (English, 2021) who perceived home education as ′the only option′ (Maxwell *et al.*, 2018), a last resort out of frustration after an experience with conventional schools. Parents of gifted children (Jolly & Matthews, 2013) or children with educational special needs (Kendall & Taylor, 2016; Maxwell *et al.*, 2018; Morse & Bell, 2018) fit more frequently into this category.

In the following sections, the topic will be approached from a big-picture perspective, able to keep these diverse motives together. The aim is to answer the question: how does the phenomenon of elective home education fit in the wider contemporary society? I will claim that, in most cases, home educators are not to be considered as a cultural enclave, but the

exacerbation of some ongoing trends in the parenting culture and the wider society that have contributed to rethinking parents and teachers' roles and responsibilities.

EHE: The Ideology of Intensive Parenting and the Redefinition of the Expertise

One of the frameworks employed by scholars to describe homeschooling families is 'intensive parenting' (Aurini & Davies, 2005; Lois, 2012, 2017; Baker, 2019) that is a frequently reified social construction according to which rearing should be 'child-centered, expert-guided, emotionally absorbing, labor intensive, and financially expensive' (Hays, 1996:8), especially for mothers. It works as a cultural script: in the practice, it may generate different responses according to individual, gender, and cultural differences.

The intensification of parenting is not a universally implemented model but a pervasive standard, influenced by the neoliberal ideology and policies (Crozier 2019). It has spread especially in the Anglophone world and in parts of Europe, but some studies have pointed out that the intensification of parenting is gradually becoming a truly global trend (Faircloth et al., 2013).

Intensive parenting is frequently addressed as 'intensive mothering' (Lois, 2012, 2017; Baker 2019) by the authors who stress it is a gender-specific theory originally developed by Hays (1996). Although a 'new model father' mirroring intensive mothering has been fostered by policymakers and experts, dominant ideologies of motherhood and fatherhood seem to remain very different (Faircloth, 2014). Every analysis based on this conceptual framework must take into account a potential difference in the parents' involvement in heteroparental families, with fathers still reluctant (often unconsciously) to detach from the breadwinner ethics and hence, for instance, less likely to become stay-at-home caregivers than mothers.

This cultural model is fuelled by what has been called 'parental determinism' (Furedi, 2008), i.e., the belief that parents and their parenting are the main determinants of children's development and future success. This causalist reading has led to an expansion of parental responsibility or, as Faircloth (2014) put it, an 'inflation of the parenting role', encouraging greater involvement in children's lives, including their education.

Contemporary home education has been described as the ultimate form of parental involvement in a child's education (Neuman & Aviram, 2015) and can be neatly seen as an expression of the intensive parenting ideology. Home education often entails a financial effort and, above all, emotional labour to deal with the added stress to the child-rearing 'conventional' practices and the anxiety related to the high self-expectations that the internalisation of intensive parenting produces (Baker 2019; Faircloth & Murray 2015; Lois, 2012).

The effort to arrange temporally and financially expansive experiences for the children was a recurrent theme I abstracted from the interviews to the participants of the ethnographic study, parents engaged in home education in Italy. One of them, a 39-year-old woman and working-class single mother, admitted: 'Whether it is right or wrong, I live my life for my kid'[1]. Her proud tone clashed with the diplomatic opening, revealing her awareness that the intensive parenting ideal is not shared by everyone.

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[1] Interview 16/12/2019.

In this ′new′ parenting culture, child-rearing practices are not meant to be improvised but thought, studied, and learned. Furedi (2008) pointed out that in recent years parenting has become a difficult job, marked by constant anxiety. The requirements for parental care have increased, legitimising the influence of professional experts, a phenomenon he called ′professionalization of parenting′. Yet child-rearing advice has become more and more unstable (Lee *et al*, 2014), encouraging public conflicts and parents' hesitancy.

The diffusion of intensive parenting has consequences in reshaping the boundaries between parents and teachers' roles and responsibilities because intensive parents are more likely to challenge teacher professionalism by intervening in their child's schooling undermining the practitioners (Crozier, 2019). This aspect is exacerbated in the case of EHE since parents decide to take complete responsibility for their children's education.

EHE and the Redefinition of the Expertise

The challenge of teachers is legitimised by an ongoing cultural shift, i.e., the narrowed social gap between professional and lay visions that also affects the educational field. In the classification of the Global Teacher Status Index of 2018 (Dolton *et al.,* 2018), elaborated by the Varkey Foundation, Italy was the 33rd out of the 35 countries included in the study and the last of the European countries involved.
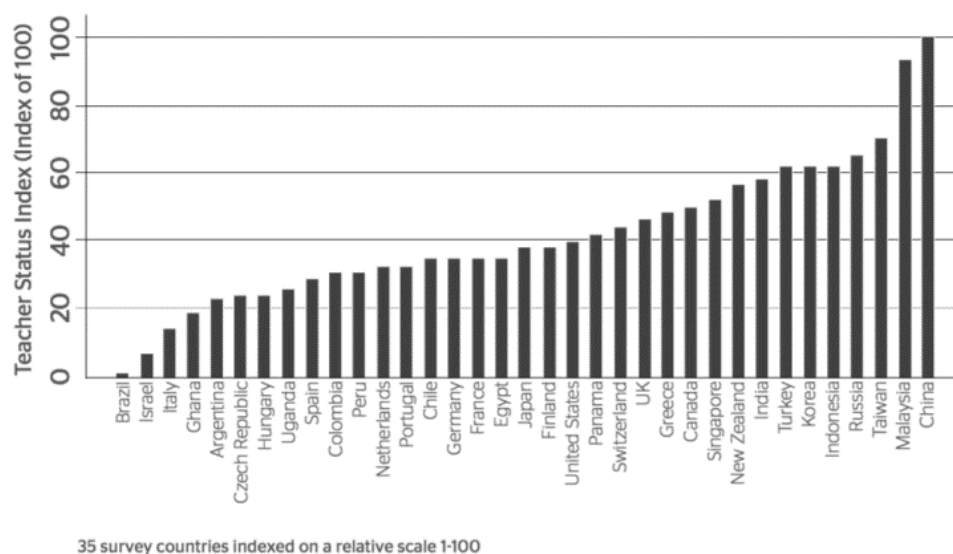
Figure 2: The Varkey Foundation Global Teacher Status Index 2018 (GTSI, 2018).

Dei (2015) warned that the social status of this profession is substantially worse in teachers' perceptions than it is in reality, i.e., in public opinion. Even in this scenario, it is significant to notice that the attitude of some parents has contributed to the diffusion of the cliché that teachers have low social prestige and are deprived of their authority.

This critical attitude towards teachers can be related to renowned sociological readings on contemporary western societies claiming that public trust in experts has declined considerably (Beck *et al.*, 1992). Among the proximate reasons of the recent past for this wane, we can identify the role of the above-mentioned conflicting pluralism of experts and the Internet.

The Internet search engines and social media have played a pivotal role in the diffusion and decentralisation of knowledge, but some scholars have pointed out that the other side of the coin is the ′flattening of expertise′ (Brabazon 2006). With knowledge being accessible, experts can be more easily questioned by everyone.

The hypothesis is that deepening distrust in experts and institutions have led intensive parents to self-select the experts' views to endorse or choose to rely on themselves. The participants of my ethnographic study were generally relucted to identify just a few experts or theories that inspired their child-rearing practices, moving towards a do-it-yourself education. For instance, one of the interlocutors of the study said: ′I am for the multipedagogy′[2]. Likewise, another home educator told me: ′I think everyone is stuck on his own [perspective]. There is only Steiner, only Montessori! We [as parents] take the good from each of them′[3].

The individualisation of the educational practices was extremely important to these parents. In the words of three of my interlocutors: ′Schools don't respect the individual, but the system, the schedule, the deadlines′[4]; ′I'm not *against* school education but […] teachers didn't see him [my child] as an individual′[5]; ′[The school] wasn't suitable for their characteristics—in my opinion. A thing that really affected… // concerned us was the levelling, the unbelievable standardization′[6]. In the ethnographic study emerged that one of the most recurrent motives to home educate was the discrepancy between what the school could offer and the child's particular characteristics.

In this parenting culture, children are seen as unique learners, but conventional instructional strategies are not meant to address the individual learning characteristics, besides the explicit recognition of special educational needs and disabilities for some pupils.

This contemporary educational issue has been tackled by Tomlinson (2014) who provided an operational framework to implement differentiated instruction in the classroom, drawing from different teaching methods to suit the interests, needs and abilities of all learners. Barriers to its application, such as the overload assigned to teachers and time constraints (Al-Shaboul, Al-Azaizeh & Al-Dosari 2020), remind us of the wider difficulty to fulfil a project of both personalised and mass education, an unresolved tension that is encouraging many families to withdraw their children from public schools to home educate.

Conclusions

Parent-led elective home education is a growing educational option in Italy and worldwide. In this contribution, an empirically-informed theoretical approach was adopted to reflect on some aspects of contemporary society that are contributing to the growth of elective home education in some cultural contexts. The analysis presented here is underpinned by the idea that homeschooling families can be observed as magnifying glasses of cultural trends that are embedded in the wider parenting culture and are redefining the role of teachers and parents. Methodologically, a hermeneutic strategy was employed to combine the insights from an ethnographic study on a non-representative sample in Italy with the international literature on the topic. Aware of the limitations of this approach, the analysis does not aim at neutrally

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[2] Interview 16/09/2019.
[3] Interview 16/12/2019, same interlocutor of note 1.
[4] Interview 16/12/2019, same interlocutor of notes 1 and 3.
[5] Interview 10/12/2019.
[6] Interview 16/09/2019, husband of the interlocutor of note 2. The couple was interviewed simultaneously.

describing a matter of fact but attempts—from a local perspective—to open a critical reflection on this rapidly evolving phenomenon.

The parent-led practice of home education is a ′significant choice′ due to its serious implications (Guterman & Neuman, 2017) whose general premise is found in the desire of parents to directly control the education of their children within the context of the family home (Jolly & Matthews, 2020). It can be framed as a reaction grounded in the widespread loss of trust in the public educational school system (Leonora, 2019) and a certain conception of childhood and parental involvement (Aurini & Davies, 2005; Neuman & Aviram, 2003; Lois, 2017).

In a social landscape marked by a growing scepticism towards mainstream expertise, teachers' professionalism is contested by intensive parents who desire to provide their children with a tailored education. In this contribution, I have argued that the diffusion of the intensive parenting ideology and the growing mistrust in experts and institutions are informing the contemporary parenting cultures. These culture trends may intertwine, (re)shaping home-school relations. The ultimate expression of this reconfiguration can be found in the case of elective home education.

Moreover, these cultural trends challenge the school system to reaffirm teachers' expertise in new ways and to rethink its role by negotiating between the necessity to guarantee public education to everyone and the demand for more attention to students' individual differences.
In this perspective, home educators bear witness to the wider and growing demand for individualised—or even personalised—education that cannot easily be fulfilled in a conventional school context.

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Altered Andragogy: Lessons from Lockdown for Systems Engineering Education

Stephen G Barker, Cranfield University, United Kingdom
Jeremy D Smith, Cranfield University, United Kingdom

Abstract

Systems Engineering (SE) is a largely interactive and applied discipline which has been mainly taught via face-to-face tuition. The move to online-only teaching due to the 2020 coronavirus pandemic thus posed significant challenges for SE education. The andragogical strategy involved had to be rethought and redesigned such that key precepts of student learning could be maintained in a way that preserved the depth, intricacy, and richness of the SE discipline. The interdisciplinary approach adopted involved combining a constructivist viewpoint with integrated collaborative and reflective activities, based around inquiry-based learning to facilitate online learning at distance. This pedagogical construct relied on a multidisciplinary and iterative approach to curriculum and module delivery, employing multiple methods to redesign the teaching approach to 'chunk' material into sets that were more readily deliverable in short bursts, and more digestible without face-to-face interaction. This took in revisions to the traditional pedagogical approach to learning, and blended short live online sessions with self-paced tasks, supported by Q&A sessions and 'thought bursts' of key information to summarise key learning points. Learning technology and software tools were used to facilitate and promote interactive and group workshops, which was particularly challenging but proved useful in bridging generational gaps and preferences for certain learning styles. This paper details the andragogical approach taken to wholly online distance learning for SE, reflecting on how successful it was both initially and as it evolved. It also considers how future learning can be successfully facilitated, incorporating the pedagogical lessons learned from the last twelve months.

Keywords: Andragogy, Systems Engineering, Teaching Practice

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Introduction

Systems Engineering is a multidisciplinary subject, which *"focuses on defining customer needs and required functionality early in the development cycle, documenting requirements, then proceeding with design synthesis and system validation while considering the complete problem: Operations, Performance, Test, Manufacturing, Cost & Schedule, Training & Support, and Disposal"* (INCOSE, 2012). As such, it is a practical, applied subject, which relies on the involvement of multiple stakeholders, and is highly interactive in its nature. When teaching the subject, especially at UK level 7 ("What qualification levels mean", 2021), this means that the focus must be on activities that allow students to explore the use of concepts in situations which are as realistic and reflective of real-world scenarios as is possible. In particular, ways must be found to allow the students to address issues such as those listed below:

- Addressing the increasingly complex challenges and problems which we face in engineering and management today.
- Identifying and exploring the root causes of problems.
- Viewing issues and requirements from multiple perspectives.
- Structuring problem thinking, solution development and application across the lifetime of a system or procurement, from concept to retirement.
- Instilling an understanding of how systems engineers, domain engineers and project managers come together as multi-disciplinary teams to develop solutions to real world problems

To do this, systems engineering education has employed a mixture of traditional, lecture-based learning, and experiential, more practical teaching and learning practice. The intention behind this, from an andragogical perspective, is to facilitate student learning of the essential concepts and components of the subject (Bligh, 1998; Bonesso et al., 2015; Garside, 1996), whilst allowing a positive and interactive hands-on experience through experiential application and learning (Pugsley & Clayton, 2003; Illeris, 2007). Cranfield University's Systems Engineering MSc ("Systems Engineering MSc", 2021) achieved this by employing two different types of course module, as described at figure 1 over page. The left-hand side format, labelled 'taught module', describes a standard module in which students are instructed on systems engineering concepts, before being given the opportunity to reinforce their learning through a series of exercises and supervise practical work, both individually and as members of a group. Formative feedback is given at regular points, and a summative assessment is then undertaken post module to test knowledge and the ability to interpret, apply, and reflect. These taught modules were interspersed with 'workshop modules', described by the right-hand format in figure 1, which allow students to apply learning to a realistic real-life scenario or case study, encouraging them to explore the application of systems engineering concepts and models, potentially challenging their validity, and to experience, within reasonable bounds, how systems engineering can bring benefit to business operations. Assessment in the workshop modules is more interactive, taking the form of group presentations, and experiential portfolios, as well as individual reflective assignments. This coverage ensures that multiple faces of student ability are tested, ranging from understanding and being able to rationalise concepts, through applying and evaluating models and techniques, to reflecting upon outcomes, and developing strategies for use and application. It also focuses on the completeness of the educational and learning experience, spans the spectrum of Bloom's taxonomy of educational objectives (Bloom, 1979), and ensures that requirements of level 7 education are met.
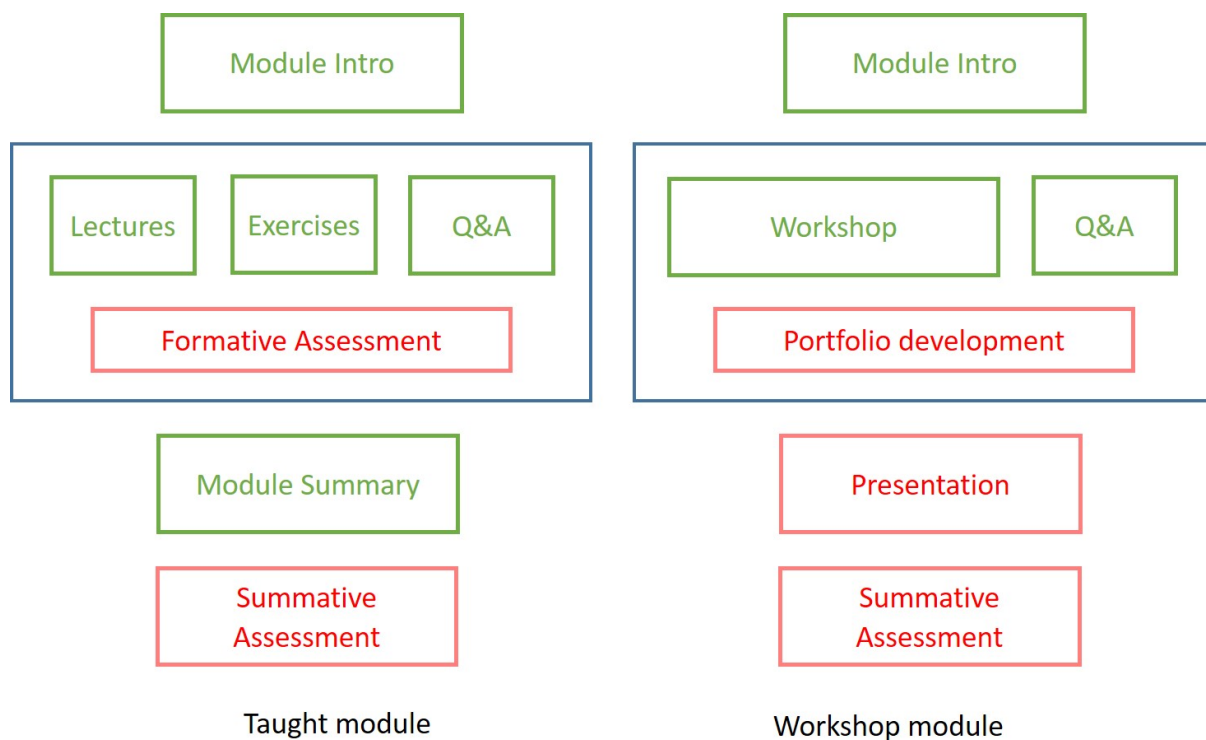
Figure 1: Module Structures

Both types of modules are clearly interactive in design and approach, and as such, received wisdom held that they were best achieved through face-to-face delivery. This idea was tested to the full when the coronavirus pandemic of 2019-20 struck and necessitated that in order to continue delivery of education, all courses had to be moved online. This move, together with associated lockdown and stay-at-home orders, posed several challenges, ranging from finding a suitable delivery mechanism to permit continued delivery, through dealing with alterations to student learning preferences and expectations, dealing with issues around staff and student wellbeing, ensuring continuation of educational offering(s), and coping with factors such a working from home and childcare. This paper describes the andragogical challenges presented by this situation, focusing specifically on the approach developed to maintain course delivery, and explores the lessons learned and what they might mean for systems engineering education in the future.

Online Education and the Challenges for Systems Engineering

The move to online-only teaching and learning delivery forced by lockdown and stay-at-home instructions to contain the spread of the coronavirus pandemic required a rethink of how teaching and learning could be continued and maintained to the required standard to allow award of end qualification. Several factors needed to be considered in this process, notably what teaching mechanisms might be suitable to facilitate purely online learning, and how student needs and learning preferences could be catered to. The type of teaching and learning was important; as certain facets lend themselves more readily to online learning than others. For a more structured learning experience, such as training, students tend to have different expectations than they would of a more exploratory educational experience (Barker, 2014). Table 1 below demonstrates this.

	Training	Education
Delivery Structure	Structured, highly regulated	Less structured, more interactive
Format	Formal Lecture, structured workshop	Lecture and workshop
Teaching style	Formal instruction	Debate, peer workshop
Interaction	Minimal	Expression of opinion
Lecturer view	Taken as authoritative	Challenged through debate
Personality "type"	Untailored	Tailored

Table 1: Student Expectations of Learning Experience (Barker, 2014)

Fry et al. (2009) and Ramsden (2003) suggest that for an educational experience, students have an expectation that there will be a mix of short instructional pieces interspersed with exploratory and interactive group work, or possibly research tasks. Students tend to be more prepared to challenge the accepted wisdom of a scenario or situation, evaluating their own view in comparison to the 'authority' view. As a result, Barker (2014) suggests that "students cycle through the 'relate-create-donate' paradigm advocated by Shneiderman (1998) in which the students interact with others in groups to develop ideas ('relate'), before putting these ideas into practice on a case study or project ('create'), and then extrapolating the learning experience into meaningful and useful contexts in their own wider world ('donate')". Thus, the educational experience is focused upon testing boundaries, and accepting the need for change (Hendry, 1996). For training, however, experience suggests that there is more an expectation of highly structured instruction followed by the undertaking of clearly specified tasks with clearly defined expectations of outcomes (Barker, 2014).

Given the interactive, multiple perspective-centric nature of systems engineering, it might clearly be seen to fall into the educational experience domain as a result of which the more fluid teaching and learning styles required posed significant issues for online delivery. Student learning preferences must also be considered, Fry et al. (2009) suggesting that students can perceive the same teaching in different ways. Table 2 illustrates a categorisation of preferred learning styles proposed by Honey & Mumford (1982). Given these differing learning styles, the employment of a variety of teaching methods is necessary to ensure completeness of understanding and learning experience. Barker (2014) identifies key teaching methods as being: lecturing; facilitated group workshop; self-study and individual research; e-learning; group debate and presentation, and the employment of a combination of these in a varied manner is a good approach to ensuring student involvement and enthusiasm (Ramsden, 2003).

Classifier	Descriptor
Activist	Responds most positively to learning situations offering challenge, to include new experiences and problems, excitement and freedom in their learning
Reflector	Respond most positively to structured learning activities where they are provided with time to observe, reflect and think, and allowed to work in a detailed manner
Theorist	Respond well to logical, rational structure and clear aims where they are given time for methodical exploration and opportunities to

	question and stretch their intellect
Pragmatist	Respond most positively to practically based, immediately relevant learning activities, which allow scope for practice and using theory

Table 2: Categorisation of Learning Style (Honey and Mumford, 1982)

Having considered the andragogical needs of education and student learning styles, it is necessary to place these in the context of achieving the delivery of systems engineering delivery online. Having already established that systems engineering is highly interactive and therefore requires a style of education that lends itself to facilitation of group working, discussion, and shared experiential learning, analysis by the Cranfield course team established some key challenges to continued delivery of the MSc in an online world. These are listed below.

- Face-to-face teaching now unachievable
- Different learning needs
- Different learning styles
- Reliance on technology which was (initially) unproven
  - Student access
  - Reliability of IT for teaching

The inability to deliver in a face-to-face manner was perhaps the biggest challenge to continued delivery of the course. Under normal circumstances, exercises, research tasks and longer workshops would be facilitated by giving the students access to physical breakout rooms containing whiteboards, paper, pens and space to discuss and debate real world issues and how to apply systems engineering in that context. This is particularly important to undertaking of the higher-level activities described by Bloom's taxonomy of educational objectives (Bloom, 1979) which are necessary in order to meet the requirements of level 7 education (QAA, 2014). Without the ability to deliver face-to-face, the online teaching delivery simply lacked the flexibility of the face-to-face alternative. Examples of this are that the interactive environment cannot be fully replicated, it can be more difficult to model and share ideas because IT solutions can be more limiting and formulaic (i.e. modelling software can enforce modelling conventions which are unhelpful when trying to characterise a fluid and complex situation). Moreover, the limitations of the IT solution employed could mean that students were not able to fully interact on group work, and not get the full benefit from their learning experience.

The learning needs of students could also be impacted, in that some students suffer from learning difficulties such as dyslexia, which could be negatively impacted by online-only delivery (Gabay et al., 2012; Kormos & Nijakowska, 2017). This required very careful consideration, as university and national/international standards of teaching and duty of care had to be maintained. Special provision of materials, and one-to-one special advice for students had therefor to be factored into the andragogical equation.

A related concept to learning needs is that of learning preference or style. Research has shown that individuals of different gender (Wehrwein et al. 2017), or age (Truluck et al. 1999), for instance, have different learning preferences, and respond better to different teaching methods. As a result, the most suitable teaching method and techniques had to be found to optimise the online learning experience, which created the ned for more frequent review than would perhaps otherwise have been the case. Apart from that, some individuals

simply tend to exhibit a preference for a particular teaching method or learning style (Kharb et al., 2013; Manolis et al., 2013). Examples from experience are that some individuals prefer step-by-step tuition ahead of a structured exercise analogous to the training experience outlined in table 1, whilst others are content to have free rein of a workshop approach to allow them to explore and evaluate ideas, methods, and techniques.

The final problem initially identified by the course team was the reliance upon IT. Several different packages and solutions had to be trialled, appraised, and approved before a consistent and reliable IT solution could be arrived at, and this was found to be disruptive to the teaching and course delivery effort. Particular problems identified were that some students, reliant upon home or personal IT, had difficulty – initially at least – in accessing software packages or programs, and the reliability of the chosen IT solutions varied across time due to the fact that they were often provided by third party vendors who were in some cases developing their offering continually (Gray et al., 1998; "How Covid-19 Has Pushed Companies over the Technology Tipping Point – And transformed business forever", 2021).

Having described the problems facing the online delivery of systems engineering, the next section will describe how the course team approached the design and implementation of an andragogical strategy to allow continued delivery of the Systems Engineering MSc online.

Approach to Online Delivery of Cranfield's Systems Engineering MSc

In order to meet the challenges to online delivery of systems engineering education outlined in the above section whilst being able to continue course delivery, the MSc course team conducted a number of planning meetings in a short period of time in order not to disrupt the intended schedule of module delivery before implementing an incremental approach to delivery and review, adopting the approach illustrated in figure 2 below.
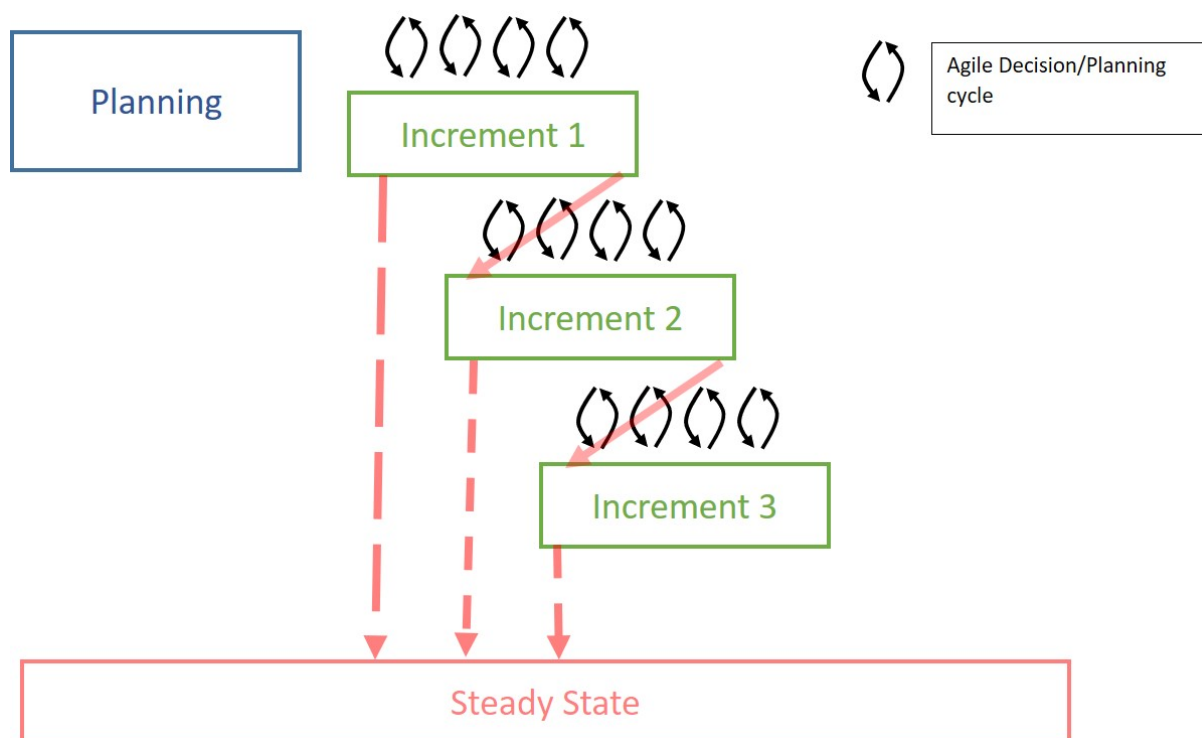
Figure 2: Approach to online course delivery

It quickly became apparent that flexibility in planning the continued delivery, but also the delivery of course modules themselves, would be vital if a successful outcome as to be achieved. The use of resources to facilitate learning would also be important to provide a varied and quality learning experience. Principle among these facilities would be:
•   Online direct contact time with students
•   Online independent study time for exercises and workshops
•   Offline research activities and reflection
•   Virtual Learning Environment as a repository for course/module material and as a learning resource

Furthermore, it would be necessary understand how student learning styles and preferences could be best accommodated by which combination of the above points with the teaching methods suggested by Barker (2014): lecturing; facilitated group workshop; self-study and individual research; e-learning; group debate and presentation. How this combination could deliver the required educational package to the requisite standard would also need careful consideration, involving an assessment against Bloom's taxonomy (Bloom, 1979) and level 7 andragogical requirements (QAA, 2014).

The planning conducted by the course team sought to achieve an initial balance of use of facilities to facilitate teaching methods, which was based upon experience of teaching at level 7 and knowledge of existing student learning preferences accrued during pre-coronavirus pandemic teaching delivery. This resulted in the following principal changes to module delivery, noting that delivery differed depending on the type of module identified in figure 1 (i.e. taught or workshop).

•   Increased use of Virtual Learning Environment (VLE) as resource for information sharing
•   Shorter instructional/lecture sessions
•   Increased blend of different learning activities
•   Increase in interactive exercise/workshop activities, followed by student briefings, and provision of worked answers
•   Increase in amount of formative feedback provided to bolster learning
•   Increased use of software to facilitate modelling exercises

It was reasoned that sitting at a computer for periods of time would be uncomfortable for students and teachers alike and would also affect the students' ability to concentrate on the necessary learning. Therefore, shorter, 'punchier' instructional pieces, either by 'live online' mini-lectures, or pre-recorded pieces placed on the VLE were adopted. The latter was thought to be important in that it would allow students to study either at their own pace, or at a more convenient time given other pressures caused by lockdown and work-at-home instructions.

A blend of teaching activities was also employed to ad variety and ensure that learning was reinforced whilst trying to cater for different learning styles and preferences. Methods used varied from module to module but might include a short initial instructional piece followed by a supervised exercise and then an offline research task to extend learning. An increased use of peer-to-peer evaluation, and group presentations was made to ensure student involvement and facilitate feedback. Regular 'live online' Q&A sessions were planned to allow formative feedback, whilst one-to-one student and mentor sessions were offered to provide reassurance and ensure student confidence in their learning. For longer workshops, more regular supervisor input was planned, along with regular 'report back' slots, and

progress reviews if requested by students. Assessment methods were also adapted more toward interactive group presentations and portfolio development, emphasising peer support and joint learning outcomes. In this way, a more complete and inclusive experience for students could be constructed. Use of software was also adopted where it would facilitate common learning across the student cohort and ease the burden of learning remotely. This course planning activity led to the development of a "blended learning toolbox" for online module delivery, as described in the bullet points below.

- Live online teaching sessions
- Self-paced "information packages"
- Interactive workshop segments
- Thought-provoking "mini-segments"
- Live discussion sessions
- Live online Q&A activities
- Peer-to-peer online/offline activities

Course modules were then delivered against the original timescale, butt with increased review both during and after the module took place, as shown in figure 2, in order to ascertain that quality was being maintained, student learning was being successfully facilitated, and that student expectation of learning was being met. There were inevitable teething issues, particularly around use of IT solution, but these were quickly resolved through discussion with Cranfield's IT department, and with minor tweaks on an ongoing basis, delivery achieved a steady state in a satisfactory timescale. Student feedback was sort throughout the delivery process, both informally and at a Student Liaison Committee, which has been run regularly by the course team to canvas student opinion, resolve any issues, and identify improvements that can be made. The process of incorporating that feedback and improving modules for future delivery is described in the next section.

Incorporating Student Feedback and Learning from Experience

Given the revised andragogical concept of course delivery and format devised at relatively short notice described above, a decision was taken by the course team to hold regular review meetings both during and after module delivery to make necessary adjustments and improvements, taking into account experience of delivery methods and student feedback. Feedback was sought as frequently as was practicable and was fed back into the continual review process to improve module delivery and student learning experience as much as possible within the limitations of online-only delivery. A summary of main student feedback to initial delivery of the online course is given in table 3 below.

Feedback topic	Student comment
Online delivery mechanism	Initial teething problems with IT, but once accustomed, could see benefits of "learning from home"
Delivery (teaching) style and learning experience	Liked the idea of shorter segments of instruction, followed by workshops and then provision of worked solution/answers
	Recognised trade-off of not having face-to-face versus freedoms of: • Working from home • Self-paced learning
	Disliked complete lack of face-to-face learning
	Found it hard to make all online sessions

Table 3: Summary of Student Feedback

The course team reacted to this feedback to include voiced-over presentations and thought-provoking "mini-segments" on the VLE to increase flexibility for the students and encourage reflection and further consideration of key systems engineering factors and issues, and a policy of recording all 'live online' sessions was introduced to attempt to accommodate other pressures on students' lives during the lockdown period. Other changes that were made to the course delivery mechanism as a result of the reviews and feedback received are listed below.

•   Make Virtual Learning Environment material available earlier
•   Ensure 'system test' sessions are programmed ahead of module delivery
•   Tailor 'blend' of delivery methods to particular groups of students
•   Double staff sessions to add redundancy in case of IT failure
•   Continue to focus on frequent review of teaching effort and learning experience

Increasing the material available by the VLE, coupled to making the material available earlier, allowed students to appraise key issues that would be discussed during modules in their own time, and also supported students with learning difficulties who required a longer timescale to understand the information provided. The course team also made efforts to tailor delivery to individual groups of students as a result of consultation and feedback, and these changes were met with significant student approval.

Attempts were then made to increase the resilience of the online delivery mechanism by double-staffing 'live online' delivery so that if one member of teaching staff experienced IT issues, there would be a second member present online to be able to takeover. In addition to this, pre-module 'system tests' were instigated to ensure that students wee able to access necessary IT and teaching resources.
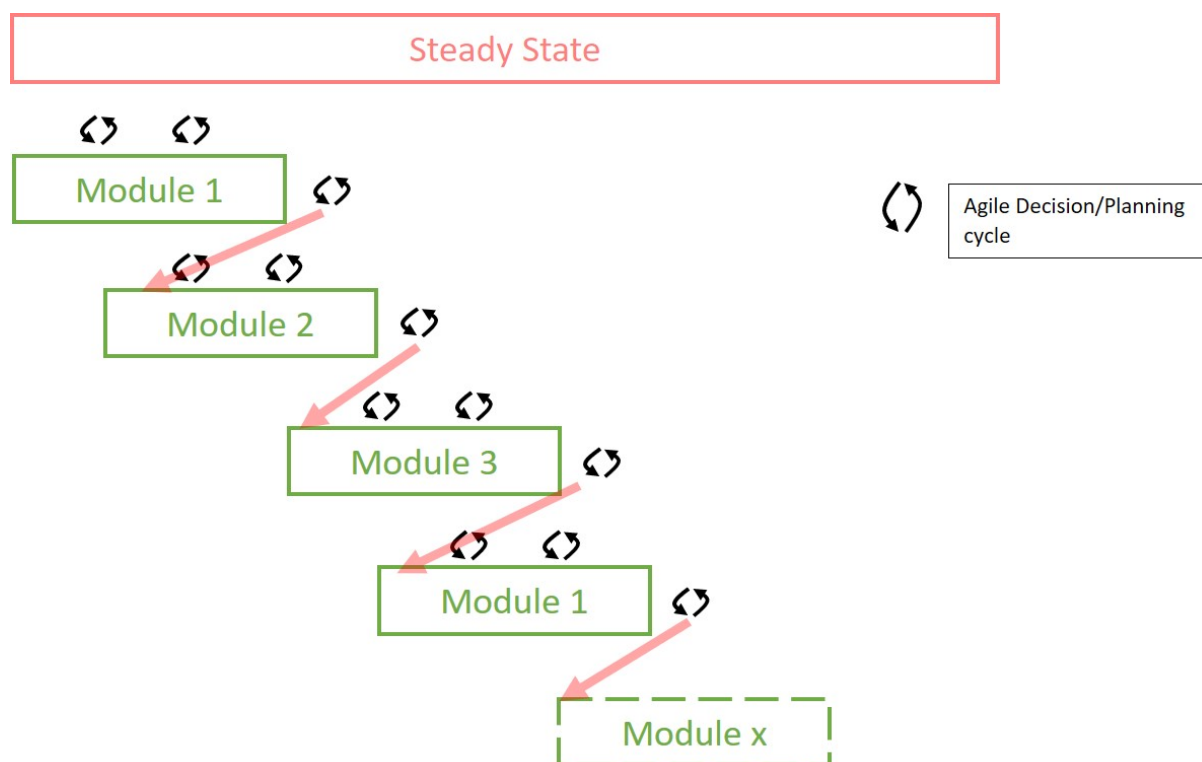
Figure 3: Steady State Delivery of the Online Course

This process of consultation, seeking feedback, regular review and improvement of module delivery allowed reflection upon key lessons, and the extension of the initial approach to online delivery described at figure 2 into a 'steady state' delivery mode described at figure 3. This allowed for module delivery as planned whilst still reviewing and updating delivery at a pace required by the prevailing situation, and sharing best practice and lessons learned across all modules. The lessons learned and improvements identified were disseminated amongst the course team, and also presented to course directors and teaching staff from other courses in order to improve practice throughout the school and wider university such other courses could avoid the issues encountered in delivering the Systems Engineering MSc, and adapt lessons learned for their own courses and modules. The next section will summarise the findings of this paper and make recommendations for future online course delivery based upon lessons learned and described in this paper and will summarise key findings.

Recommendations and Conclusions

This paper has sought to describe how the course team for Cranfield University's Systems Engineering MSc reacted to the instruction to lockdown and stay-at-home as a result of the 2019-20 coronavirus pandemic in order to continue to deliver the MSc course in an online-only manner. The difficulties facing online-only course delivery are described, both generically and from a systems engineering perspective. The course team's response was to hold a series of planning meetings in an extremely short period of time as shown at figure 2 in order to maintain the established schedule of module delivery and limit disruption to students. An incremental approach to delivery, incorporating agile/real-time review and replanning and module update sessions was then implemented in order to maintain effective delivery whilst solving issues such as IT problems in an ongoing manner. In this way, the student learning experience was optimised as far as was possible under the circumstances. Student feedback was sought throughout the process, and key elements of this are detailed at

table 3. This feedback was incorporated into the course planning and review strategy, and along with alterations as a result of other lessons learned resulted in the 'steady state' delivery mode described at figure 3. The whole experience led to a number of recommendations for continued online course delivery, and these are listed below.

•   Although Systems Engineering does not lend itself readily to pure distance learning, a blend of online and face-to-face sessions could facilitate successful education
•   Back-up staff options are essential to ensure resilience of online teaching delivery and learning experience of students
•   Shorter, more impactful, information packages facilitate improved student learning
•   Ensure blend of learning activities is appropriately tailored to student learning needs, preferences and styles

The context in which such recommendations are applied is of course important as different courses have different demands – for example, theory-based courses would not necessarily face the some of issues outlined above in that they would not necessarily require a highly interactive andragogical approach to delivery and student learning, whilst other experiential or practitioner courses where interaction and sharing of ideas is a necessary part of the learning experience, might be dealt with in a similar way to the systems engineering example described in this paper. However the course is structured, the lessons around IT issues, the structure of the delivery mechanism, and the impact of online learning on student mindset and learning experience must be carefully thought through and tailored appropriately in order to maintain the effectiveness of the course offering.

The main conclusions from the reflective process behind the writing of this paper are detailed below.

•   Mix of online learning and face-to-face 'consolidation' sessions can be a viable vehicle to teach Systems Engineering
•   Frequent review of teaching approach and learning experience is vital
•   Use of IT can facilitate Systems Engineering learning, but only if tailored to learning needs and used appropriately
•   Communication to student of body of approach, and how it evolves, is essential
•   Institution of a Student Liaison Committee is really valuable asset in eliciting feedback from students

In terms of future work, it would be useful to apply the ideas learned from the Systems Engineering MSc to other courses to deepen the andragogical knowledge base around online teaching and learning, and further work around understanding student preferences would be valuable to enable more effective and seamless tailoring of delivery mechanisms to enhance the student learning experience.

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Re-imagining Blended Learning 3.0 in Education - Defining a New Technology-Enabled Experience Led Approach to Accelerate Student Future Skills Development

Jamie A Kelly, University College Dublin, Ireland
Victor McNair, Digital Schools Awards, Ireland

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Abstract
This paper argues that digital living and working has changed irrevocably as a result of the Covid-19 Pandemic and therefore, digital developments in education brought about mainly by the use of blended learning during the Pandemic needs to be converged to support lifelong digital learning. Adopting the European Unions definition of blended learning, the paper shows that a tripartite understanding of blended learning between schools, Industry and policymakers is needed to secure sustainability and transferability of digital skills from school to the workplace.   The Digital Schools Awards programme is offered as a potential contributor to a digital culture of lifelong learning to consolidate the development of digital literacy across Europe so that the experiences of blended learning and teaching during the Pandemic can be harnessed and advanced.   To be sustainable, blended learning must appeal to students and their teachers' pedagogical and curricular needs. The paper, therefore, promotes a continuum approach to blended learning where a range of developmental and progressive strategies are proposed as 'accelerators' for digital skills. A rationale for future work and draws on this continuum to support blended learning and the workplace as a lifelong practice. A multistakeholder, peer to peer approach to the future of learning and skills development will, we argue, positively impact the way 21st-century citizens can educate, learn and work at cross-cultural, multi-societal and institution levels.

Keywords: Blended Learning 3.0, Blending Learning Accelerator, 3Es Framework, Education Learning Continuum, Future of Work Skills, 3Es Model, Tri-partite Approach, Digital Literacies, Digital Wellness

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Introduction

This paper explores blended learning as a developmental continuum that supports the strategic embedding of digital learning skills in schools. This strategic approach, we argue, can accelerate student learning and hence better prepare them for post-pandemic digital living and working. We use the term 'accelerate' as a metaphor for increasing the levels of student digital competence in three ways. First, to exploit, and where pedagogically viable, embed the many digital developments that teachers created during the Pandemic to support remote learning to enhance their pedagogical efficacy. Second, 'accelerating' student digital skills is made necessary by the mounting pressure for flexible learning. At a policy level, the UN [2020], UNESCO [2020], the European Commission [2020] and OECD [2021a] take the view that governments must support more diverse forms of digital learning and teaching. At the workforce level, McKinsey (2020a p.2), early in the life of the Pandemic argued that; *"In just a few months… companies have accelerated the digitisation of their customer and supply-chain interactions and their internal operations by three to four years"* (authors' emphasis), with the survey highlighting an increase in remote working as the second-largest shift most likely to 'stick' through the recovery. Third, by providing a developmental road map, education organisations can recognise the scope and breadth of blended learning (defined in detail below) and therefore activate strategies to embed, extend, and enhance student experiences. Combining these elements of the metaphor, we argue, is an effective way to understand how best to support schools and students in developing appropriate, sustainable, progressive and future-ready skills for lifelong education, learning and work [WEF, 2018].

The Pandemic forced up to 94 per cent of the world's student population to change their established patterns of learning [United Nations, 2020]. Education institutions had to recalibrate their teacher-learner relationships to maintain continuity in learning [Barron et al., 2021]. The traditional classroom-based understanding of the 'lesson' had to become distributed in time and space, requiring teachers and learners to develop different digital skills to account for hitherto unknown variables such as hardware, connectivity and home physical space. They had to reimagine the nature of their human connections with their learners and develop new ways of offering support.

However, Schleicher (in OECD 2021a p. 3) observes, *"Remote classrooms …are not the same as smart ones"*. Lucas *et al*. [2020] also suggest that learning did not take advantage of the range of online tools that could support learning in the transition. Instead, they argue, teachers replicated their established forms of learning in a remote context. Similarly, learners, released from the controlling influence of the classroom, teacher proximity, school culture and corporate identity, faced learning alone, remotely, with few constraints. Without the immediacy of teacher presence and support, they may have struggled to understand their role in this new context. Eivers *et al.* [2020] found that just over half of pupils taught remotely did not have 'live' or real-time teaching but instead presented with traditional tasks such as completing a worksheet or reading. As a consequence of many of these factors, claim the World Bank, *"…the* [global] *impact* [of the pandemic] *on the human capital of this generation is likely to be long-lasting…"* [World Bank, 2021].

1.   Opportunities of Post-pandemic Learning and Teaching

Despite these difficulties, forced remote learning has, perhaps inadvertently, created an innovation explosion that has all the potential to accelerate more varied and digitally-based

learning and teaching scenarios. The new education landscape has forced a rethinking of education policy in many countries. For example, calls for more flexible and resilient education systems include expanding the definition of the right to education to include '...*connectivity entitlement...*' [UN, 2020].

There is now an emerging policy agenda for building post-covid flexibility using the newly acquired digital skills that have made online learning and teaching possible [McAleavy and Gorgen, 2020]. Similarly, UNESCO [2020 p.16] argue that interest in mobile learning "... *has grown exponentially...*" and the UK think-tank Ed Tech APPG [2020] argue for traditional teaching to be coupled with educational technology to enrich the variety of pedagogical approaches. The European Commission [2020 p.3] has taken a more radical stance proposing sweeping changes to established curricular norms, arguing that post-pandemic education has the opportunity to explore how 'traditional' ways of learning and teaching can be adapted *"...from subject-based knowledge transfer to scaffolded competence development…"*. (2021a) argue that classrooms are now poised to take advantages of emerging technologies such as AI and robotics.

1.1.   The Digital Schools Award: An Example of Blended Learning

Blended Learning as an Accelerator

The Digital Schools Award (DSA) programme, helping schools address these calls for change, is an EU-wide self-review pilot framework that provides primary and secondary schools with strategic and practical digital learning and teaching approaches, including blended learning. While recognising the complexity of the emerging debate and the range of variations and approaches to blended learning, Singh & Thurman's [2019] helpful summary of 46 separate definitions into four common elements has supported the DSA approach. The four common elements are time (the use of synchronous and asynchronous activities), interactivity (teacher-student, student-teacher, whole-class or group activities, student-student interactions all facilitated through a variety of technology tools), physical distance and educational context.

Similarly, the European Commission has summarised its ongoing policy blending learning agenda as "...*a hybrid approach that combines learning in school with distance learning, including online learning…*". [EC, 2020 p.4].

Augmenting Singh & Thurman's four elements with the Commission's definition, the DSA programme has created a progressive and developmental continuum of strategies (Figure 1) that can support Europe-wide recognition among schools, transferability and policy consistency. At a practical level, teachers can select appropriate blended learning strategies and techniques depending on the needs and skills of their learners and the context in which they are working.

Another critical policy element of the DSA programme is its linkage in terms of language, focus and outcomes to SELFIE (2021), the EU-wide developmental school's self-review questionnaire. In the DSA Framework, development and adoption are in three stages that move from a strong classroom focus (Blended Learning 1.0) through more varied blends (2.0) to Blended learning 3.0, where education is primarily online and where digital pedagogies use tools that support a range of collaborative and independent learning activities and where teacher control is more remote.

Blended Learning 1.0   Blended Learning 2.0   Blended Learning 3.0

Figure: 1. DSA Blended Learning Continuum
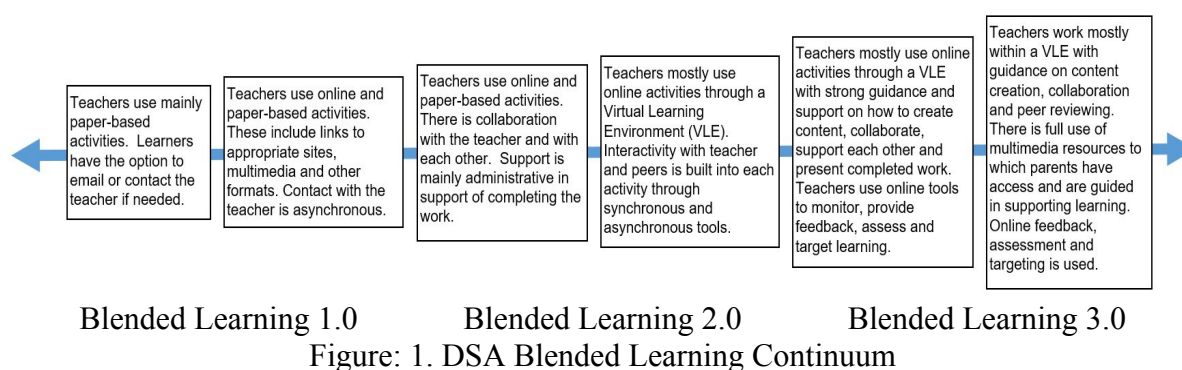
The continuum is also augmented into a whole-school developmental framework. The core is seven key developmental areas (shown in the circle) drawn from the European Digital Action Plan [EU, 2021], which for participating schools further expand to include statements of best practice that support current government policy agendas. The areas are summarised in Figure 2 below.

Figure. 2. Digital Schools Awards Framework.
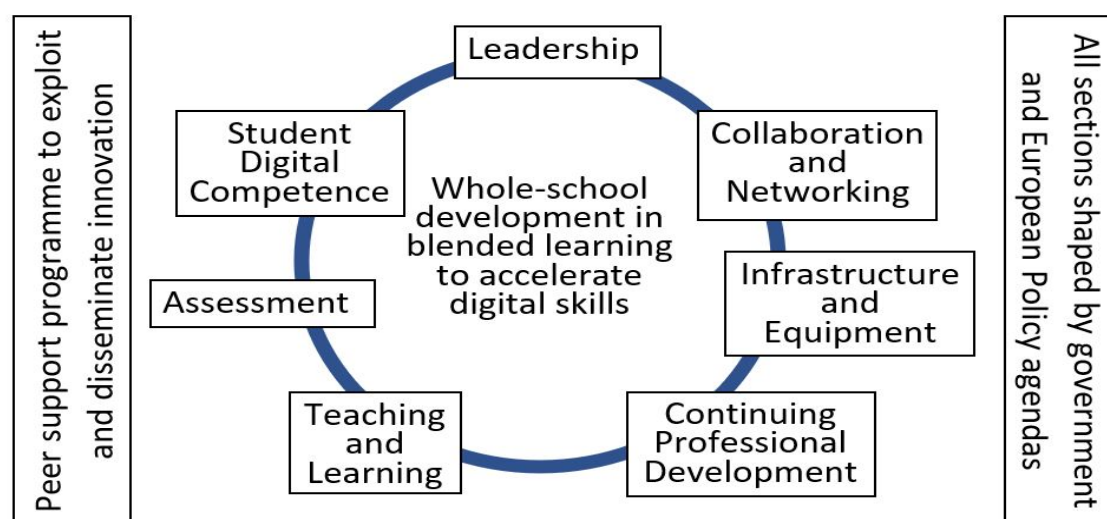
The DSA potential for impact lies not only in its conceptual alignment with the EU Digital Education Action Plan 2021-2027 [*ibid.*,] but its close relationship with the SELFIE tool [2021] itself is crucial for the plan. Furthermore, the DSA is also an incentivising tool for schools to embark on developmental trajectories that potentially lead to 'Award' status. Central to the DSA programme is a whole-school approach, implied by Castano Munoz *et al.*[2021] as essential to adding student voice to that of leaders and teachers. Reimers and Schleicher [2021 p.11] further assert that student's voice is vital to taking learning forward "*... in the design of a new expanded blended ecosystem for learning, and in providing them more agency and autonomy in directing their learning ...*".

DSA programme - Impact to Date

Table 1 (below) illustrates the success of the DSA's blended learning approach by educators, students and education ministries up to December 2020.

	Primary School	Secondary	Total Number of students participating in the DSA Program
Republic of Ireland	60%	5%	
Northern Ireland	44%	24%	1.01 million
Scotland	52%	77%	

Table: 1. Digital Schools Awards Schools - Adoption of online programs.

Addressing schools' developmental needs as described above, the programme draws on the expertise of the digital technology industry and the policy influence of a range of ministries of education. Along with schools, the DSA programme constitutes a tripartite knowledge transfer mechanism. The next section of the paper explores the potential of the DSA Framework for supporting developmental learning and teaching in further education and workplace environments.

2.   Re-Imagined for Further/Higher Education

Unforeseen disruption in higher/further education occurred in the delivery of undergraduate courses and modules through 2020 and into 2021, even though education instruction through any number and blending learning modes for many educators was nothing new.

This sudden and disruptive shift to remote education varied by size, governance models, and disciplinary differences. Large comprehensive institutions usually found it more challenging to develop an institutional approach [EUA, 2020]. Figure 3 [EUA, 2014] details the reported finding of the level of blended learning in European universities as of 2013.
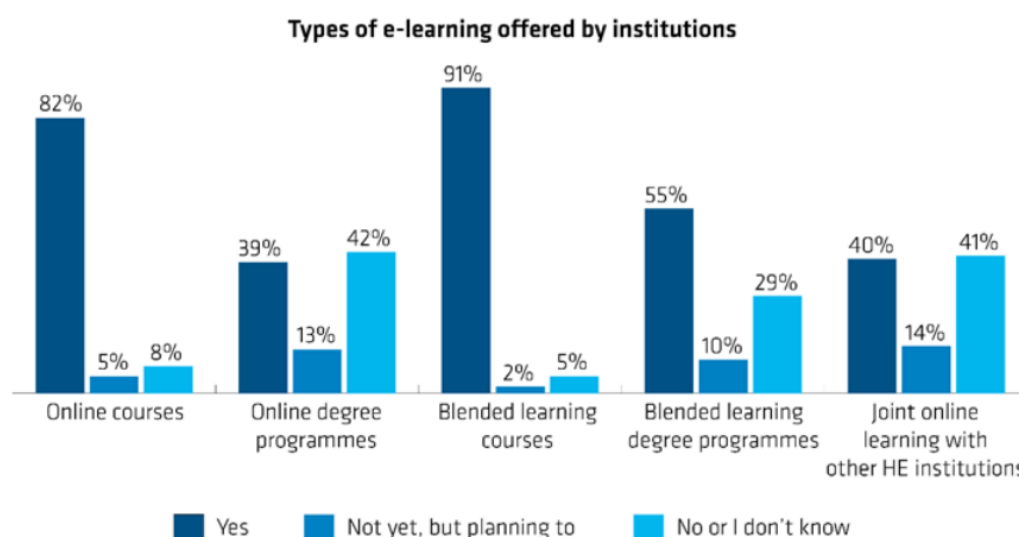
Figure. 3: European University Association Report Finings 2014.

The vast majority of institutions indicate that they have plans beyond the crisis to explore new ways of teaching (87%) and enhancing digital capacity (70%) [EUA,2020].

In the same report, the immediate and short terms (and full academic year) response from Universities focused on extending the existing educational content and modes of teaching as

used in face to face teaching to online, blended forms. This initial response in evolving education content to suit the delivery method was expected given the considerable amount of societal level disruption caused by the Covid-19 Pandemic. Still, as the Pandemic continued, this inertia contributed to students' increased dissonance, desire, and mental disconnection in their course program and progression.

As already discussed in this paper, the application of a framework approach developed and adopted by the Digital Schools Awards Program has enabled an agile "flexing" and structured approach to reduce disruption in education in primary and secondary school environments. Such an approach can be extended to further/higher education as part of a broad "digital wellness" learning policy.

The OECD Learning Compass 2030 [OECD,2021b] is an evolving learning framework that sets out an aspirational vision for the future of education. It provides orientation points towards the future we want: individual and collective well-being and was adopted to emphasise the need for students to learn to navigate by themselves through unfamiliar contexts. The OECD Learning Compass 2030 identifies three "transformative competencies" that students need to contribute to our world and shape a better future: creating new value, reconciling tensions and dilemmas, and taking responsibility.

Such approaches could also create a defined bridge for sharing of best practices with and between Industry and the workplace as a means of knowledge transfer. The workplace equally can share learned practice, the subject of the next section.

3.   Workplace Covid-19 Response to Collaborative Learning

Deloitte, a global change management consulting company, created a 360° lifecycle framework [Deloitte, 2020] that charts the different change and response phases (in office-based environments) from the initial impact of the Pandemic to the medium and long-term response. The effect was one of moving office workers from face-to-face working (and learning) to a blended working (and learning) environment. As with education institutions, this phenomenon also impacted workers' and managers' ability to maintain group, collaborative and peer to peer collaboration and productivity.

For this reason, the lens in this paper draws upon the changing nature of work and learning to understand and shape the future of blended learning 3.0 in a more distributed workplace and formal education setting, given that knowledge is bi-directional from the workplace to education and education to workplace settings.

The authors of this paper have subsequently developed an Education-focused 360° lifecycle framework using the Deloitte approach as a proxy, detailed in Figure 4 and an explanation of what the authors define as each phase in Table 2.
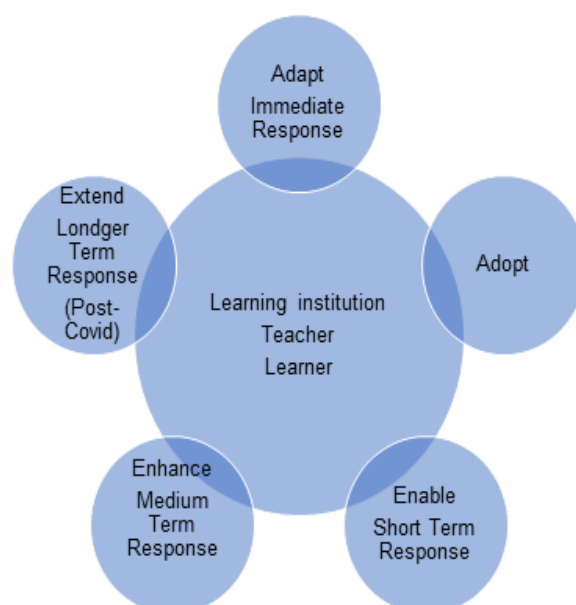
Figure 4: Authors' Visualisation of Education's Response (3 "Es" Approach).

Phase 1	Adapt	Education institutions rapid response to switch to 100% online blended learning mode. No time to assess the impact on pedagogy or learning
Phase 2	Adopt	New/updated typical business conference call ts such as MS teams and Zoom increases in usage to deliver teaching/assignments
Phase 3	Enable	Increased focus on content design, formats in order to keep the audience/students engaged
Phase 4	Enhance	Adaptation and refinement in the blended learning approach at learner, user, organisation/institution level engaged
Phase 5	Extend	Move to refreshed approach, content and delivery as the initial Adopt/Adapt phases transform

Table 2: Response Phase to Learning in Schools Due to Covid-19 Restrictions.

4.   Future of Work Skills - Policy, Practice, People

"Accelerated Technology development and the adoption during 2020 has opened up fractures in the workplace today." (Price Waterhouse Cooper Consultants, 2020).

Given the present and forecasted changes [OECD, 2020], it is likely that the workplace has changed forever. As with previous recessions, the current Pandemic has put increased pressure on global and European socio-economic and political institutions to find solutions, break the crisis, and adapt to accelerate where possible, usually through the intervention of digital technologies. In 2020 necessity pushed aside the hesitations of policymakers, technology companies, commerce, and others to adopt new ways of working, such as home working using new digital technologies and new forms of innovation. Institutions such as the European Commission [EC] and the World Economic Forum increasingly acted as the Pandemic's oracles. The EC vastly increased its Research and Innovation fund [Horizon, 2020] to act as a growth stimulus beyond the Pandemic. Technology moved from an enabling force in the workplace and education to a driver. While the global and European policy and research and innovation institutions were looking beyond the short-term, the

mammoth international focus on technology as the "fix" has ironically created and increased the digital divide (not discussed in detail in this paper).

Proficiency in new technologies is only one part of the future challenge. Human skills such as creativity, originality and initiative, critical thinking, emotional intelligence persuasion, and negotiation will be increasingly vital for knowledge workers [WEF, 2018].

The Futurium Report [European Commission, 2020] Foresight exercise was launched in Autumn 2012 to prime policymakers' imaginations and promote a broader debate. The aim was precise, to explore potential interactions between different technologies, human life and global resources. One key outcome was learning where boundaries will increasingly blur across other areas of life. With greater flexibility in designing individualised lifelong educational pathways within knowledge-worker workplace settings technology, education directions are likely to support new forms of learning, e.g. digitally enhanced classrooms, virtual educational spaces, and personalised, interactive, intelligent, wearable teaching systems. In this innovation environment, a blended learning 3.0 approach is applicable in education and workplace settings.

"Building the capacity and engagement of workers organisations in skills development… based on a human-centric approach… will help build a better "normal" post-Covid-19 workplace"(International Labour Organisation,2020).

This is not to ignore the enablement potential of emerging technologies such as Extended Reality [Forbes, 2019] that are increasingly a focus of attention both in the education [Brooks, 2011] and business worlds [Steelcase, 2020].

McKinsey's Global Institute [McKinsey, 2020b] draws on data from almost 1,100 local economies across EU countries. It states that the Pandemic will not be the only trend shaping the future of work. Once economies recover, they may have a shortage of skilled workers, despite a growing automation wave. More people will be working in independent and shared workspaces, "Intentional Learning" (informal learning) will become a critical new soft skill [McKinsey, 2020c]. While the most significant increase in the type of roles will be those with technology skills, the foundation for many of these roles will be in the broader "4C" (Creativity, Collaboration, Communication, Critical thinking) skills. McKinsey [2020c] highlights an increase mainly in creative and entrepreneurial skills, while technology/technical roles will be in most demand. Figure 5 highlights the critical workplace skills needed in the future [McKinsey, 2020b].

Total hours worked in Europe and United States, 2016 vs 2030 estimate, billion

● 2016   ○ 2030

Physical and manual skills	Basic cognitive skills	Higher cognitive skills	Social and emotional skills	Technological skills
203	115	140	119	73
174	97	151	148	113

Change in hours spent by 2030, %

		8	24	55
−14	−15			
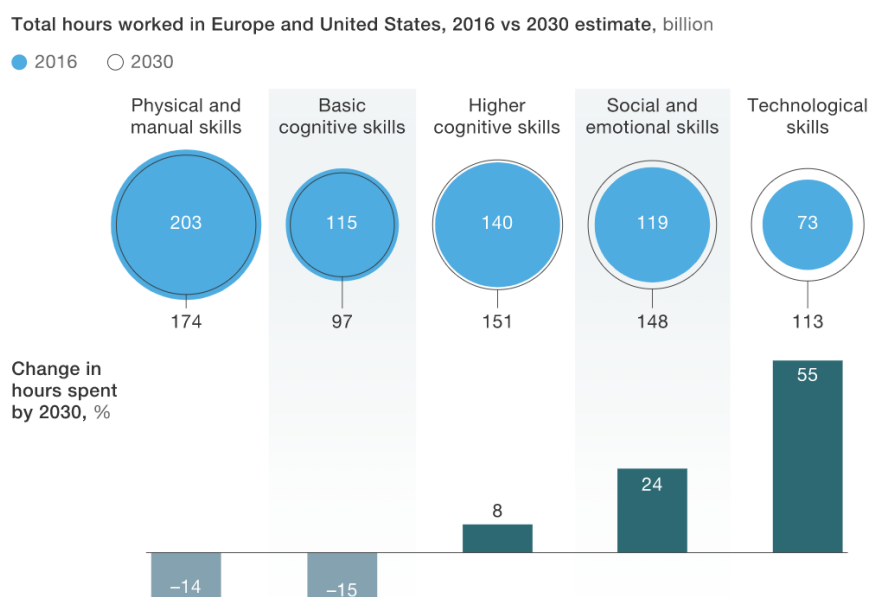
Figure 5: Analysis of critical learned skills for the workplace.

A learning workplace adoption of Blended learning 3.0 will be possible by converging theory, practice, and policy with formal educational learning settings.

The "4Cs" [European Commission 2020, 2018] are at the centre of Policy and Futures Strategy in terms of research and innovation to deliver sustainable digital futures [Wilson *et al.* 2019] and digital workplace transformation [OECD, 2018] at the societal, economic and organisational level.

The Global Business Transformation Consultancy PwC [2021] reports on the importance of informal and creative learning in the knowledge-worker workplace, of which creativity has received considerable focus.

The longer-term impact on an increased tripartite blended learning partnership will be to increase productivity in the workplace, given the "productivity paradox" [Brynjolfsson, 1993] has negatively impacted the workplace despite technology advancements [Kelly, 2020a].

The immediate and short term workplace impact up to 2022 is in an environment of flux and transformation. The future is one of a blended model combining physical presence with online work, the latter of which needs to be highly structured and rich in media [DeLuca and Valacich, 2005]. There is an opportunity to synchronise how blended learning takes place in the workplace and formal education settings.

New technological developments will also cross the chasm between formal education settings and the workplace as collaborative virtual environments first envisioned 25 years ago [Harrison and Dourish, 1996] become commonplace, thus creating a lifecycle approach and bridge between education and workplace skills.

Virtual spaces, enabled by virtual reality, will transcend and overlay the "real" spaces of the everyday world, further enhancing opportunities for blending learning. These, in turn, will accelerate peer to peer learning that introduces the idea of "experience" as the process of formal or informal education, thus supporting the "4C's" (Eraut, 2010).

The Covid-19 Pandemic has increased the spotlight on the future of work, where the workplace will be significantly more distributed and up to 30% of knowledge workers will continue to work from home   [Kelly, 2020b]. Covid-19 has spotlighted the European Commission's Digital Workplace initiative (European Union, 2021) to meet critical strategic goals on workforce transformation for its staff.

Increased digital literacies in schools, further and higher education are the future foundation for the new young generation in the workplace regarding "readiness" to adopt and adapt to the future of work. Younger staff are digital natives [Prensky, 2001]. They are much more connected and react in real-time. The Digital Workplace initiative will meet their expectations and allow them to contribute to their institution's work with the tools of their culture. Curiosity being the openness to ideas and an ability to make connections between disparate concepts, is the future fuel for adopting a blended learning 3.0 model that will be powered through end-to-end lifecycle approaches that programs such as the Digital Schools Awards have championed and led.

Conclusion

Pedagogies have to adapt (Not just the channel)"*... it is now clear that transformation should include an enhanced dialogue and stronger partnerships between educators, the private sector, researchers, municipalities, and public authorities....*" [EU, 2021].

The enforced widespread use of digital technologies has opened the door to changes in education at all levels. Increased application of specific Digital Literacy Frameworks has to be adopted to define and measure the future. The DSA programme and the blended learning continuum approach offers a transferable and practicable lens to view how to take a 360° lifecycle approach in Further Education and the workplace in terms of learning. The future of blending learning is a responsibility of education, policymakers and the workplace [BCG, 2020].

This paper has argued that despite the challenges faced by schools in providing continuity in learning and teaching during the Covid-19 Pandemic and despite the need to return to face to face based teaching, there is widespread agreement that the flexibility, resilience, mobility and innovation offered by digital technologies has opened the door to change in education. Much of the change agenda is now driven by new further education, higher education and workplace patterns and practices, consolidated and formalised in emerging EU policy. Pedagogies have had to adapt. While much of that adaptation has been patchy, somewhat reactive and based almost exclusively on the skill and experience of the teacher offering the lessons, the EU call for societal engagement is now unassailable. "*... it is now clear that transformation should include an enhanced dialogue and stronger partnerships between educators, the private sector, researchers, municipalities, and public authorities....*" [EU, 2021]. The DSA programme and the blended learning continuum approach (1.0 to 3.0) offer a highly transferable and educationally proven lens to view how to take a 360° lifecycle approach in further education and the workplace in terms of learning. Furthermore, accelerating a multistakeholder peer-to-peer system to the future of learning and skills development can positively impact how we all educate, learn, and work at a cultural, societal, and institutional level.

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Quantification of Knowledge Exchange within Classrooms: An AI-based Approach

Omar Elnaggar, University of Liverpool, United Kingdom
Roselina Arelhi, University of Sheffield, United Kingdom

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Abstract

Knowledge management improves efficiency and productivity of a company. A typical knowledge transfer pipeline, an enabler of knowledge management, consists of academics, higher education institutions, research funding bodies and companies. While the knowledge exchange mainstream sheds light on research collaborations, the evaluation of in-classroom knowledge exchange is often omitted, underestimating the impact this would have on the student employability. Current work on knowledge exchange at higher education institutions primarily focuses on: (i) collaborations with external parties, and (ii) identifying factors that affect knowledge sharing behaviours. This paper extends knowledge exchange to classroom teaching through: (i) formulating a framework among undergraduate Engineering students, and (ii) proposing an Artificial Intelligence based approach for evaluating the knowledge exchange process. The framework comprises of two group coursework with an intermediate handover event emulating an industrial workplace scenario in which knowledge exchange plays a key role. Then, an artificial intelligence-based visualisation technique processes data from two coursework-based surveys, completed before and after the abrupt handover event, to assess the change in the student intellectual backgrounds using two-dimensional maps embedding students as datapoints. The results interestingly reveal correlations between standard student evaluation metrics (for example grades, peer review and survey scores) and the formation of datapoint clusters. It is argued in the paper that the proposed artificial intelligence tool lends educators with tools to better understand the individual student performance in ways that are not captured by conventional academic assessments.

Keywords: Knowledge Exchange, Knowledge Transfer, Knowledge Sharing, Dimensionality Reduction, Assessment Metrics

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1.   Introduction

In today's era of knowledge economy, knowledge has become the main driver of economic growth. Knowledge management (KM), a term coined in the 1980s, has been recognised as a crucial factor for the survival of companies in today's dynamic environment. Explicit and tacit knowledge as assets that originate from an individual through learning or experience resides within a company for as long as the individual is, unless they are captured, stored or transferred. Hence knowledge transfer (KT) is crucial to ensure that the departure of any individual with valuable knowledge will not deprive a company of its crucial assets.

While there is a wealth of literature on KM adopted by companies, the same cannot be seen in the education sector (Asrar-ul-Haq et al., 2016). KM in the context of higher education where knowledge is often created has typically involved academics and researchers transferring knowledge to companies and the wider communities. It is only recently that students at HEIs have been included in the KT pipeline as it is recognised to enhance their employability skills enabling them to succeed in their future workplace, empowered by their ability to acquire and transfer knowledge effectively. In 2020, the *Office for Students and Research England*[1] provided funding of £10 million to twenty HEIs to explore the student involvement in knowledge exchange (KE) activities. The project aims to investigate the benefits of such activities with the business and wider community partners. On a large scale, this is a good initiative that adds undergraduate students to the KE pipeline after it was exclusive to researchers and academics only. In the literature, the student-oriented KE mainstream primarily focuses on one of the following: (i) the investigation of factors that affect knowledge sharing (KS) student behaviour, and (ii) the benefits of KE to students and external collaborators.

Many factors such as personal and group characteristics tend to affect knowledge-sharing behaviour (Asrar-ul-Haq et al., 2016). It was found that students may embrace hoarding knowledge to secure a competitive advantage over their peers (Boytsov et al., 2017; Wei et al., 2012). It is very likely that if their unwillingness to share knowledge continues, this personal trait will have a long-term impact on their future career. Mistrust and lack of self-confidence are also barriers for knowledge sharing. From a psychological perspective, it is thus imperative to cultivate knowledge-sharing habits as early as possible. Many works encouraging knowledge sharing among students involve collaborations with external partners. However, these partnerships do not directly address challenges such as lack of confidence especially when students communicate their ideas to senior staff in collaborating companies. Instead, a better way to boost confidence would be to facilitate peer-to-peer learning as students feel more comfortable interacting with each other. In fact, there are many benefits of peer learning as reported in (Boud et al., 2014).

Motivated by the benefits that peer-to-peer learning could bring, this paper proposes a KE framework within classrooms. In addition, to address the lack of methods and metrics to evaluate the effectiveness of such a framework, an Artificial Intelligence (AI) based approach is employed to help visualise the KE process on low-dimensional maps.

The remainder of this paper is outlined as follows. First, the context, methodology and assessment metrics for our proposed KE framework is presented in Section 2. This is followed by a discussion on the dimensionality reduction technique used for visualising the KE process

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[1] https://www.officeforstudents.org.uk/advice-and-guidance/funding-for-providers/knowledge-exchange-funding-competition/

in Section 3. The results and metric-based analyses of the students' performance are presented in Section 4. The paper concludes in Section 5 with a summary of the benefits of the proposed approach and directions for future work.

2.   Knowledge Exchange Framework

2.1   Context

There are many terms describing the enablers of KM; some are used interchangeably but with overlapping concepts. The three key terms that are used in our proposed framework are KS, KT and KE. A common demarcation between KS and KT is related to the levels of analysis where KS is more frequently used to describe knowledge on the individual level, whereas KT implies the involvement of groups of people (Argote et al., 2000; Choo, C W and Alvarenga, 2010). In the same vein, as our framework involves a group work for a module, we define KS as a multi-directional, intra-group process where members within a group share knowledge as knowledge givers and/or recipients. KT on the other hand involves a uni-directional, inter-group transmission of information, where the recipient group absorb, use and make sense of the received information. In our two-stage approach, a knowledge recipient group subsequently becomes knowledge givers by transferring their work to another group. As it will be further elaborated in Section 2.2, all groups are knowledge givers and recipients in Stages A and B respectively, hence, KT occurs as a bi-directional process which we refer to as KE.

2.2   Methodology

Students undertaking an engineering year-long module have two group coursework to complete. In a conventional group work setting, students tend to create and share knowledge primarily within their own group. On a macroscale, this means that different groups of students will end up having varying levels of understanding of the given subject. The proposed framework aims to introduce a bi-directional KT element to the learning process. Eventually, this would move the class from several isolated KS groups to a KE environment where knowledge flows within and between groups as illustrated in Figure 1.

Figure 1 illustrates the proposed framework. Group *Y* (on the right) is given Assignment A in which they need to propose a solution to a given engineering problem. Initially, intra-group KS is expected to occur as they brainstorm ideas. At the end of the assignment, they submit a report which documents their proposed solution. Their report is anonymised and passed on to Group *X* (on the left). In this respect, KT occurs through the *codification strategy* (Joia et al., 2010) as there is no interaction between the knowledge givers and providers and the transferred information is contained in an object; the group report in this case.

Before handing the report to Group X, the recipient members are first asked to complete a survey that tests their knowledge on the given engineering problem of Group *Y*. Afterwards, Group *X* is provided with the report, makes sense of the information provided, evaluates the feasibility of the proposed solution, and devises a management plan for carrying out the project. In other words, following the KT from Group *Y* to Group *X*, KS re-occurs within Group *X*.

After Group X finishes their coursework, they are asked to complete the same survey once again by the time they submit their own report. Completing the same survey twice enables the evaluation of how much each member have benefitted from KT. From an industrial perspective, this allows for measuring the absorptive capacity of students, a notion introduced

by (Cohen et al., 1990) which defines the ability of an employee to recognise the value and capitalise on external information, and apply it to the problem in hand. Ideally, through a successful KE framework, the student scores will be higher in the second survey.
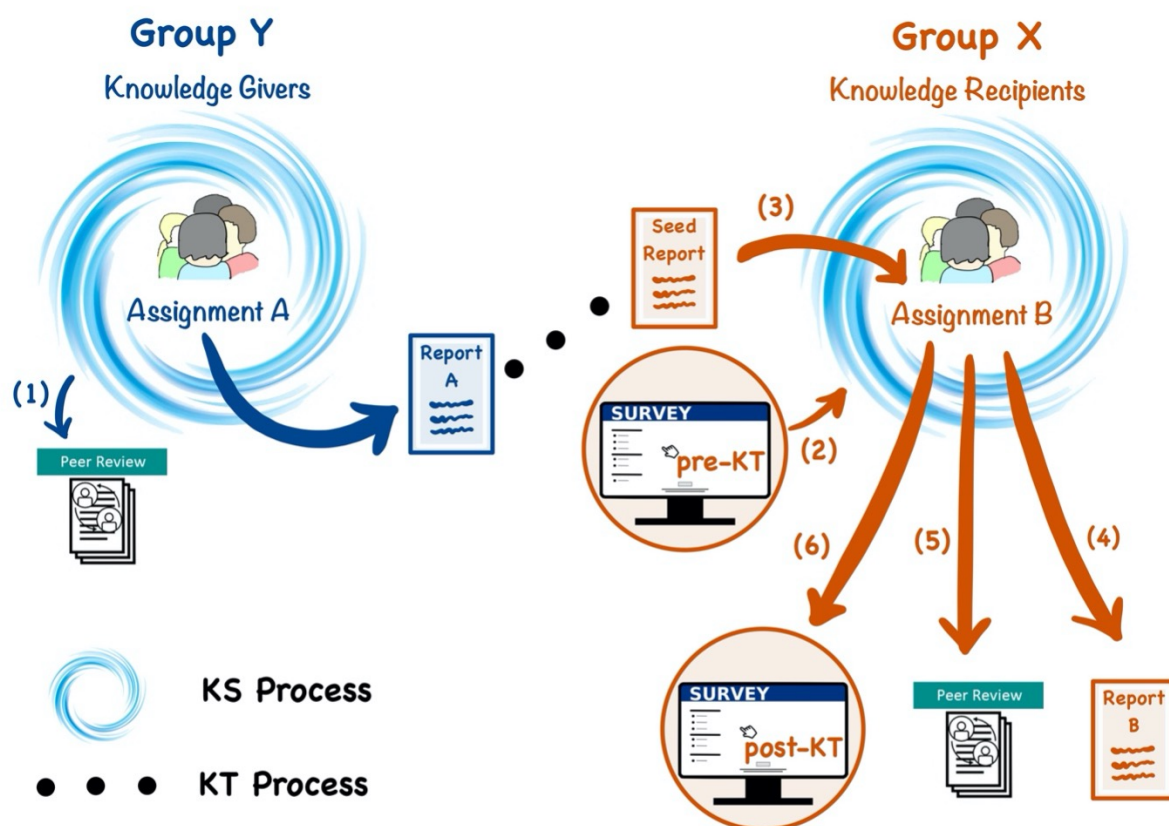
Figure 1: The Proposed KE Framework for an Undergraduate Engineering Group Work (Only One-Way KT Is Illustrated for Simplicity).

While Group Y was working on Assignment A, Group X was also working on a similar assignment but for another engineering problem. Therefore, Group X is considered knowledge givers but on a different topic. Subsequently, both student groups transferred knowledge bi-directionally before starting the phase of Assignment B. This ensures that the KE cycle is completed, and each student gains the experience of being both knowledge giver and recipient.

2.3   Assessment Metrics

(Jer Yuen et al., 2007) conducted a survey on undergraduate students to find out their knowledge sharing habits. They found that students normally have a positive attitude towards knowledge sharing and were appreciative of its importance in peer learning. However, they are less inclined to sharing knowledge when it involved graded work for competition-related reasons. (Ong et al., 2011) conducted a similar survey and concluded that the motivation to share knowledge appears to be affected by relationships, rewards and the level of satisfaction with the knowledge sharing activities. (Brouwer et al., 2019) investigated various determinants of knowledge sharing and their effects on student success. Human nature makes altruism seldom a factor that encourages knowledge sharing. If no reward is present, a person who willingly shares knowledge do so knowing that this will lead to enhanced reputation as a personal benefit.

As rewards are a catalyst for positive attitude towards KS (Brouwer et al., 2019; Ong et al., 2011; Wolfe et al., 2008), we employ a two-fold reward system, where each student's final mark is the product of their group work mark and their individual contribution. First, all group members will share the same group mark based on the overall quality of their submitted work. This incentivises teamwork where everyone feels motivated to contribute with the aim of securing a good group mark in a healthy inter-group competition.

Second, a peer review exercise is adopted. Although we defined knowledge sharing among group members as a multi-directional process where all members are both knowledge givers and knowledge recipients; however, in practice, there are members who are passive, breaking the multi-directional links within the group. We attempted to identify proactive and passive members by making it compulsory for the students to complete a peer review form to assess the relative contribution of each member, ensuring that contributing members are rewarded appropriately, and 'free-riding' passive members are penalised. The exercise also fosters trust among members, which was proven as a precursor to catalysing KS and KT (Xue et al., 2011). Students share knowledge with group members because they feel their peers will be honest when assessing each other's contribution. This exercise can be viewed equivalent to the performance appraisal often adopted in companies which is one of the most effective ways to promote KS (Ling et al., 2009).

Metrics to evaluate the success of KE activities in the teaching and learning pipeline which involves researchers and academics are well covered in the literature. However, similar metrics for KE among tertiary students are missed out with little attention. It is easy to design quantitative metrics which suit different group work and/or KE approaches, as these are typically marks attained by students or class performance statistics. However, determining meaningful qualitative metrics remains a challenge because of the myriad intangible variables involved (*Royal Academy of Engineering: KEF Metrics*, 2018). Figure 2 presents the quantitative, qualitative and hybrid metrics used in the proposed framework. For the qualitative analysis, we leverage on AI-empowered qualitative metrics that uses dimensionality reduction to model the learning process as a grey box and provide human-interpretable visualisations.
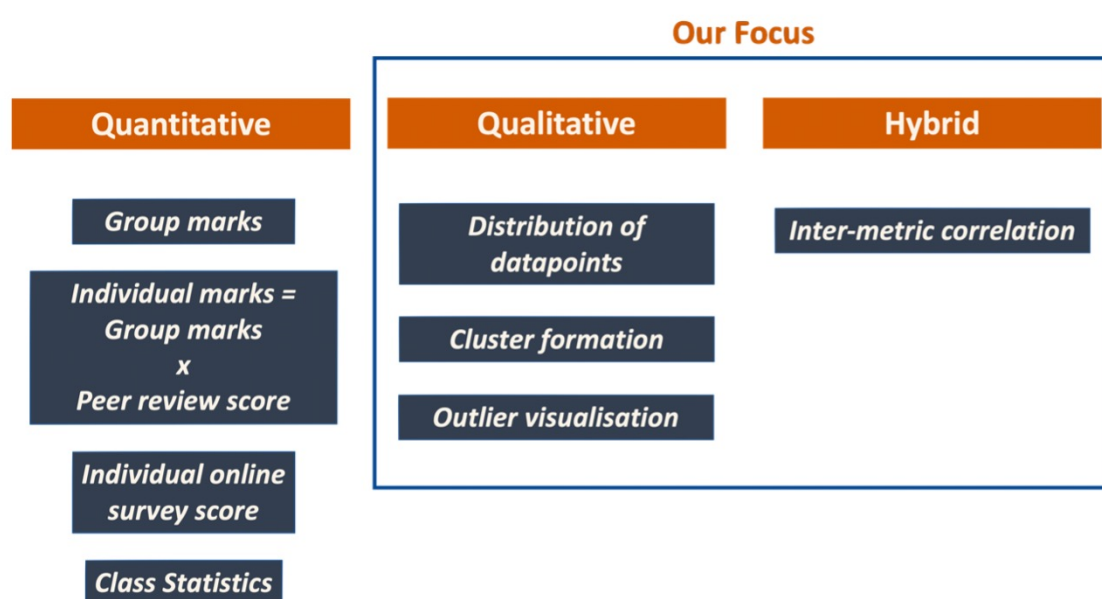
Figure 2: An Overview of the Evaluation Metric Categories in the Proposed KE Framework.

3.   Visualisation of the KE Process

The evaluation of KE is an intricate, multi-variable process which is often difficult to gauge. Our work takes the process from hand-crafted methods to using AI-based dimensionality reduction which captures high-dimensional data and representing it in a low-dimensional map. The well-known *t-distributed stochastic neighbourhood embedding* (t-SNE) (Van Der Maaten et al., 2008) demonstrated significant success at producing 2D/3D visualisation of high-dimensional datasets. t-SNE was employed in several domains, such as speaker identification (Elnaggar et al., 2019), handwritten digits and images (Abdelmoula et al., 2016) and animal behaviour mapping (Todd et al., 2017). Its main function is to capture the local data structures, while retaining the global data distribution. Although explaining how t-SNE works is not the main scope of this paper, we simplify how t-SNE measures the similarity between input datapoints to construct the low-dimensional embedding. Its algorithm relies on transforming the Euclidean distances between pairs of datapoints x_i and x_j (Equation 1) in the high-dimensional space (hyperspace) to a joint probability distribution $p_{j|i}$ that is the conditional probability of x_j having x_i as its neighbour in the low-dimensional map.

$$p_{j|i} = \frac{exp\left(-\|x_i - x_j\|^2/2\sigma_i^2\right)}{\sum_{k \neq i} exp\left(-\|x_i - x_k\|^2/2\sigma_i^2\right)} \quad , i \in \{1, 2, \dots, N\} \tag{1}$$

where σ_i is a parameter that is dependent on the local density in the high-dimensional space and N is the number of datapoints. As illustrated in Figure 3, the Euclidean distances between input datapoints are transformed into piecewise probabilities that act as attractive or repulsive forces between the output datapoints, $Y = \{y_1, \dots, y_N\}$, in the low-dimensional space.
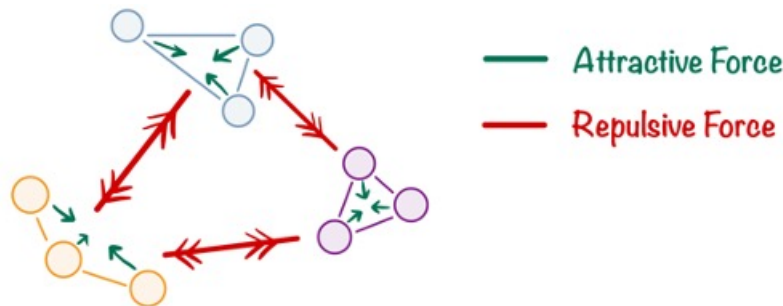
Figure 3: Datapoints Form Clusters of Similar Features in the Low-Dimensional Space

Speaking of datapoints, they represent the individual students who completed the online survey form. Each student's datapoint is constructed of eight different numerical and binary features based on their survey answers. The dimensionality reduction step should reproduce the student responses on a 2D map for visualisation. Therefore, t-SNE is responsible for transforming the 8D hyperspace to a 2D map.

4.   Results and Discussion

The low-dimensional maps representing the survey-based student performance produced by t-SNE are shown in Figure 4. Datapoints of the same colour represent students from the same group. Additionally, some manually identified structures were drawn on the plots, showcasing how the proposed AI evaluation tool will help academics extract insights that were difficult to observe previously. Herein below we illustrate some of these insights.

Figures 4(a) and 4(b) show the results from the first survey (before the KT process takes place) for two student populations; Groups A-H and I-P who started with Assignments A and B respectively. Figures 4(c) and 4(d) show the results from the second survey (after the KT process took place). Individual marks are tagged to each datapoint. These are not true marks; they are scaled marks that reflect the statistics of the true marks for confidentiality reasons.

(a)　　　　　(b)

(c)　　　　　(d)
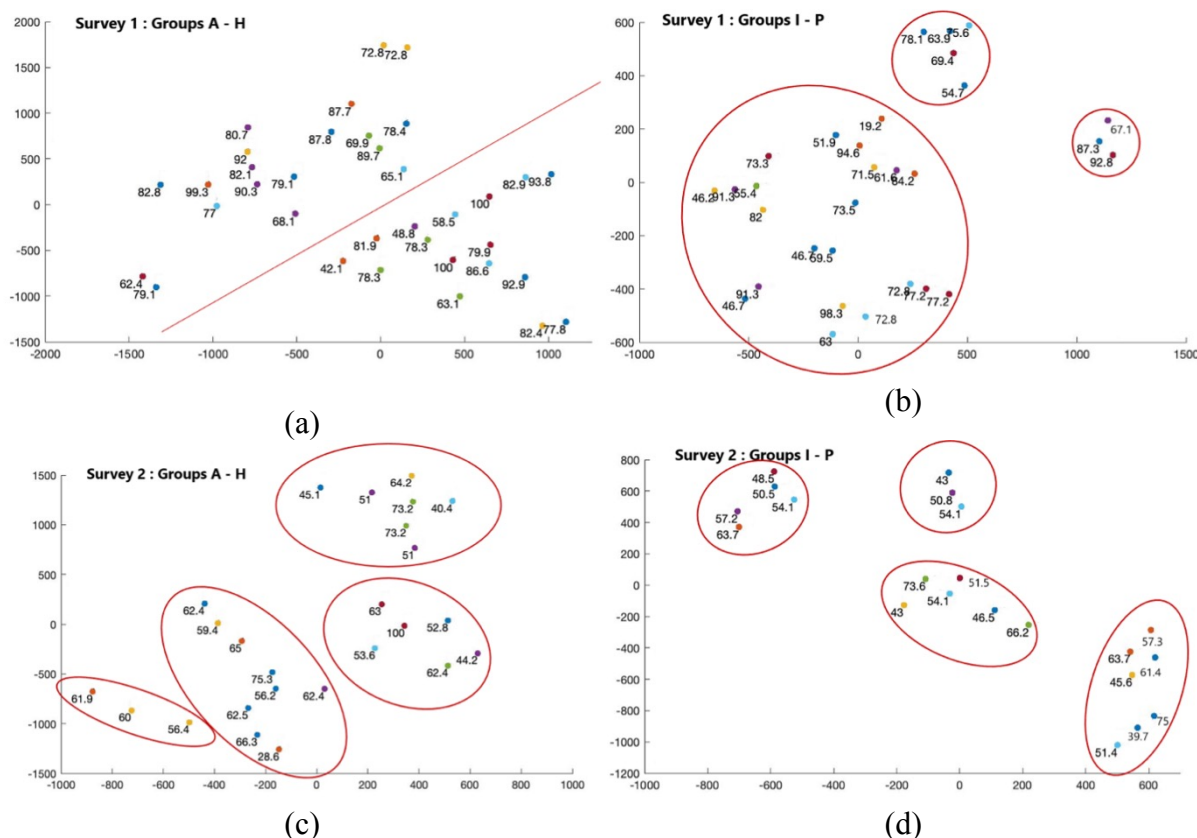
Figure 4: 2D Maps of Student Performance Based on the Survey Responses from the Two Student Populations: Groups A-H ('A' And 'C') and Groups I-P ('B' And 'D').

4.1　Quantitative Metrics

Conventional group mark analysis reveals that all three groups, which achieved below 61% in Assignment A, ended with improved marks (as high as 16% increase) in Assignment B when provided with seed reports from other groups that scored marks above 70%. This practically demonstrates the boost in performance that the proposed KE framework brings to students.

4.2　Qualitative Metrics

4.2.1　Distribution of Datapoints and Cluster Formation

Comparing Figures 4(a) and 4(c) on the left for Groups A-H, it is evident that prior to the KT process, the *distribution of datapoints* is somehow random with no clear data structures. Since students at this stage have not studied the presented topic before, it was an expected outcome that most students will have similar shallow level of understanding. After the KT process, *data clusters* emerged indicating that student groups have shared a common pool of knowledge.

Similar observations apply to Groups I-P in Figures 4(b) and 4(d) respectively. Although the responses from the first survey yielded three clusters in Figure 4(b), the post-KT survey reveals far sparser clusters of datapoints as shown in Figure 4(d). The emergence of clusters in the second survey could stem from a number of reasons which include, but not limited to, the distribution of individual tasks among group members from different student groups. For instance, students from different groups who were responsible for literature search could share very similar pools of knowledge despite working from different groups. Therefore, AI-extracted insights like this fit to be extensions for future research.

4.2.2   Outlier Visualisation

Outlier students are regarded as students who are spatially situated away from their peers in the low-dimensional maps. The presence of outliers does not necessarily indicate any positive or negative observations; it most importantly means that something interesting made those students stand out from the rest. The *datapoint outlier* phenomenon can be observed in Figures 5(a-b) which show 2D maps of student performance for Groups A-H. Before the KT process, there were six outlier students circled in yellow in Figure 5(a). A further work would be to study the reasons for such anomalies. After the KT process, there are no distinct outliers except for one mild case circled in yellow in Figure 5(b). This is expected since the KE process grew the students' understanding of the topic to comparable levels, explaining the sharp drop in the number of observed outliers.

4.3   Hybrid analysis

In contrast to the purely quantitative/qualitative approach covered in Sections 4.1 and 4.2, herein we present a hybrid analysis unveiling interesting inter-correlations. Two example student groups are highlighted in Figure 5(c). The blue circle contains four students forming a tight cluster with individual assignment marks between 56.2% and 75.3%. Recalling the outlier qualitative metric, it is clearly seen that a fifth poorly performing student (45.1%) is located far from their group cluster. This demonstrates the ability of t-SNE to differentiate students by the set of knowledge/skills they have acquired and their individual contribution. For this student, the knowledge or skills gained has set them apart from other members in terms of the mark attained which is much lower than the rest. Magnificently, t-SNE was able to identify such a difference from the students' survey-based input features independent from their awarded assignment marks. The same observation holds for the group circled in green.

The pure and hybrid analyses showcase t-SNE success in a new domain that is survey data. From an academic perspective, t-SNE qualifies to be a strong candidate for a complementary tool for academics to verify their formal assessment outcomes. Besides, leveraging on the inter-correlations between pure and hybrid metrics, lecturers can find new ways of verifying/resolving mark disputes by students. For instance, the case when a student raises a complaint about their peer assessment score for a group work.

(a)   (b)

(c)
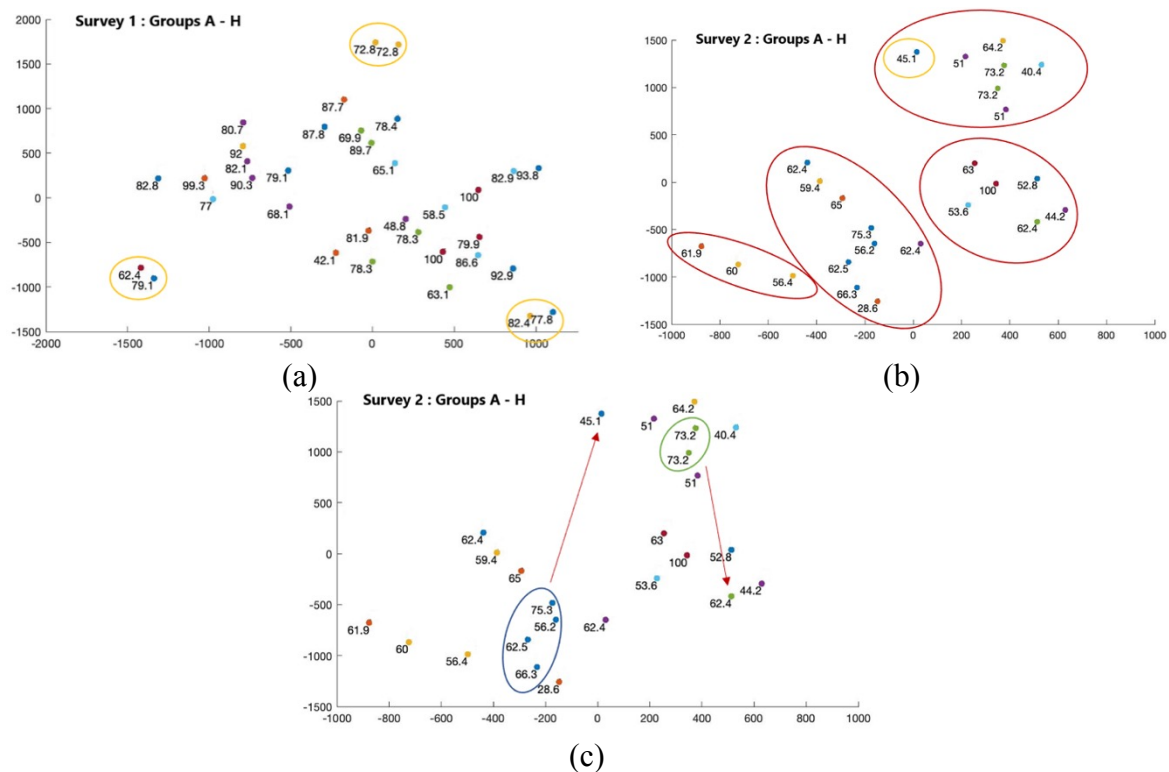
Figure 5: Outlier Datapoint Visualisation (A-B) and Its Correlation with the Tagged Individual Student Marks (C).

5.   Conclusion

The proposed framework brings the KE culture to HEI classrooms after it was exclusive to research and external collaborations. A bi-directional KE framework allows for intra- and inter-group KT enhancing the flow of knowledge throughout the student population and allowing students to reach similar levels of competence. From an employability perspective, the framework equips students with the skills needed to handle externally sourced knowledge and build upon it, making them more agile in their future dynamic workplaces. In contrast to the pure quantitative approach widely adopted in academic assessments, this paper leverages on t-SNE to produce AI-empowered visualisations based on survey responses and independent from individual student marks. Several interesting links between the quantitative and the proposed qualitative metrics were identified, enabling academics to verify formal assessment outcomes and/or resolve any marking-related disputes. Since the quality of t-SNE visualisations are heavily dependent on the survey-based data, the authors intend to further research ways of optimising the online survey questions to suit other engineering and non-engineering modules. The main aim of such a survey to provide an equal opportunity to each student demonstrating their knowledge and contribution independently from their role/task in their group.

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Contact email: Omar.Elnaggar@liverpool.ac.uk

Efficacy of STEM and Engineering School Model Programs in the Los Angeles, California Area

Julie Smith, Loyola Marymount University, United States

Abstract

California is famous as the home of technology companies like Apple Computers, Space-X, Tesla, Google, and many more. But are California schools doing enough to supply a workforce capable of working in these companies? To address this, the California government and K-12 school districts have devised many different STEM school models. Some students start in Kindergarten STEM programs. STEM charter, magnet, and schools within school academies have been created at all levels, with many different versions and program details. But do these programs actually generate more engineers, programmers and designers? Collecting data involved a combination of online research, and direct contact with a variety of schools. However, the program details, demographics, how they operated were ultimately so disparate, that the scope of the research was narrowed to focus compare three different high schools, each representative of the three main school types – school within a school academy, a charter and a magnet school. The first was a school within a school model, which students could select into regardless of academic qualifications. The next was an independent charter school. The last was a STEM academy which had high academic entrance requirements. All of these schools had faculty which included at least one professional engineer. The results showed that although the student populations were similar, many students did opt to matriculate into STEM career pathways at university and apprenticeship levels. Not all students did so, with female students often opting for other non-STEM career pathways upon high school graduation.

Keywords: STEM, Charter Schools, Magnet Schools, Academies

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Introduction

California is home to many tech start-ups and companies, that have changed the world. Most of their founders were products of the American, or more specifically the California public educational system. A climate exists in Silicon Valley which is highly conducive and friendly to starting technology businesses – there is "venture capital" seed money available. Entrepreneurial expertise and support are abundant. But are California public schools currently producing a workforce capable of working in such businesses? And, will their graduates go on to also be STEM professionals and even entrepreneurial? To address this issue, the California state government has implemented many educational mandates to address this issue. A wide variety of Science Technology Engineering and Math (STEM) school types have formed, which serve many different kinds of demographics and communities. But the question remains: are these schools actually producing students who pursue university level courses, which will result in more engineers, scientists, programmers and designers?

This paper addresses some of the history of how and why STEM schools evolved. It covers some of the different types of STEM school models in the Los Angeles California area. Finally, the research was narrowed down to focus on three basic types of high school STEM programs. It looks at how likely their respective graduates were to enter these fields and why. What features of each of these schools made them more or less conducive to the stated goal?

To answer these questions, data was collected from online and other sources. However, it was deemed necessary to interview as many graduates of these programs as possible to really hone in on the specifics of their respective experiences. The results section provides data in the form of charts and tables. From this information some recommendations are made about what works well and what does not. Also, although the student populations of these schools have similar demographics and numbers of male and female students (with some exceptions), the students opting to pursue STEM careers upon graduation were predominantly male. Some reflections on why this happened is provided, which may be controversial or even surprising. This information is summarised in the conclusion section.

Historical Background

Before detailing how and why STEM programs have become so important in Los Angeles public schools, and why that is potentially important to the California business community, some historical background is useful. The current climate of STEM education innovation is the result of some important swings of the educational pendulum. A free public education for all American children is provided by the United States Constitution and Bill of Rights and subsequent case law. The details of that education are left to the individual fifty states. In general, most states are divided into "school districts" which are loosely organized around geographical areas. For instance, in the Los Angeles, California area, there is one large school district known as the Los Angeles Unified School District (LAUSD). It is second in size only to that of New York Public Schools. But not all cities in the Los Angeles area belong to it. An example would be the Beverly Hills Unified School District. Each of these districts is mandated to direct educational policy subject to state and federal law, but the exact manner and form of how they do this is left to the districts to decide. A locally elected school board must decide what is best for the children and families of any given district. For this reason, there is a very broad diversity of programs of various sorts not only in California and Los Angeles in particular, but across all of the USA.

Prior to the early 2000's in California schools, school districts had their own interpretations of California's standards for Math, Science and other areas of study. Although there was some state testing at the end of each school year for these subjects, there were no particular negative consequences for students performing poorly. As part of President Lynden Johnson's "War on Poverty," various Federal programs were enacted which entitled low performing school district to get large sums of money with which to improve. In fact, a district could get substantially more Federal "entitlement" funding if school districts' students were doing poorly. No incentives were tied to the money which would require improving student performance or outcomes. So, low income neighborhood school districts might be very wealthy, getting large amounts of federal money, while their students' outcomes were not good and few efforts were made to improve them. Some suggested this was the "Poverty Pays," educational funding scheme. In some cases, district coffers contained millions of dollars while money allocated for new textbooks and supplies went unspent.

This changed when President George Bush was elected in 2000. With Microsoft founder Bill Gates and others, the "No Child Left Behind" (NCLB) movement was legislated. It literally meant that all students should be prepared as if they were all going to university. With it came mandates for state standards for all subject areas, plus "high stakes" testing to determine if school districts were making progress at improving student outcomes. If they did not, school districts could be taken over, loose funding or worse. Schools scrambled to improve their curricula and great pressure was put on teachers to "teach to the test," and even more pressure was placed upon students to perform well on them. And with NCLB, schools reduced or eliminated their "vocational education" which was aimed at conferring marketable skills to students who were not university bound. "Teachable moments" for discussion and relationship building in classrooms also disappeared. Mr. Gates was also intent on identifying and ridding the system of "bad teachers." If schools could just eliminate bad teachers then education would be excellent and 100% of students would qualify as proficient. There would be no below grade level students anymore, was the hoped for result. As statistically unlikely as this was, the enormous ship of education had been steered in a new direction and vast resources were committed to seeing it through. As part of this effort, power and individual initiative was stripped from individual teachers in many places. In some cases, they were given teaching scripts to follow. If not actual scripts, rigid pacing guides were put in place. Administrators anxious to improve test scores checked carefully on teachers to make sure they were adhering rigidly to their scripts or pacing plans. The results of this were predictable. Test scores went up somewhat, but critical thinking skills plummeted.

It soon became apparent to business and university leaders that the graduates from this NCLB education were lacking in self initiative and the ability to think for themselves. They might be able to find the right Algebra answer, but the ability to apply their Mathematics knowledge to a real life problem was not so strong. It was finally determined that this approach was not yielding the results expected. Along the way, even Bill Gates finally had to admit, that he did not know how to fix education and that not all kids were in fact headed to university. The scripts were abolished but teacher and classroom micro-managing were here to stay. The lack of "common sense" problem was still acute.

To remedy this at the national level, a consortium of industry and education leaders and state governors came up with an attempt at national standards, something known as the "Common Core Standards" (CCS) and the Next Generation Science Standards (NGSS). Not all U.S. states have adopted these to this day. A mandate for national standards violates "States' Rights" and many states resented the intrusion into their affairs. Some states believe that their own state

educational standards are far superior to the new ones. But with them comes a stronger focus on critical thinking and STEM education. California adopted CCS and NGSS in 2013.

For California, ever concerned about fulfilling the needs of the Tech community businesses and industries for a tech capable workforce, this shift to STEM education meant a rush to implement STEM school programs. There was a great deal of innovation and many different types arose. Options became available for children as young as five years old to enroll in STEM focused schools. From Kindergarten through the end of high school, STEM programs proliferated. These were aimed at producing more students who wanted to become engineers and scientists. Within comprehensive high schools, and in separate schools, STEM education proliferated. One could almost say that it was like the Wild West, as there were few rules and lots of imaginative STEM programs were conceived of. Charter and magnet schools formed, as well as school within a school academies were birthed which gave STEM unprecedented visibility. School textbook publishers and others came up with many different packages of STEM curricula with kits of STEM laboratory equipment, replete with all the widgets necessary for doing engineering education.

Some STEM Charter schools formed which were loosely affiliated with school districts. Then different school districts formed their own charter schools. A charter school has no academic or behavior standards for applicants to meet. Any child can apply to attend a charter and its students are chosen in a public lottery. Students who do not make the list are placed on a waiting list. Still others formed STEM magnet schools, which were schools of choice with a STEM focus. They had to be applied to, and had academic and behavior standards to be met by prospective students. They had rules about mandated parent participation and student behavior.

In school districts, there are schools that can be attended solely by reason of geography and address. If a child's address was within a certain area, then they were entitled to attend certain schools without any sort of application. Not to be outdone by the smaller and more nimble charter and magnet programs, these "comprehensive" schools set up their own schools within schools or academies within the main school. These mini-schools could be selected into by the students themselves without any requirements for academic performance, solely based on student interest. These schools within schools embraced all comers. Today, most California high schools have some sort of program specifically aimed at encouraging STEM interest and participation. School districts rearranged and reformed themselves, a process which continues to this day.

Methods

The objective of this project was to determine which kinds of programs were most effective at getting students interested in STEM such that they would pursue a STEM career, such as engineering or computer programming. Because the Los Angeles Unified School District (LAUSD) is so large and has so many innovative programs, research began there. This is the second largest school district in the nation and encompasses only part of the L.A. metropolitan area. It was therefore assumed that finding data would be easy since there should be so much of it. There are many districts surrounding and distinct from LAUSD, but with fewer programs and so not as much diversity in program designs. Using online resources, as much information about the various STEM programs within LAUSD was collected first. Data was easily compiled on student and family demographics, age level of students and the like. Less transparent were the details of each school's particular programs. Some schools had lots of technology – computers, and other equipment available to use. Some schools had adopted "off

the shelf" engineering education programs available in the USA such as "Project Lead the Way," (PLTW), or "Project Based Learning," (PBL) or "Teach Engineering" or a variety of other programs. However, from each school's webpage or the school districts' own descriptions, it was almost impossible to tell which they had adopted, or if they had concocted their own. It was virtually impossible to determine if they had an actual engineer working in their program as well. The latter was the case for many, but again it was not necessarily publicized. A call had to be made to each school to inquire about their program model. In many cases, they did not want to disclose this information. Qualifications of the school faculty members to teach an engineering curriculum were undisclosed and guarded. While some schools had hired actual engineers, while others simply used Math or Science teachers to teach engineering.

At the big comprehensive LAUSD high schools, many had STEM programs in a school within a school configuration. It was assumed for purposes of this project, rightly or wrongly that if students had an interest in STEM career pathways, they would have selected into these programs. However, the exact program details that could be obtained showed a great of variation. Many details were unknown to the persons answering calls, and in many cases they did not know where exactly to direct the calls. Or so they claimed.

After many attempts to glean information but not obtain what was hoped for, it seemed more logical to focus on the three main STEM school types described above, and to select representative schools from which information could be more easily collected. Three schools within a certain geographical area were selected. These schools had somewhat similar demographics. For instance, all three qualified as inner city, were ethnically diverse, and most students qualified for the "Free or Reduced Price Lunch Program" which is a federal program, which is often used as a measure of poverty and low income level. The information sought from them was 1- Type of curriculum 2- Results of four years of participation in the program in terms of university attendance and program selection, 3- Was program student versus mentor centric, 4- Qualifications of the instructors (i.e. did they have an engineer teaching engineering or a Math or Science teacher teaching it instead), 5- Equipment and technology available for students to use. 6- General and miscellaneous information.

The three schools selected represented each basic type - a STEM charter, a STEM magnet and a school within a school.

Discussion and Findings

Overview of LAUSD school types, as background is shown in Figure 1. As can be seen from the table, the specific kinds of magnet or charter schools are not delineated. Approximately twenty percent of K-12 LAUSD schools were found to be specifically STEM focused from other available information. This included magnet, charter and school within a school program formats. STEM focused schools and curricula varied widely across Los Angeles area schools and districts as already mentioned. The Beverly Hills Unified School District (unified means it has high schools, without that designation it would just have K-8 or Kindergarten through middle schools, and would be called a school district) includes STEM education for all its students. All of them must take and pass coding courses. They were the exception. For most school districts, coding and STEM were offered to those interested in it and not to all students. For instance, some schools within LAUSD were performing arts charter or magnet schools, and did not offer coding. That tended to be a common approach from available information.

Computer equipment was generally available to all students, although the age and quality of that equipment varied.

To satisfy the project objective, the three focus schools were chosen- the Lennox Math Science and Technology Academy (LMSTA), a charter school, the California Academy of Math and Science (CAMS), a magnet school and the Hawthorne High School – Manufacturing Engineering School (HHS-MES) the school within a school. The schools were in a similar geographic area. Students who were at any one of these schools could have attended any of the other three under the right circumstances. All three were in an inner-city, mostly low income, ethnically diverse area. All of these schools included the option for their students to take university preparation courses, something in California known as U.C. courses (courses eligible to be considered for acceptance to University of California, at any of their campuses). LMSTA and CAMS are explicitly college preparation programs, while HHS-MES had such programs as options for interested youth. Since HHS-MES had an open "opt in" design, many students chose it because they wanted to build and make stuff, rather than get into college. All three schools had Advanced Placement (AP) courses available in many different subjects. All three also had options for students to take actual college classes either through a community college or on a university campus. Engineering was treated as an elective, except at CAMS where it was integrated into all curricula. All of these schools had computer equipment available for students to use. At LMSTA and HHS-MES students were assigned a Google Chromebook, which they were able to carry and use at home.

All of these schools had students in cohort groups which stayed together throughout all four years of high school. This "familia" or camaraderie approach was deemed critical to the success of students in all these programs. Parent and family participation was encouraged at all three schools.

All three schools had engineers who had degrees in engineering and industrial work experience, prior to teaching in their respective programs. All of the other teachers were fully credentialed by the state of California to teach in their content area. CAMS had teachers who were also professors at Cal State University – Dominguez Hills.

Some differences between programs were how their student body was formed. For the charter school, LMSTA, any child could apply and the first 150 students were chosen in a public lottery. For CAMS, since it was a magnet school, students were recruited and had to apply and meet high academic and behavior standards. They could be highly selective about who the students were in their program, balancing for ethnicity, gender and other attributes. HHS-MES on the other hand, had no academic or other requirements for their students. If a student could attend Hawthorne High School by virtue of his or her geographic address, they were entitled to opt into the Engineering School as well.

Other differences between the programs were in student versus mentor centricity. In other words, students at CAMS and LMSTA were in rigorous academic college preparatory programs, with teacher or mentor delineated projects. Students were advised, counseled and taught with the goal of college preparation. Contrast that with HHS-MES which was very student centric. Older students were trained to use, maintain and trouble shoot many highly technical pieces of equipment, after which they would mentor younger students. There was a great deal of flexibility in type and scope of engineering projects and coursework students could engage in. For instance, all students had to learn 3D modeling at all three schools. But some students at HHS-MES preferred to do this above other things and were free to develop

their skills in this area. Indeed, some students from this program were so skilled in this area that they could graduate from the program and go immediately to work in a professional capacity doing 3D modeling. So this program was more flexible and amenable to student choice than the other two.

All three programs demonstrated excellence, but in different ways. All met or exceeded student and community expectations.

Data

In determining if these STEM programs actually produce more STEM professionals, general data and specific data can be compared. To answer the general question of whether or not STEM programs in California are generating more STEM professionals, we can utilize general data from the University of California (UC) system. In Figure 2, one can see that from 2010 to 2020, the period when most of these STEM programs were implemented, the number of students enrolled in Engineering went from 70,000 to over 100,000, representing a 43% increase. In trying to determine whether this increase is due to California's educational STEM program innovations, it is not so easily done. Students in California are not limited to attendance at universities solely in California, nor do universities and colleges in California draw exclusively on students of Californian origin. However, the Next Generation Science Standards, which have a strong STEM focus debuted in many of the United States around 2010, so it could be inferred that STEM interest increased in part because of this.

For the three STEM focus schools, interest in STEM was evident from their respective programs. Although it might have been optimum to do a double-blind study, to have a control group from a non-STEM program contrasted with these three focus groups, it would have been virtually impossible. Even in regular public schools, the NGSS mandates STEM awareness and activities, so all students have STEM exposure through their Science classes which all students must take. However, looking at the number of students opting to matriculate into STEM university majors from each of the three focus schools, shows that their programs certainly did not kill interest in STEM careers. See Figure 3. Looking at the percentages alone can be a bit deceptive though.

For LMSTA, there is a fairly high acceptance rate to four year colleges and universities of sixty percent. This is in spite of the fact that members of their incoming freshman class had only to apply and be accepted to the school through a lottery. In other words, they did not have to have demonstrated any particular level of academic achievement prior to enrolling. In this particular community, there had been a history of many students not even completing high school. So to have over sixty percent going to four year colleges and universities represents a significant achievement. Of the forty percent not going to university, many are most likely going to community college. In the USA, community colleges are two year post high school colleges. Anyone can take courses at these schools including adults. As much as two full years of university credit can be accomplished there. Then those students can apply to transfer to a four year university program, such as engineering with all of their prerequisite coursework satisfied. The transfer rate from community college to the U.C. system is actually quite high. So students who could not initially get into a four year program always have this "side door" way of accessing their desired degree. LMSTA faculty members also expressed surprise that so many of their students were choosing careers with a community service aspect. For instance, of the sixty percent going to university, many said they wanted to become teachers or lawyers or health care professionals, and only half of those wanted to go into STEM careers.

It is worth noting however, that teachers in the three schools specifically interviewed, noted that many of their students could not get accepted into the STEM programs they applied to. For instance, California Polytechnic University at San Luis Obispo had a 28% acceptance rate. This includes all majors. When narrowed down to specific majors, such as Engineering, the acceptance rate was 31%. But for inner city, ethnically diverse students that amounts to seven out of ten being rejected or perhaps more, since these students have additional academic challenges. Many are English language learners and began Kindergarten as much as three years behind academically, due to complications from impoverished circumstances. As well, students who were of the first generation to attend university often did not have family support or understand how to get financial aid. Some schools had excellent counseling staffs to help with this, although not all were so good. Teachers also noted a "fear of failure" amongst their students. Students had a preconceived notion that if they were not "A" students, then they were failures. Instructors at these schools noted that "failure education" should be explicitly taught, since many times success is the result of a series of improvements upon failed trials. This is borne out by research.

Most of the CAMS students were university bound. That was anticipated due to the high academic achievement level of students coming into their program. They also had a high level of students going into STEM majors upon matriculation at four year colleges and universities. However, many of their female students opted not to go into STEM careers. These students cited male attitudes towards them which could be interpreted as sexist. Some stated for instance that on four person robotics teams, they were frequently relegated to the less interesting or fun role on the team. On most of these teams the roles are programmer, maker-builder, operator and recorder. The recorder writes and keeps the lab notebook, takes pictures, keeps the budget, etc, which sounds a lot like the job of a secretary. Girls said they wanted one of the other roles, but their male counterparts would tell them that they could not have those jobs. Many girls from this program chose to major in nursing. When asked why they did not want to go to medical school instead, they said they wanted a program with more women, since members of their own gender were "easier to work with."

The students from the HHS-MES program did not show as high of a rate of acceptance to four year colleges and universities. This was expected due to the nature of the incoming freshman class who classified as being part college preparatory and part vocationally education oriented. However, their engineering instructor thought more of them probably went via the community college route. Also, they had a higher rate of STEM career pursuit than the others. Because this program functioned as both a college preparatory and vocational education hybrid school, there were many students who opted to go straight to work upon graduation. Many were hired by local tech companies because they were already so skilled in programming, 3D modeling and robotics. Because of the flexibility of the community college and American university system, students can always go back to pick up a university degree later.

Figure 1: Los Angeles Unified School District – Roster of Types of Schools

Primary School Centers	18
Elementary Schools	439
Middle Schools	77
Senior High Schools	88
Option Schools	54
Magnet Schools	65
Multi-level Schools	28
Special Education Schools	12
Home/Hospital	2
K-12 Magnet Centers (on regular campuses)	245
Independent Charter Schools	231
Other Schools and Centers	154
Grand Total	**1,413**

(Graphic source: https://home.lausd.net/apps/news/article/457182)

Figure 2: STEM versus Non- STEM Majors within the University of California System

STEM vs. Non-STEM enrollment by student level

Science, technology, engineering, and mathematics (STEM) includes degree programs in engineering, computer science, biological sciences, physical sciences, and health sciences. UC enrolls about 102,000 undergraduate and 35,000 graduate STEM Majors. The proportion of STEM majors has grown steadily over the past ten years for both undergraduates (47 to 54 percent) and graduate students (54 and 60 percent).

https://www.universityofcalifornia.edu/infocenter/uc-stem-degree-pipeline
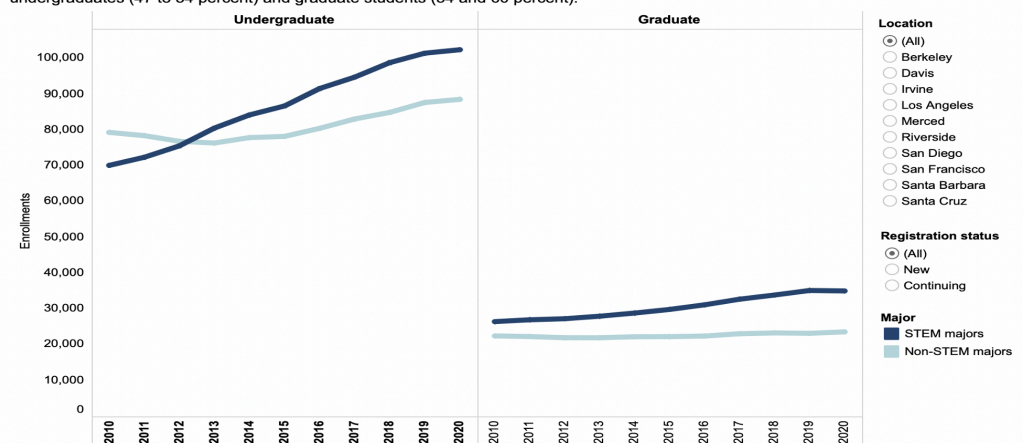
Figure 3: Comparison of the Three Focus Schools

	LMSTA – Charter	CAMS - Magnet	HHS-ES: School within a School
Engineer on Faculty	√	√	√
Student Cohorts	√	√	√
Qualify to Apply?	No	Yes	No
Integrated or Standard Curriculum	Standard w. Engr. Elective	Integrated	Standard w. Engr. Elective
Student or Mentor Centered	Mentor	Mentor	Student
Students going to 4yr University	60%	95%	35%
Students going into STEM Career Fields	30%	72%	89%

Males to STEM	25%	62%	85%
Females to STEM	5%	10%	4%

Conclusion

It is evident that there is more interest in students pursuing STEM careers. If students would never have considered going into an engineering or programming career twenty years ago because they were unaware of what those were, now they know better. The STEM focus in Science classes in California schools has highlighted STEM possible career pathways. But in the three focus schools, it was clear that students had many hands-on opportunities to experience engineering and programming first hand. All three schools provided students with multiple opportunities to get excellent academic college preparation, and earn university credit at the same time. Even though not one hundred percent of these students wanted to go on to STEM careers, it is clear that such STEM focused schools gave them a realistic representation thereof. It is also clear that more students are graduating from these Los Angeles schools with a solid educational background for pursuing STEM careers if they choose to go that way.

Acknowledgements

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Contact email: chemistry4elementary@gmail.com

Technology Driven Management and Employees' Task Accomplishment in Government Technical Colleges in Lagos State, Nigeria

Akeem Adekunle, University of Lagos, Nigeria

Abstract

The study examined the contributions of Technology-Driven management to employees' task accomplishments with particular reference to Government Technical Colleges in Lagos State Nigeria. The study was guided by one research question and three hypotheses. The descriptive survey research design was used for the study. The population comprised all the 528 teachers in all the five Government Technical Colleges in Lagos state. The sample size consisted of 132 teachers selected using multi-stage sampling procedure. A 25-item validated and reliable ($r = 0.96$) instrument titled "Technology-Driven Management and Employees' Task Accomplishment Questionnaire" (TDMETAQ) was used for data collection. The analysis of data was carried out using mean and standard deviation to answer the research question, one sample t-test to test hypotheses 1 and 2, and Multiple Regression Analysis for hypothesis 3. The findings indicated that the level of adoption of e-administration in the colleges was low, the provision of ICT infrastructure was low and the capacity building programmes for employees on ICT was inadequate. It was also found out that the adoption of e-administration, provision of ICT infrastructure and capacity building programmes on ICT jointly contributed to employees' task accomplishments. Arising from the findings of the study, it was recommended that as a matter of policy, e-administration should be made an essential component of institutional administration; there should also be adequate provision of Digital facilities in schools as well as regular capacity building programmes on ICT for both administrative and teaching staff in the colleges.

Keywords: Technology-Driven Management, Task Accomplishments, Technical Colleges, e-Administration, ICT facilities and Capacity Building

Introduction

In Nigeria, like other countries all over the world, education has continued to be regarded as the instrument through which the nation's sustainable growth and development can be attained. Yakubu (2020) affirmed that most governments in different parts of the world have consistently placed emphasis on education as an indispensable factor in their efforts towards the achievement of socio-economic, political and technological greatness. The Nigerian educational system is anchored on the five main national goals as contained in the constitution of the country which among others include: the building of a united, strong and self-reliant nation; and a great and dynamic economy, hence, the Federal Republic of Nigeria (FRN) (2014) in the National Policy on Education sees education as a tool that helps in the acquisition of appropriate skills and competences necessary for individuals to live in and contribute to the development of the society. Therefore, education provided by educational institutions should be functional, such that the outputs of the school system can be employable and self- reliant.

The need to equip students with technical skills required of them to be able to fit in different industries, getting prepared to work in business communities, undertake entrepreneurial pursuits and production of skilled craftsmen for the enhancement of national development and promotion of self-reliance has necessitated the establishment of technical Colleges in Nigeria. Technical Colleges are educational institutions offering technical and vocational education and training. The institutions, in addition to general education, provides opportunities for learning in technologies and allied sciences and the possession of applied knowledge, attitudes and proficiency in connection with career in different sectors of productive and social life (FRN, 2014).

According to Odu (as cited in Godiya,2016), Technical Colleges in Nigeria are set up to train artisans for industries and to develop in the people, the appropriate physical, social, cultural and economic proficiencies with the curricular focusing on technical skills, crafts and engineering trade. The courses offered include: painting, auto-mechanic, plumbing, furniture making/ carpentry and joinery, electrical/ electronic technicians, home economics, pharmacy technicians, refrigeration and air conditioning, etc. For Technical Colleges to accomplish the purpose at which they are set up, effective management is highly indispensable. Management has to do with the optimal utilization of human, material, financial and time resources towards the realization of goals and objectives of the organization.

There is no doubt that the management of education generally and technical education in particular is a very complex task and the unprecedented development in technology has brought about a profound advancement in the institutional administrative system in the 21st century. Environmentally friendly technology coupled with adaptability in learning and administrative activities is crucial to the attainment of organizational efficiency, hence, the need for the adoption of technology driven management (Tyagi & Abbi, 2019).

Technology driven management in the context of this study refers to the application of information and communication technology or electronic devices in carrying out management functions in technical Colleges. It also refers to e-management or automated management system. Odedina (2019) noted that the contemporary application of technology in institutional administration is evident in decision making, planning, organizing, communicating, coordinating and performance evaluation. These responsibilities are carried out in the areas of educational programme improvement, instructional quality control, staff

and students' human resources management, guidance and counseling, financial management, plant maintenance and facilities management as well as general school administration. These duties are no doubt very complex, amorphous and extensive. Therefore, the effectiveness and efficiency of institutional management in the contemporary digital generation will to a large extent be hinged on the level at which they are able to rise to the occasion of embracing emerging technological assets and amenities in school administration (Oladipo & Adekunle, 2015).

Information and Communication Technology has brought about a paradigm shift in the methods in which people carry out commercial activities and also transmit information, messages and ideas, and technical colleges and their administrators are no exception. It has radically modernized the patterns of doing business, attitudes to work and social interactions (Mbakem, 2006). Aboderin (2009) however, noted that a large number of the third world countries do not have access to the ICT infrastructure and this has affected the level of utilization of automated devices. In a study carried out by Olayemi and Omotayo (2012), it was reported that there was a low level of awareness on the part of the sampled school administration with regards to ICT usage and that most of the secondary schools in the study area lacked adequate provision of digital facilities. The study further revealed that a significant positive relationship existed between the adoption of ICT and administrative effectiveness of secondary schools.

In a similar study, Jegede and Musa (2020) showed that the effectiveness of technology enhanced system in secondary school administration has been hindered by factors such as insufficient provision of financial backing for ICT education, insufficient ICT infrastructure, haphazard execution of policies on ICT, unstable interest connectivity and coverage as well as low level of literacy in ICT among others, students and school administrators. Toluse (2018) asserted that electronic technology is yet to be suitably incorporated into the teaching-learning process and personal functions in the school system. As observed by Chidobi (2015), some Nigerian schools and Colleges have continued to hold on to the age long system of keeping records in files and lockers thereby exposing them to damage by termites and mice. This has served as obstacles to easy retrieval of these documents when the need arises.

From the foregoing, it can be deduced that the imperativeness of ICT in Nigerian schools and Colleges cannot be under-estimated, especially in this high-tech age where proficiency in ICT is needed to be able to sustain the keenly challenging labour market. Okebiorun (2019) asserted that the accessibility of ICT and its utilization is a distinguished factor in contemporary organisations. This is because technology has developed alongside human development, therefore showing the critical role of employees in the accomplishment of goals of the organisation.

Ayeni and Ogunbameru (2013) evaluated the extent of provision and utilisation of ICT infrastructure towards the realisation of goals of secondary education in Nigeria. The findings revealed that secondary schools are mostly inclined to the use of computer set, printers, and bulletin board, and that there was low association between teachers' and students' utilisation of ICT resources. Maisari, Adikwu, Ogwuche and Ikwuche (2018) in a study to evaluate the proficiency of teachers and principals in the utilisation of digital resources and reported a low-level usage of the resources for the teaching-learning process and administrative functions.

Across the Nigerian secondary schools and Colleges, the facilities for effective operation of technical and vocational Education and training are abysmally deficient, insufficient and outdated. This has without doubt, culminated into the decline in the caliber of graduates of Technical Colleges (Okolie, 2014). Relatedly, Ikoya and Omoyase (as cited in Odedina,2019), reported that about 26% of vocational and technical educational institutions in Nigeria could boast of adequate physical resources. Furthermore, there is evidently a low level of technological development and high-tech enhancement infrastructure. For instance, it is almost unfeasible to access the internet in many schools in the country. The libraries are outdated to the extent that current materials are not easy to come by in the libraries.

The Federal Ministry of Education (2011) conducted a study and reported that a large number of teachers in Nigerian secondary schools and Colleges still had low level of comprehension and expertise in the usage of technology resources for instructional activities, this has been ascribed to factors like inadequate ICT facilities for a large number of teachers and students who require them, other factors include: inappropriate facility support such as epileptic supply of electricity, poor internet connectivity and deficient maintenance culture, especially with regards to ICT infrastructure among others. The implications of these deficiencies are evident in teachers' and administrators' inability to effectively carry out instructional and administrative functions respectively, thereby leading to the production of low-quality graduates by educational institutions.

It therefore, implies that teachers' ability to effectively accomplish their task can be attributed to the extent of integration of ICT in school administration. As noted by the National Council for Accreditation of Teacher Education (NCATE) (2002), teachers are required to demonstrate proficiency in the usage of appropriate teaching methods, educational programme, instructional technology and classroom climate. It is also anticipated that teachers should have in-depth understanding of the sophisticated nature of their learners and have adequate mastery of the subject matter. For the sustenance of outstanding accomplishments, teachers are expected to be kept abreast of the appropriate course of action and exhibit enthusiasm for continuing career development.

Teachers' pedagogical activities in the classroom are extensive and extremely challenging to bring about the expected educational attainment. Thus, the teachers' task accomplishment is demonstrated by convincingly understanding of what to teach, impressive classroom control and adoption of adequate assessment techniques (Begiri, 2014). As part of teachers' tasks, classroom management is a professional activity expected to be adopted by each and every teacher through the exercise of control on recalcitrant attitudes by students so as to guarantee successful educational outcomes. This requires the availability of instructional resources, such as ICT infrastructure aimed at further stimulating and enlisting the consciousness and excitement of the learners in the educational environment (Ukala & Nwabueze, 2015).

Assessment of students' learning is another important task of teachers; hence, it is anticipated that teachers should embrace relevant evaluation procedure in the instructional process and in the assessment of examinations. This task may take too long to be accomplished in the absence of digital equipment in the classroom. Even if the apparatus is made available and the teachers do not possess the technical wherewithal to make use of them, the extent of their service delivery will be hindered. The observation by Etor, Mbon and Ekanem (2020) has shown that teachers in some secondary schools are deficient in the instructional task performance, hence, institutional administrators need to equip teachers with the appropriate technology enhanced equipment and develop their capacity towards the utilisation of the

equipment to enhance effective teaching and learning. The observation further revealed that teachers' job engagement in Nigerian secondary schools is below average due to inadequate knowledge of the application of contemporary technology in carrying out their teaching and allied responsibilities.

Arising from the foregoing, the study examines the technology enhanced management in relation to teachers' task accomplishment with particular reference to Government Technical Colleges in Lagos State Nigeria.

Statement of the Problem

Institutional management is getting more complicated and the adoption of ICT in Nigerian schools is gaining more awareness, especially with the advent of the coronavirus pandemic which has now made the role of school administrator to be more noticeable in ensuring ceaseless learning during the lockdown and school closure as well as in guaranteeing the conduciveness of the school environment for effective teaching and learning. Akinwunmi and Itobore (2020) asserted that the covid-19 crisis has brought about immense threat to the educational system, particularly this time when most school systems were ill-prepared for the electronic learning which probably is the lifeline of education in this emergency situation.

The observation of the researcher has shown that in some of the Nigerian schools and Colleges, the automation of the routine administrative operations seems not to have been accorded due attention as noticeable in the adoption of the conventional system of manual keeping of records and in carrying out other administrative responsibilities. In a large number of schools, the technological enhanced infrastructure appears to be in short supply, even when provided, they are not effectively made use of. Furthermore, the school administrators and teachers who are needed to handle the gadgets seem to be incapable due to their level of incompetence and this is assumed to have implications on the successful utilisation of the facilities in the way and manner to bring about positive outcomes.

It is as a result of the aforementioned that the study examined technological driven management and employees' task accomplishment in Government Technical Colleges in Lagos State, Nigeria.

Purpose of the Study

The study was specifically designed to achieve the following objectives:
1.   To investigate the level of adoption of e-administration in Government Technical Colleges, Lagos State.
2.   to determine the extent of provision of ICT infrastructure in the Colleges.
3.   to examine the adequacy of the capacity building programmes for employees on ICT in the Colleges.
4.   to assess the contributions of the adoption of e-administration, provision of ICT infrastructure and capacity building programmes on ICT to employees' task accomplishments in the Colleges.

Research Question

The study provides answer to the question:
How adequate is the capacity building programme on ICT for employees of the Colleges?

Research Hypotheses

The following hypotheses were formulated and tested at .05 level of significance:

Ho1:   The level of adoption of e-administration in Government Technical Colleges, Lagos State is not significantly low.

Ho2:   The extent of ICT infrastructural provision in the Colleges is not significantly low.

Ho3:   There is no significant joint contributions of e-administration, provision of ICT infrastructure and capacity building programmes on ICT to employees' task accomplishment in the Colleges.

Research Methodology

The study adopted a descriptive survey research design because it tried to give a description, explanation and validation of the objectives, research questions and hypotheses of the study. The population comprised all the 528 teachers in all the five Government Technical Colleges in Lagos State as at the time of this study. The sample size consisted of 132 teachers selected using multi-stage sampling procedure. The use of the sampling procedure was premised on the different stages involved in drawing the sample. The first stage was the choice of the Colleges based on division of the state in which they are located using stratified sampling technique. The next state is the selection of teachers in each of the sampled Colleges using random and stratified sampling techniques.

A 25- item instrument titled "Technology-Driven Management and Employees' Task Accomplishment Questionnaire (TAQ) designed by the researcher was used for data collection. The instrument was validated by two academic staff in the Department of Educational Management and one expert in test and measurement, Faculty of Education, University of Lagos Nigeria. The reliability of the instrument was determined in a plot study using split half method. Spearman Brown prophecy formular was used and a reliability co-efficient of 0.96 was obtained. Due to the high level of co-efficient, the instrument was adjudged to be reliable for use in the study. The analysis of data was done using mean and standard deviation to answer the research question, while one sample t – test was used to test hypotheses 1 and 2, and Multiple Regression Analysis for hypothesis 3.

Results

Research Question

How adequate is the capacity building programme on ICT for employees?

This question was answered using mean and standard deviation. The result is presented in table 1.

Table 1: Adequacy of Capacity Building Programme for Employee

S/N	Item	A	NA	Mean	SD
1	There is a clear- cut policy on ICT training for employees in technical colleges	34(25.76)	98(74.24)	2.01	1.03
2	Different ICT training programmes are available for employees in technical colleges	49(37.12)	83(62.88)	1.53	0.61
3	I have attended training on the use of	54(40.91)	78(59.09)	2.34	0.08

	learning management system				
4	I have attended one form of training programme or the other on the use of ICT in the lats two years	57(43.18)	75(56.82)	2.53	1.38
5	The college management provides technology support for employees.	50(37.88)	82(62.12)	1.92	0.16
6	I have the required competence to use ICT for instructional purpose.	73(55.30)	59(49.70)	2.73	0.74
	Average			**2.18**	**0.67**

NOTE: Figures in parentheses are in percentages; Key: A – Applicable, NA – Not applicable

Table 1 shows the participants' responses on the adequacy of the capacity building programme on ICT for employees. The mean responses and standard deviation ranges from 1.53 – 2.73 and 0.08 – 1.38 respectively, with an average mean value of 2.18 less when compared with the criterion mean value of 2.50. This therefore indicates that the Capacity Building Programmes on ICT for Employees of the Lagos state technical colleges were inadequate.

Test of Hypotheses

H01: The level of adoption of e – administration in Lagos state technical colleges is not significantly low.
The hypothesis was tested using one sample t – test and the result of the analysis is presented in table 2.

Table 2: Adoption of e – administration in Government Technical Colleges

N	Mean	SD	Df	t-cal	P	Remarks
132	4.63	.215	131	89.6	.001	Significant

$P < 0.05$

Table 2 shows the one sample t-test indicating the level of adoption of e-administration in Lagos state Government Technical Colleges. The table shows the t-test calculated value of 89.6, df = 131; P = 0.001<0.05, therefore, the null hypotheses is rejected. It then means that the adoption of e-administration in Lagos state Technical Colleges was significantly low.

H02: The extent of ICT infrastructural provision in Government Technical Colleges is not significantly low.

One sample t-test was used to test the hypothesis, the result is provided in table 3.

Table 3: ICT infrastructural provision in Government Technical College

N	Mean	SD	Df	t-cal	P	Remarks
132	2.52	.103	131	1.4.93	0.002	Significant

$P < 0.05$

Table 3 shows a one sample t-test indicating the extent of ICT infrastructural provision in Government Technical Colleges. The table shows that the t-cal = 104.93, df = 131, P = 0.002 < 0.05, therefore, the null hypotheses was rejected. It means that ICT infrastructural provision in Government Technical Colleges was significantly low.

H03: There was no significant joint contributions of e-administrations, provision of ICT infrastructure and capacity building programme on ICT to employees' task accomplishment in Government Technical Colleges.

The hypothesis was tested using Multiple Regression Analysis, and the result of the analysis is presented in table 4.

Table 4: e-Administration, Provision of ICT Infrastructure, Capacity Building Programme on ICT and Employees' Task Accomplishment

Model Summary

MODEL	R	R Square	Adjusted R square	Std error estimate
1	.527	.278	.275	.249

a.　　Predictors: (constant), e-administration, provision of ICT infrastructure and capacity building programme on ICT

ANOVA

MODEL		Sum of square	DF	Mean square	F-ratio	Sig.
1	Residual	42.318	2	21.159	40.226	0.001
	Regression	67.274	128	0.526		
	Total	109.592	131			

a.　　Dependent variable: Employee's Task Accomplishment
b.　　Predictors: (constant), e-administration, provision of ICT infrastructure and capacity building programme on ICT.

Table 4 shows that the co-efficient of determination (R square) = 0.278 which gives proportion of variance (R^2 x 100) = 27.8%. This is an indication that the independent variables (e-administration, provision of ICT infrastructure and capacity building programmes on ICT accounted for 27.8% variance in the dependent variable (Employees' Task Accomplishment). This therefore, implies that the joint contributions of the independent variables were significant on employee's task accomplishment, since F – ratio (2, 128) = 40.226; P = .001< 0.05. Thus, the null hypothesis which states that there are no significant joint contributions of e-administration, provision of ICT infrastructure and capacity building on ICT to employees' task accomplishment in Government Technical Colleges was rejected.

Summary of Findings

1.　　There was low level of adoption of e-management in Lagos State Government Technical Colleges.
2.　　The provision of ICT infrastructure in the Colleges was low.
3.　　There were inadequate capacity building programmes on ICT for employees in the Colleges.
4.　　There were significant joint contributions of e-administration, provision of ICT infrastructure and capacity building programmes on ICT to employee's task accomplishment in the Colleges.

Discussion of Findings

The first result revealed a low level of adoption of e-management in Lagos State Government Technical Colleges. This means that the rate at which technical colleges in Lagos State make use of technology in the day-to-day administrative operation was not encouraging and below average. This finding confirms the earlier one by Adomi and Kpangban (2010) that despite

the series of attempts by the government to incorporate the information and communication technology in the educational system, the extent of adoption and usage of technologies in the teaching-learning process as well as in the administrative practices in Nigerian secondary schools and Colleges had been low as a result of bad policies/ project execution plan and bad information architecture. Similarly, Toyo's (2017) study also corroborates the present study by reporting that the effective utilization of digital infrastructure in colleges had been impeded by factors such as inadequate financial allocation, insufficient expenditure on technological appliances, defective digital literacy among teachers and institutional administration, among others. Also confirming the present finding, Abubakar and Bashir (2021) reported that inspite of a large sum of money invested on ICT facilities and capacity building to enhance school improvement, the adoption of ICT and its utilisation in teaching and learning as well as in school administration has continued to fall behind.

Another finding of the study is that the provision of ICT infrastructure in the Colleges was low. This is an indication that the supply of technology enhanced equipment for teaching and learning as well as in the day-to-day administrative operations in technical Colleges was below expectation as they have been in short supply. The present finding is giving credence to the finding of Godiya and Abana (2017) which justified the imperativeness of information and telecommunication technology's facilities in the promotion of effective teaching learning process and in skill acquisition in technical college. The study further showed that in some of the Nigerian educational institutions, computer is the only electronic technology device that is oftentimes available. Relatedly, the findings of Bawa and Rabiu (2020) supports the finding that the low level of provision and utilisation of electronic devices in the teaching learning process and in administration is evident in the exorbitant ICT appliances, inadequate smart board, erratic supply of power, poor internet connectivity and inadequate financial provision for the maintenance of the few information technology tools at hand.

The result also showed that the capacity building programmes on ICT for employees was inadequate. This suggests that the available in-service training programmes that enhance the skills and proficiency of teachers and school administrators in the effective use of different technology tools and packages are insufficient. Shorunke, Makinde and Makinde (2014) in a study on digital proficiency level of teachers in Lagos State secondary schools found out that effective application of information technology in the school system depends upon proficiency in the usage and retrieval of the needed information without unnecessary pressure. The study further showed that a positive and significant relationship existed between the ICT proficiency level of teachers and the effective usage of information technology facilities and that on the whole, a greater percentage of teachers and school administrators had a fair knowledge of ICT due to their exposure to one form of training programme or the other. Goshet (as cited in Makewa, Mereno, Role and Role, 2013) reported that most schools did not yet offer ICT programme for teachers, students and administrators.

The last result indicated that e-administration, provision of ICT infrastructure and ICT capacity building programmes jointly contributed to employee's task accomplishment. This means that all the technology-driven management variables studied collectively predicted employees' exercise of functions and service delivery. The study supports Kathure's (2015) finding that educators, administrators and learners were unable to benefit from the holistic satisfaction derivable from automation as a result of insufficiency or absence of gadgets. The teachers acknowledged the fact that some measures of encouragement were received from management inform of provision of opportunities for on-the-job ICT training. The study concluded that ICT was used in the management of student-related records, school finances

as well as in the evaluation of students' learning achievement among others; this has without doubt helped in promoting teachers' effective service delivery.

Conclusion

The study has been able to establish the fact that adoption of information technology in the teaching learning process as well as the administration of technical colleges has become imperative, specifically with the Covid-19 pandemic which as necessitated the integration of technology in the school system. Based on the findings of this study, it is evident that technical colleges in Lagos State have not fully integrated information technology in the administration of the institutions as well as in the teaching learning process. Consequently, the ICT infrastructure are in short supply in the Colleges and the very few that are available are poorly maintained, with little technical support provided. The technological skills of teachers and administrators were found to be low, due to the inappropriate training programme available for them which has continued to have implications on their willingness and enthusiasms to use the technological gadgets. Conclusively, the adoption of e-administration, the provision of ICT infrastructure and capacity building programmes for employees jointly contributed to task accomplishment in Lagos State Technical Colleges.

Recommendations

Predicating on the findings of the study and the conclusion deduced there from, the research hereby recommends the following:

The need for a clear-cut ICT implementation policy in all educational institutions in the country. This is to ensure that schools are moving on with the information age. By so doing, ICT culture should be developed in staff and students by putting in place functional ICT implementation committee in all schools.

There should be regular and continuous technical support for teachers and school administrators through the provision of considerable IT proficiency training and retraining programmes, such as in-service training workshop, seminar and conferences as this goes a long way in developing in them the appropriate skills required for the application of technological devices, software and packages.

Since effective application of ICT is to a large extent hinged on adequate provision of facilities, there is therefore, the need for the government to provide adequate ICT infrastructure in schools for teaching and administrative purposes. By so doing, attempt should be made to encourage computer ownership programme for teachers and school administrators by subsidizing the cost of ICT facilities, as this is an essential factor in encouraging personal acquisition of gadgets for personal use and to complement those provided by the government. Therefore, adequate funding of education generally is a panacea in this regard.

The use of technology in both staff and student personnel functions in educational institutions should be fully embraced in order to facilitate tasks accomplishment for staff and improved learning outcomes for students, thus, bringing about the attainment of goals and objectives of vocational and technical education in the country.

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Contact email: adekunleakeemunilag@gmail.com

Application of Comparative Law Methods in Teaching Legal English to Law Students in Russia

Tatiana Kalugina, MGIMO University, Russia
Maya Golubtsova, MGIMO University, Russia

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Abstract
A major challenge inherent in a course of legal English taught to students outside the common law tradition lies in the very fact of the difference between the legal system native to the student and that of common law. This difference, manifested in every aspect – formal and cognitive – of legal language, should be made aware to the students from the start and throughout the course. Comparative method is therefore the best strategy of teaching English to international lawyers. This method will only be effective if the students are able to understand the legal intricacies and implications concealed in vocabulary, grammar, and syntax. For this reason, MGIMO adheres to the policy of introducing its students to the language of profession after they have achieved a high command of language. Teaching legal English in the Russian universities was traditionally confined to the development of specialized vocabulary and the translation of professional texts. Today, however, even a profound knowledge of terminology will not suffice – the employers expect that the graduates arrive prepared to act in a professional environment. The article highlights the idea that a university course of Legal English for English Second language students should be focused on the development of the required competencies, and the choice of teaching methods and techniques must serve this goal.

Keywords: Legal English, Comparative Legal Studies, Legal Translation, Comparative Approach, Teaching Methodology, English as Second Language

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Introduction

The idea of basing a course of Legal English on comparative principles is not universal. Legal English programmes are so diverse in subject and purpose that there can be no uniform criterion to judge their composition and methodology. The only test that remains is whether the teaching strategies correspond to the goal of training of a specific type of lawyer – a specialist whose practice will be confined to a particular legal system (national or globalized), a sphere of law, or a branch of the legal profession.

Thus, American universities challenge their ESL students with the specifics of the American law – or International law, if such is the course of choice – regarding as immaterial the fact that their native language is not English and their native law is not common law. In fact, extinguishing the cognitive comparative processes looks as a deliberate policy. Katerina Levinbuk, professor at South Texas College of Law, emphasizes as an absolute requirement the need to 'restrict the students' usage of their native language dictionaries in the classroom," "to get away from word-by-word translation," "to commit to converting the students' law-related thinking and writing into one that is acceptable in the legal community in the United States or another country" [4]. The purpose behind this requirement is not only to reach a "high level of sophistication in the use of language", but to immerse into the target legal system thus cutting away any link with that of the native law. "Successful lawyers cannot think in different languages, if they do, their lawyerly communication will not come out in a clear fashion." [4].

A different approach to educating lawyers is advocated by Nicole Kornet, Faculty of Law at Maastricht University. Emphasizing intrinsic connection between law and language, professor Kornet is concerned about the Europeanisation of legal practice which calls for a special type of lawyer, capable to 'think across jurisdictional boundaries and to become "interpreters" of different legal systems and traditions." [3]. European integration is a permanent challenge to lawyers in the sense that various legal concepts and institutions (expressed through corresponding languages) must be brought to communication, and, at the same time, this alliance is largely affected by means of a language foreign to all member states – moreover, a language representing a different legal culture, that of common law. "The English language cannot express the distinctive style or mode of thinking of a legal system that is conveyed by the original language." [3]. Comparative methodology applied through translation techniques, therefore, becomes essential to teaching at European law schools.

Interestingly, comparative agenda is of relevance even within legal English itself. Professor Antonios Emmaniel Platsas of University of Derby School of Law and Criminology warns foreign students of English law against confusing legal terms that look similar but belong to different spheres of law and so signify different legal concepts: "linguistically equivalent legal notions will frequently have different contents in different jurisdictions." [6, p. 108]. Another problem that ESL students find difficult to realize is that certain words or phrases that mean one thing in the common context have a special meaning in legal discourse: linguistic functional equivalent is not always a legal functional equivalent [6]. He further points out as essential for teachers to realize that legal difference between two terms will all too often escape the minds of their students if the terms look similar in the native legal language and the English legal language. "Comparative law students find it difficult to comprehend that one word in their language being written in the same way in another language has a different meaning altogether." [6, p. 111]. Logically enough, Professor Platsas views legal translation as integral part of training comparative lawyers; although he often uses the word "translation" in the inverted commas – perhaps, as a metaphor of the necessary transition from one legal system

into another, - translation is what actually takes place in the mind of a comparative lawyer, or a foreign student of law.

Yet, there are authors who, though agreeing with the idea of the need of a comparative approach "for better understanding of the differences and similarities of the two legal systems and for a correct interpretation of the legal texts," [5, p. 5476] still take translation out of ESP curriculum and separate the training of legal practitioners in legal English and the training of legal translators. Medrea Nicoleta Aurelia from Petru Maior University discusses legal translation only in the narrow sense of professional occupation. It is not quite clear, therefore, from her article what she means by "comparative approach". Perhaps, the law specialists involved in the teaching process will be expected to interpret the terms (i.e., institutions, concepts) of the target legal culture to ESL students. Professor Medrea sees the goal of legal translator in establishing "an effective communication between two cultures" by "identifying connections between the two cultures in order to render a completely functional translation" [5, p. 5479]. In our honest opinion, it is not so much the connections, but the differences that should be identified in the source legal language and articulated in the target legal language – which constitutes legal translation and is, in fact, the comparative legal analysis.

Discussion

Legal English v. Legal Translation

This article proceeds from the understanding of the distinction between the broad meaning of the term 'translation' in which it is used to denote a method of teaching a foreign language as described above, and its narrow, professional, use. It is this second meaning which makes legal translation part of intercultural professional communication and, effectively, a tool for comparative legal studies.

Distinguishing between the profession of a lawyer and that of a lawyer-linguist, the article will set aside translation as a separate professional trade with its specific rules and requirements. The primary focus here is on translation as a form of comparative legal research which is a natural and indispensable part of mastering a foreign legal system.

In fact, broadly available legal English textbooks and courses contain no recommendation to practice translation – leaving, perhaps, the decision to opt for translation to a particular teacher, should circumstances require. Even where a basic legal English textbook is expanded to include certain translation assignments to meet the requirements of a specific group of students, these assignments usually serve the purpose of controlling the understanding of terminology and of the ability to express the ideas contained in the unit. Sometimes, the overall rendering of a text is offered as a summing-up activity, its goal being, again, to make sure that the material of the unit has been made own to the student.

Legal Translation as Essential Teaching Methodology

Law expresses itself in and through language. In a sense, law *is* language [1, 2], which means that every piece of legislation, every rule or practice must be put into words of a language. Therefore, the study of law requires the study of its language. In the context of teaching legal English to law students, this also means that by studying the English language of their profession, they necessarily study the law of the community that originally laid its regulations in English.

The idea that by approaching legal English they are in fact approaching the study of Anglo-American law, is not at all clear to the students. At the early stage, they do not even question the possibility to use a Russian legal term or any handy word to express or explain original legal language, or to use Russian legislation in a particular sphere as a source of corresponding terminology. Sometimes it is quite safe – is cases where the two legal systems come close together *('contract', 'specific performance', 'agency', 'patent', 'board of directors')* or where the sphere of law in question is internationally made and regulated *('negotiable instrument', 'letter of credit', 'bill of lading')*.

Where the system of the student's native law and that of Great Britain, the USA, or the European Union (to the extent that English acts as lingua franca) are so different that few legal institutions are in fact comparable or are applied in a similar way, it is the duty of the teacher to make the students understand that there are no corresponding terms or broader legal formulae in their own language. All too often will the students be tempted to use a native term which sounds similar or appears parallel to an English legal term or phrase, but which in fact is specific to the English law. This may result in a legal error or, in less serious cases, in a misunderstanding. (E.g., the term *'novation'* is not the same as the Russian *'новация'*, although the words sound similar: the first means the substitution of a party to a contract, while the second means the change of obligation.) The requirement to put the term – or the whole clause – into Russian is essential in such cases. Otherwise, the error will stay. A typical classroom situation can be illustrated by the following very demonstrative example. The students are challenged with a task to comment on a provision in a contract stating:

"This principle is found in statute, law, constitution, and this Agreement."

While the terms *'statute'* and *'agreement'* are easily understood because they fully correspond to the Russian legal understanding of these notions and the term *'constitution'* will be familiar to those acquainted with company law, the term 'law' invariably perplexes the students. For a student educated in the culture of the Russian (i.e., codified) law, this term is synonymous to *'legislation'*, *'statute'*, or *'regulation'*. Therefore, they will see no difference between the first and the second element in the enumeration. But with the awareness of the fact that the English legal language is the language of the English (i.e., judge-made) law, they would easily realize that the term speaks of precedent and the statement actually draws attention to the fact that the principle in question is reflected in all applicable legal sources.

This very simple example shows the importance of legal translation as a means of developing the awareness of the difference between the legal systems. It is essential that the students should be able to find proper resources in their native language to emphasize this difference, particularly so as there are much subtler cases where nothing in the composition or context of the text will point at a catch.

Another instance where translation comes into teaching legal English to Russian students arises with the need to coin a term. There are areas of Anglo-American law so completely special in regulation, court practice, place within the overall legal system, that the legal language through which they 'speak' has no terminological equivalent in the Russian legal discourse. Examples are real property law or the law of trusts, with such terms as *'fee simple'*, *'quiet possession'*, *'equitable interests'*. Even within more similar legal areas, such as contract law, there are specific categories, like *'consideration'*, *'parol evidence'*, or *'promissory estoppel'* that require a very careful choice of words for students to be able to arrange a legally accurate discussion in their native language. Here, the students are introduced to the field of professional consensus,

where legal scholars, practitioners, and translators have agreed about a particular wording or a common algorithm of approaching a translational challenge. The result of such a consensus usually lies very far from what the students have become used to in their studies of the Russian law:

rule against perpetuities – правило, запрещающее бессрочное владение

consideration – встречное удовлетворение

deed – документ за печатью

These examples help the students to understand, that the professionally correct and safe way of solving such intercultural problems will be either to provide a brief explanation or to produce an agreed-upon formula. The first concern is to avoid the Russian legal terminology so as not to confuse oneself, as well as the audience, into thinking that the named institution is similar of the Russian law and, consequently, is governed by the same principles. The second is to find a good enough word or phrase to explain, as far as possible, the meaning of the original term.

Apart from the many inconsistencies arising from the differences between the common law and the civil law systems, there is still another complication. Each system has developed its own way of expressing similar phenomena and procedures, which makes literal approach to translation highly inadvisable and urges the students to look deeper into various sources in both languages. A good illustration of such research and its outcome may be found in the comparative analysis of three published English translations of the Russian Civil Code. In the specific instance of treating the term *'исполнение'* as pertaining to the payment order, one author chose the term *'performance'*, the second preferred *'execution'*, while the third used both terms. (The terminological phrase in question was '*принять к исполнению платежное поручение*,' literally, *'to accept a payment order for performance/execution'*.) On analysis, it turned out that the first author treated the term 'исполнение' in the sense that the bank performs its obligation by accepting the client's payment order, thus placing the article of the Civil Code purely into the context of contract law; the second author saw the transaction in the light of Chapter 9 UCC, as the execution (making out) of a new, internal payment order drafted by the bank in response to the document accepted from its client, while the third author applied both terms in the contextually accurate way. But for all this useful research, the true conclusion will be paradoxically different and unexpected: The English equivalent of the Russian terminological phrase will not require either *'performance'* or *'execution'*: the client *presents* a payment order – the bank *accepts* it. Nothing further.

Legal terms and terminological phrases are only one element of the intricate and complicated system of legal English – and its most visible stratum. They stand for the substantive part of the law they denote, they form a framework of the language of law, and it is usually the terms (words used to describe legal concepts and categories) that typically fill the glossary banks for the students to learn. And yet, legal English, being the language of precedent law, is far more intricate and cunning. It is abundant in 'terms of art', phrases, that not being terms in the narrow sense, are nevertheless integral part of the legal discourse. The Russian students of Anglo-American law should be made aware of, basically, two things. First, with terms of art, the legal meaning not always coincides with the lay meaning, and, second, the words that are presented in dictionaries as source and translation may not be completely identical in meaning.

The first case may be illustrated by the phrase 'from time to time'. A general dictionary will offer '*иногда*' or '*по мере необходимости*' ('sometimes' or 'as required'), while for a lawyer the meaning will be '*актуальный на момент возникновения вопроса*' ('as relevant or applicable at the time of the event'). The students of legal English are advised to develop the

awareness of such phenomena, tread carefully, and never take for granted anything that even remotely resembles an idiom.

Typical of the second group will be the phrase *'included but not limited to'*. Unfortunately, the literal translation of this term of art ('включая, но не ограничиваясь') has become so deeply incorporated into the language of the Russian legal practitioners that there is little hope left for any rectification. The reason why it sounds so un-Russian is that the English word *'included'* does not indicate with certainty whether the list is open or complete, while its Russian equivalent *'включать'* positively means an open catalogue.

The existence of such inaccuracies further dramatizes the need to practice translation with the students of law, because it is in the process of shaping common law ideas and concepts in the language accustomed to reflecting the Russian law ideas and concepts that the proper understanding and good mastering of both legal languages (and hence systems) may be achieved.

Conclusion

Law schools are expected to develop in students – in fact, in lawyers – professionalism, clarity and responsibility. Persistent inaccuracies in the interpretation and application of legal language of a system foreign to students highlight the urgent need to practice translation. This will not only help to eliminate the issue at hand, but to develop the students' analytical thinking. All teachers of law and legal language agree that successful communication is key when working between international legal systems. Accurate translation of common law ideas requires not only a clear understanding of the legal mechanics, but a good grasp of the linguistic and cultural differences. A translational error, a misinterpreted term, a misstated condition, a lost legal link may cost not only very big money, but also a career a reputation.

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Contact email: t.kalugina@inno.mgimo.ru
              maya.golubtsova@gmail.com

The Observation of Gender Stereotyping in Music Instruments in 2020, and the Process of Musical Instrument Selections of Children

Sori Kim, Columbia University, United States

Abstract

In 2020, a research team in the music and music education department at Teachers College at Columbia University conducted an explanatory sequential research consisting of both the quantitative and the qualitative methods to contemplate the current status of the gender association in music in the instrument selections and the correlation in regard to the influence of a parent. This report investigates an answer for the following research questions: (1) Has there been less or more sex-stereotyping of musical instruments and crossed-over students who chose atypical instruments with regard to their genders over ten years? (2) Are there any parental influences in the process of a child's musical instrument selection? (3) What similarities and differences are observed from the parents of those children? The result of this study answers the three research questions. This study describes that there has been lesser and lesser gender-stereotyping in musical instrument selection for ten years considering the number of cross-over students has increased through quantitative research. Furthermore, it demonstrates that the process of a child's selecting musical instrument is projected from their parent's perspectives. Besides the portraits of parents provided three themes.

Keywords: Music, Music Education, Gender Stereotype, Music Instrument

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Introduction

Previous studies regarding gender-stereotyping in selecting the musical instruments demonstrated that gender stereotype had been still observed in children's musical instruments selections from in the past to modern society. Whilst this research subject has been researched for four decades by the researchers, additional cross-questions and concentrations have appeared with regard to the possible reasons for the gender association in musical instrument selections. Previous research discerned not only a noticeable increase in the proportion of the students who "cross-over" and play atypical for their sex (Abeles, 2009) but also the prospective influences from a society, parents, peers, and ethnicity (e.g., Conway, 2000; Sinsabaugh, 2005). The questions of which influence is the most ascendency and how this influence affects the musical instrument selections lead to scrutinize the possibility of a parental influence on choosing children's musical instruments.

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This report investigates an answer for the following research questions: (1) Has there been less or more sex-stereotyping of musical instruments and crossed-over students who chose atypical instruments with regard to their genders over ten years? (2) Are there any parental influences in the process of a child's musical instrument selection? (3) What similarities and differences are observed from the parents of those children?

Related Research

Abeles (2009) conducted the research to identify if changes in the sex stereotyping of music instruments had emerged during the last thirty years after Abeles and Porter (1978) had researched. In the previous study, the researchers collected data from groups of 20 college students of nine different colleges and universities, which locates in diverse areas in the United States. Each group included 10 music majors and 10 nonmusical majors. Those students completed the Musical Instruments Paired-Comparison Survey Form (MIPCSF) which consisted of 28 pairs of eight musical instruments often played as part of school music programs including flute, clarinet, saxophone, trumpet, trombone, drums, violin, and cello. With these given data, Normalized Scale Scores were produced. For the latter study, Abeles (2009) surveyed 2,001 middle school students in the United States to research the music instrument selections by genders. To compare the similarity and differences between this paper and Abeles and Porter (1978), the data were converted to Normalized Scale Scores using the NSS of Abeles and Porter (1987) and Abeles (2009). The researcher tabulated the data to compare the proportion of musical instrument selections by genders compared to the data from Fortney, P. M., Boyle, J. D., & DeCarbo, N. J. (1993). While the results showed little difference in the sex-by-instrument distribution in 1978, 1993, and 2007, there was an increase in the number of students who chose crossover instruments from Fortney et al. (1993) and Abeles (2009).

Wiedenfeld (2012) surveyed of students ($n = 73$) and parents ($n = 73$) at one intermediate school in North Texas to configure whether the opinion of students and parents had influenced the musical instrument selections on students of fifth grade in regard to sex-types. The parents and students were given a three-page packet that included closed-response questions for both parent and student with the option of 'other' for clarification. The parents were asked for the

parent's and family's formal music background (questions 30 through 34), and if they would have preparations towards any instruments and why. Whilst the results represented the 'sound of the instrument', 'student's ability' and 'family members play it' were the essential elements in these children's instrument decision-making process rather than 'parent's choose', the researcher insisted the importance of further study by mentioning that a larger scale study should be conducted with a larger sample of sex-role questions for the students or the students' parents to answer to measure the influences. Furthermore, the research stated that gender-neutral in musical instruments is expanding.

Conway (2000) interviewed 37 high school instrumental music students in two sites in the United States to research the perceptions related to gender and instrument choice. The protocol was used only as an interview guide, and the actual interviews included several unstructured questions and conversational responses depending on the students. After transcribing recorded interviews, he categorized the results with the commonalities related to the experiences of these particular students in choosing musical instruments. The results reflected that the students believed the relationship between gender issues in society exists because of society, parental influences, and the media. In addition, several of the students who participated in the interview suggested that the stereotype may derive from their parents and older generation. The research reported that some parents of students who selected atypical musical instruments in regard to gender were supportive of their musical selections. However, some parents were closely related to children's musical instrument selections. In addition, the researcher found the possible influences on students regarding instrument choice: characteristics of the instruments including size, sound, volume, and role in the band, elementary instrumental teachers, and friends.

Method

To identify the change in gender-stereotyping in musical instrument selections and of cross-over students, each research team member conducts the replicated surveys of Study 1 and 2 from Abeles (2009). The Musical Instruments Paired-Comparison Survey form (MIPCSF) which consists of 28 pairs of musical instruments is used to generate Normalized Scale Scores. The participants are a mix of gender, ethnicity, race, and occupations (30 musicians and 30 non-musicians). The second survey is to research the musical instrument selections of middle school students (six through eight grades) in three middle schools in California and New York in the United States, and Jeju Province, South Korea. Following by the calculations of the Normalized Scale Score Means for students' instrument selections concerning generated Normalized Scale Scores from the first survey, the results are compared with Abeles (2009).

In the subsequent process, each research team member interviewed the parents ($n = 3$) whose child plays an instrument for at least five years online. The interview questions were to identify the detailed process of musical instrument selection of their child and the parental influence in the process. An interview protocol is created based on the questionnaire of Wiedenfeld (2012) and the research questions of Conway (2002). The key questions are: (1) Do you consider yourself to have a musical background? (2) Can you tell me about the process for your child in choosing his or her instrument? (3) Can you tell me about your influence in your child's choice? (4) When your child was choosing an instrument, did you ever think of encouraging or discouraging them because the instrument was a boy's or girl's instrument? (5) What are the instruments that you generally associate with girls or boys? The recorded interviews are transcribed and compared with other interviews. Followed by this phase, the portraits of interviewed parents are provided from each research member for cross-case analysis.

Phase	**Procedure**	**Product**
Quantitative Data Collection	• Conduct a survey of musicians and non-musicians (*n* = 60) using MIPCS • The musical selection of middle school students (*n* = 538)	• Numeric data (Normalized Scale Scores and Means)
Quantitative Data Analysis	• Factor analysis • Identify the change of collected data comparing with Abeles (2009)	• Factor loadings • Descriptive table charts
Case Selection: Interview Protocol Development	• Selecting 3 parents to interview the process of choosing the instrument of a child • Developing interview questions based on Wiedenfeld (2012) and Conway (2000)	• Cases (*n* = 3) • Interview protocol
Qualitative Data Collection	• Individual online interview with 3 participants • Record each interview and transcribe • The portraits of parents are written for cross-case analysis	• Text data (transcribed interview transcripts and the portraits of 3 parents)
Qualitative Data Analysis	• Observe the parental influence from interviews • Identify the commonalities, similarities, and differences across the parents • Categorize the similarities for case-cross analysis	• Analysis of collected data • Cross-case analysis
Integration of the Quantitative and Qualitative Result	• Interpretation and explanation of Quantitative and Qualitative results • Compare with Abeles (2009), Windenfeld (2012), and Conway (2000)	• Discussion • Implications • Future research

Figure 1: Research Process

Results

Quantitative Research Results

In the quantitative part, two surveys are conducted periodically. According to the results of the first survey, Musical Instruments Paired-Comparison Survey forms (MIPCSF), the Spearman-rank correlation coefficient technique is assessed to identify the relationship between musicians and non-musicians. Since the results produce a correlation of 0.98, the Normalized Scale Scores are tabulated from the Edwards Normalized Scale Scores Table to compare with Abeles (2009) and this study in Table 1 (Range = 2.027, $M = 0.914$, $SD = 0.722$). The results illustrate the flute, violin, and clarinet are appeared to be feminine musical instruments, while the drums, trombone, and trumpet are masculine musical instruments.

	Abeles (2009) $n = 222$	This Report $N = 60$
Flute	0.000	0.000
Violin	0.843	0.044
Clarinet	0.910	0.452
Cello	1.458	0.819
Saxophone	2.089	1.185
Trumpet	2.329	1.211
Trombone	2.568	1.567
Drums	2.962	2.027

Table 1: Normalized Scale Scores Comparisons in 2009 and this Report
Note. Higher score indicates more masculine.

The result of the second survey of middle school students ($n = 538$) at three sites generates the Normalized Scale Score Means in Table 2. The results describe the means of the student concerning two genders and three grades. Since a higher score means more masculine, the female students have lower scores than the male students in grades 6, 7, and 8. While the figures of female students in three grades are ranged from 0.31 to 0.46, those of male students are between 0.81 and 0.99. On the other hand, there is a similar pattern in both male and female students. Besides, there are steady rises from grade 6 to 8. The Normalized Scale Score Means of this report is used to compare with Abeles (2009). A chi-square test of independence is performed to examine the relationship between gender and instrument played in middle school. The relation between these variables is significant, $X2$ ($df = 7$, $N = 538$) = 20.9, $p = .0000$.

	Sixth Grade		Seventh Grade		Eight Grade	
	Girls	Boys	Girls	Boys	Girls	Boys
Abeles (2009)[a]	1.02	2.03	0.91	2.10	0.94	2.13
This study[b]	0.31	0.81	0.43	0.90	0.46	0.99

Table 2: Comparison of Normalized Scale Score Means for Students' Instrument Selections: Abeles (2009), and This Report
Note. Higher score indicates more masculine.

a.   Converted with 2009's instrument normalized scale scores (NSS).
b.   Converted with this report's instrument NSS.

To scrutinize the change in the rate of students who chose atypical of their gender and the pattern of musical instrument selection by genders, the compiled data of the second survey, musical selections of middle school students (164 males and 164 females), are tabulated in proportions in Table 3. Since the list of instruments is limited to six to compare more effectively with Abeles (2009), it should be noted that Abeles (2009) chose these six musical instruments to compare with Fortney et al (1993). According to Table 3, it appears that 25.5% of male

students in this report play the flute and clarinet, which are generally associated with girls. On the other hand, 28.7% of female students play atypical instruments with regard to their gender (drums, trombone, trumpet, and saxophone). Overall, the percentage of crossed over students occupies significant proportions.

Instrument	Abeles (2009)				This Study			
	Girls		Boys		Girls		Boys	
Flute	269	39.4%	15	2.1%	72	43.9%	18	10.9%
Clarinet	240	35.2%	67	9.5%	44	26.8%	24	14.6%
Saxophone	56	8.2%	119	17.0%	15	9.1%	28	17.0%
Trumpet	61	8.9%	240	34.2%	16	9.7%	47	28.6%
Trombone	28	4.1%	142	20.2%	11	6.3%	26	15.8%
Drums	28	4.1%	119	17.0%	6	3.6%	21	12.8%
		100.0 %		100.0 %		100.0 %		100.0 %
Number	682		702		164		164	

Table 3: Comparison of Middle School Students' Instrument Selections: Abeles (2009) and This Study

Qualitative Research Results

For the qualitative part of this report, three of a parent who has a child playing the musical instrument participated in an online interview and the interviews are recorded and transcribed to examine the commonalities between the parents.

Jenny, a Female Parent

The interviewee is currently a kindergarten teacher and sings frequently since she played the piano in her childhood. She has two daughters. The elder daughter has played the flute and piano since her childhood, and her younger daughter plays percussion. Her answers point out her younger daughter chose the percussion because she wanted to be different from her older sister and she has seen her friend's brother plays the percussion. The participant didn't give any suggestions for choosing the instrument because she believed she already had given the influence on the elder daughter. She recognizes the percussion is associated with boys, and she supports her daughter's musical instrument selection. She mentions the flute and harp are associated with girls, while bass, percussion, and trumpet would be more associated with boys.

Mary, a Female Parent

The participant was born and raised by musically engaged parents. Her father played the piano, and her mother played the violin. She said she occasionally learned music from her parents, but she never trained professionally or taken any formal lessons. Following her given information, she has at least 3 children, but she talks about the eldest daughter who plays the flute for at least five years. Her daughter chose a musical instrument after she had exposed to a

variety of instruments in early music class. She mentioned she and her husband did not influence her in choosing a musical instrument. Overall, her spouse and she are glad that their daughter plays flutes because it does not make loud sound and flutes occupies a small space. She believes that that the flute and the violin are female-associated instruments because the majority of female play those two instruments. On the other hand, she mentions that the drums, trombone, and trumpet are male-associated instruments.

David, a Male Parent

He has a musical background. He took both piano and violin lessons in his elementary school years. He has one son who has played the piano for six years. He said his child did not have a choice in choosing a musical instrument, and he suggested the piano for him. He thinks that he influenced and played an important role in his son's musical instrumental selection. He answers that the violin, flute, and harp are female-associated instruments, while classifying that the piano, trumpet, and viola are male-associated instruments.

Overall, all participants have musical experiences either formal or informal and they are generally satisfied with their children's musical choices. However, according to the interview transcriptions related to a child's musical instrument choice, three interviews reveal different processes: (1) a child selects her instrument with a free choice without parental influence, (2) a child chooses her instrument to be different from her sister, (3) a parent suggests a certain instrument to his child. Furthermore, all participants have gender stereotypes in musical instruments. They commonly answer that the flute is the female-associated instrument, while the trumpet is a male-associated instrument. Furthermore, they are aware that their children's choices are whether typical or atypical instruments with a child's gender.

On top of that, the portraits of three parents from each research team member are collected for cross-case analysis to configure the themes across the parents based on the similarities of interviewed parents.

Jenny, a Female Parent of a Female Child Who Plays the Percussion

Jenny is in her mid-40s. She is a mother of two girls, one of whom is 15 years old and plays percussion. She was a kindergarten teacher, so she has a strong musical background with singing and piano. Now, she is a housewife. She is originally from Shanghai, China. She lives in New Jersey with her younger daughter and husband. She started to learn to play the piano when she was 8. She has a lot of stages and instrumental experience.

Jenny does associate instrument choice with gender. In her opinion, percussion is associated with males since percussion brings people masculine feelings, and it requires more energy to play. Instruments like the flute, harp are associated with females.

During the interview, I found Jenny had a strong desire for both of her daughters to learn to play instruments. She helped her older daughter choose the instruments. However, she gave her younger daughter the freedom to choose what kind of instrument to play despite her thinking about percussion was associated with males. She told me interest was a key factor for a kid to learn.

Mary, a Female Parent of a Female Child Who Plays the Flute.

Mary is the mother of three children, one of whom is 12 years old and plays the flute. Mary is in her late thirties, and lives in a suburb of New York, with her husband and children. She grew up in a musical household, with two parents who were amateur musicians. Her father played the piano, and her mother played the violin. As a byproduct of her parents' musical hobbies, Mary became immersed in music and began to play the piano herself.

Mary admits that she holds certain gender stereotypes of musical instruments, but it did not come across as something she felt strongly about. She acknowledges it at the moment as if it were the first time she'd considered it, which might suggest that it was the product of pattern recognition, rather than an ideology. She described thinking of the flute as feminine, which did not come as a surprise considering that is a common association, but it did beg the question if this idea of hers was reinforced by her daughter playing the flute.

Despite acknowledging her gender stereotyping beliefs, her daughter came to the flute on her own due to exposure to the instrument in a school music class. Mary didn't need to encourage her daughter to pick up an instrument, but if she had, perhaps the encouragement would have perpetuated her ideas of the instruments that girls play.

David, a Male Parent of a Male Child Who Plays the Piano.

David is in his mid-30s. He majored in biophysics and recently earned a Ph.D. degree. He is currently working at a medical research laboratory in Minnesota. He is originally from Seoul, South Korea. He came to the United States alone when he was in high school as an international student. He graduated high school, undergrad school, and grad school in the United States. He is an only child, and his family is still in Seoul, South Korea. When he was in elementary school, he played the flute and piano and took lessons for several years. He recalled that his parents chose his musical instruments to learn. His father was an engineer, and his mother was a housewife.

David's answer was straightforward. He was never hesitated to answer the questions. During an interview, I found that he thinks that the piano is associated with a male because it requires a lot of physical power and energy, while many people who have Asian cultural backgrounds think the piano is associates with a female.

Most importantly, he is self-teaching himself to teach his son by using the Suzuki method, and other online resources that his son likes such as *A Whole New World* from *Aladdin*. It seems like he knows the importance of learning music. At the end of the interview, he asked me for age-appropriate suggestions of Korean dramas that he and his son can watch together to learn Korean culture and improve Korean language skills.

Cross-case Analysis

Overall, three major themes are discovered from the compiled portraits of three parents.

First of all, three parents have musical backgrounds in their childhood, while David took violin and piano lessons, Jenny learned piano. Besides, the parents of Mary were amateur musicians and played the piano in her childhood.

Second, they have a gender-association in the musical instrument. However, it is difficult to decide if this gender-stereotyping in musical instruments is depending on their children's choice, cultural background, or social perception. In particular, based on the portraits of both Jenny and David, they commonly mention physical capabilities when they describe the male-associated instruments.

Lastly, all the parents positively support their children's musical experiences either a child plays a typical or atypical instrument with their gender. For example, Jenny believes a child's interest is the most important, so she is pleased with her daughter playing the percussion. As well as that, David is directly engaged in his son's music learning by teaching his son's favorite music piece.

Discussion

Through those studies replicating Abeles (2009), the results of those surveys demonstrates that there is a decline in sex-stereotyping of musical instruments for late ten years in Table 1. Besides, there is an increase in the number of crossed-over students who choose atypical instruments over ten years in Table 2.

According to Table 1, the rank orders of NSS, which are derived from the result of Musical Instruments Paired-Comparison Survey both in Abeles (2009) and in this report, are identical. Meanwhile, it indicates that both musicians and non-musicians less consider the gender stereotyping in music instruments than they did ten years ago, although it still exists undoubtedly. The figures of range, means, and standard deviation in each study noticeably decreased (2009 range = 2.962, M = 1.645, SD = 1.013; current study range = 2.027, M = 0.914, SD = 0.722). Besides it is seen that the numbers of middle school students in each category of gender by grades noticeably reduce comparing with Abeles (2009) as appearing in Table 2, whilst the figures for males are bigger than those of females both in Abeles (2009) and in this report.

Table 3 describes the data regarding the percentage of students who choose either typical or atypical instruments. In 2009, 11.6% of male students played an instrument generally associated with girls (flute and clarinet), whereas 25.5% of male students in this report chose an atypical instrument against their gender. In 2009, 17.1% of female students played male-associated instruments (trumpet, trombone, and drums). However, 19.6% of female students chose these instruments. Overall, the proportions of students who chose "cross-over" instruments significantly increased over 10 years.

The transcribed interviews from three parents indicated that both direct and indirect parental influences were observed in the process of choosing a child's musical instruments. As well as that, there were commonalities and differences across the interviews. Furthermore, these characteristics were compared with the relevant studies (Wiedenfeld 2012; Conway 2000).

First of all, all participants have a musical background in a common either formal or informal way as Wiedenfeld (2012) revealed that the reason for choosing an instrument (Table 5). Besides, since Conway (2000) discussed "the stereotypes exist because of society, parental influences, and the media." (p. 9), three parents have the gender-stereotyping in the musical instruments. They acknowledged whether a child's musical instrument is associated with a certain gender either typical or atypical.

Meanwhile, the differences across the three interviews are detected in the process of selecting a child's musical instrument. For instance, Jenny's child is a girl who chose percussion to be different from her sister who plays the flute. In a matter of fact, Conway (2000) found "Many of the students who broke gender stereotypes discussed their desire to be different from the crowd" in the common traits of children who broke the gender stereotypes (p. 11-12). Furthermore, Mary's female child selected the flute because she had a great interest in flute from early music class experiences, whist David directly recommended a piano for his male child. The similar cases of these aspects are found in the self-stated personal characteristic of who did not break gender stereotypes in instrument choice (Conway 2000, p. 11).

However, there were certain differences across the parents who were not able to compare with data from Conway (2000) and Wiedenfeld (2012). While David and Jenny are Asian immigrants, Mary did not provide her cultural background. Although David and Jenny have Asian backgrounds, David suggested an instrument to his kid. However, Jenny gave her child the freedom in choosing an instrument. To sum up, the interviews and the portraits in this report have limited resource to unravel the reason and correlation between those findings.

Conclusion

The result of this study answers the three research questions. This study describes that there has been lesser and lesser gender-stereotyping in musical instrument selection for ten years considering the number of cross-over students has increased through quantitative research. Furthermore, it demonstrates that the process of a child's selecting musical instrument is projected from their parent's perspectives. Besides the portraits of parents provided three themes.

Nonetheless, it is difficult to depict if the parental influence is a major influence on children's decisions and why a child chooses cross-over instruments because the process of choosing musical instruments requires complex procedures including the cultural background, social perceptions, or ethnicity. For this reason, I strongly believe that a larger number of samples are required to identify the considerations and the influences in musical instrumental selections from various perspectives.

Furthermore, in the qualitative part of this study, David believes that the piano is associated with males and that was the reason why he suggested the piano to his son because it requires the physical strength and energy to play the music. As it is strikingly against the Asian music-cultural perspective, none of Abeles (2009), Wiedenfeld (2012), and Conway (2000) includes the data concerning the piano. Therefore, further research including the piano is going to be another rich research area. Besides, since the cross-case analysis offered three themes, the new question of if the three themes correlate with each other is suggested for future research.

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Contact email: sk4478@tc.columbia.edu

How to Create a Supportive Learning Environment in Mathematics Classes - An Example from a Norwegian Lower Secondary School Class

May Olaug Horverak, Birkenes Learning Centre, Norway
Judith Emelie Espegren, the University of Agder, Norway

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Abstract
Mathematics is an important subject in school, however, many students find this subject very challenging. Some even dread mathematics as they do not master it and they may fear that their social status will be negatively influenced by this. It is therefore important that the teacher facilitates for creating a learning environment where students feel they can be open and supported when they struggle. The aim of the current study is to investigate how a five-step method including individual reflections and classroom discussions may facilitate for this type of supportive and motivating learning environment. The method builds on self-determination theory and theory of self-regulation. The five-step method was applied through a four-week long intervention in an eighth grade and focused on numbers and algebra. The students reflected on the following five questions: 1) What is important to learn in algebra and why? 2) What do you already master in relation to algebra? 3) What is difficult and prevents you from learning algebra? 4) What will you focus on improving the next few weeks? and 5) How exactly will you do this? The students filled in evaluation forms including both open and closed questions after the intervention (n = 15). The findings showed that six of the students agreed that the method helped them find out what was important to learn, seven followed the plans they made, five agreed that they had become better at dealing with challenges and three students felt more comfortable in class after the intervention.

Keywords: Mathematics, Algebra, Learning Strategies, Self-Regulation

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Introduction

Principles for learning and personal development in the Norwegian curricula speak clearly about what is expected of the education. It is said that education is to 'contribute to students reflecting on their own learning, understanding their own learning processes and adapting knowledge independently (The Ministry of Education and Research, 2017, p. 12, our translation). Self-regulation and learning strategies are very relevant when a goal for students is to develop the ability for lifelong learning. This study illustrates how a five-step method may support students in reaching this goal of becoming self-regulated learners mastering different strategies (Langeland & Horverak, 2021), by facilitating for a supportive learning environment in mathematics classes.

The five-step method for mastery and motivation applied in the current study is an example of a metacognitive learning strategy, relevant to apply to achieve self-regulation. Metacognition can be defined as 'thinking about thinking' (Mevarech & Fridkin, 2006, p. 86). In addition to building on theory of self-regulation and metacognition, the five-step method also builds on self-determination theory, claiming that to achieve intrinsic motivation, the basic needs of competence, autonomy and relatedness must be met (Ryan & Deci, 2017). Another theory that has inspired the method is Bandura's theory on self-efficacy, claiming that an increased feeling of competence leads to an expectation to succeed with new tasks, which again may influence motivation positively (Bandura, 1997). The essence of the five-step method is that when students get to choose what they need to work with, and how, they will achieve intrinsic motivation and perseverance in learning.

There are different definitions of self-regulation. Zimmerman's definition focuses on how thought processes are started, and actions planned to achieve goals (2000). Pintrich's definition focuses on how self-regulation is a process where students make goals and try to monitor their own cognition, motivation and behaviour (2000). There are different self-regulation models, but common for most of them is that they have three main phases; planning, action and self-reflection (Zimmerman, 2000; Perels et al., 2005; Schmitz & Perels, 2011). Self-regulation is seen as a means to improve performance (Schunk, 2005). Teaching self-regulation skills should be implemented already from primary school, particularly in mathematics, where it appears that it is the teachers' job to regulate the students' learning (de Corte et al., 2011). Mastering various learning strategies is related to efficient learning, but to become conscious about one's own learning process and strategy use must be learnt and is something that develops gradually (Aastrup & Johnsen, 2014).

Self-regulated learning is not something that appears spontaneously and automatically, there is a need for training (De Corte et al., 2011). Research in mathematics has shown positive development of self-regulation competence when self-regulation and problem solving are combined (Perels et al., 2005). Positive effects on self-regulation competence and mathematical performance have also been found when students monitor their own homework in mathematics through writing reflections in personal journals (Schmitz & Perels, 2011). A more extensive intervention study shows that mathematical performance was improved after self-regulation training (Dignath & Büttner, 2008). The effect sizes were largest in primary school, and somewhat lower in lower secondary school. The researchers reflect on whether this may be related to the fact that motivation generally drops in lower secondary school. Compared with results in reading and writing, the study shows that the self-regulation competence improves more in mathematics. The study also showed that training in self-regulation is more effective the longer it lasts. Another study has also documented that the

students' ability to make goals improves gradually during training self-regulation (Perels et al., 2005). Based on these findings, an urgent need is advocated for research on how self-regulation can be promoted in the classroom (Dignath & Büttner, 2008).

Learning strategies are central in the domain of self-regulated learning. Previous research shows that it is important that students have strategies to solve exercises (Otto & Kistner, 2017). Self-reflection does not help the students if they do not have appropriate learning strategies (Schmitz & Perels, 2011). The students do not just need a list of strategies, but they need a deeper understanding of when, how and why the different strategies are applied (Aastrup & Johnsen, 2014). This requires extensive competence on the part of the teacher as well, as the teacher is responsible for providing students with this understanding. In Dignath and Büttner's study (2008), interventions carried out by researchers gave better results than interventions carried out by teachers, and the teachers' lack of competence on self-regulation is mentioned as an important element here. Other studies emphasize the importance of teachers going through and presenting self-regulation methods for students before they are to apply these methods and explain the point of self-monitoring to them (Schmitz & Perels, 2011; Kramarski & Mevarech, 2003). The teachers' own competence within self-regulation is crucial for students to succeed with self-regulation practice.

The research question for this study is: How can teachers facilitate for a supportive learning environment in mathematics classes, enhancing self-regulation and intrinsic motivation. The study is limited to focus on learning algebra, as this is a central part of what students are to learn in mathematics. Learning algebra forms a basis for generalising and modelling in mathematics (Norwegian Directorate for Education and Training, 2020a) and there are several competence aims concerning algebra after year 8 in the curriculum (Norwegian Directorate for Education and Training, 2020b). Still, algebra has been a topic where Norwegian students have had low scores over several years on the TIMSS surveys. The most recent report from 2019 shows that within the Nordic countries, Norwegian students have the lowest scores (Kaarstein et al., 2020). This study illustrates how the five-step method may be applied with a focus on teaching algebra in mathematics, and how this may contribute to develop a supportive learning environment where motivation and self-regulation are in focus.

Methodology

To answer the question of how teachers can facilitate for a supportive learning environment in mathematics classes, a short intervention of three sessions over three weeks was carried out in an eight-grade class. The topic being taught this period was numbers and algebra, with a focus on equations, and using algebra-tiles as an alternative learning strategy. The intervention carried out included a five-step method for self-regulation of learning. The sample consists of 16 students (66 % of the 24 students in the class), of which nine were girls and seven were boys. The data was collected anonymously, and the students consented in participating in the study.

Intervention

The five-step method applied in the intervention of this study included the following five questions: 1) What is important for you to succeed with learning in the chapter 'Numbers and algebra', 2) What are you already good at which helps you mastering algebra, 3) What is difficult and prevents you from learning algebra? 4) What will you focus on improving the

next weeks, and 5) How will you carry this out? The teacher led a class discussion about these questions, and then the students wrote individual, anonymous answers (see figure 1).
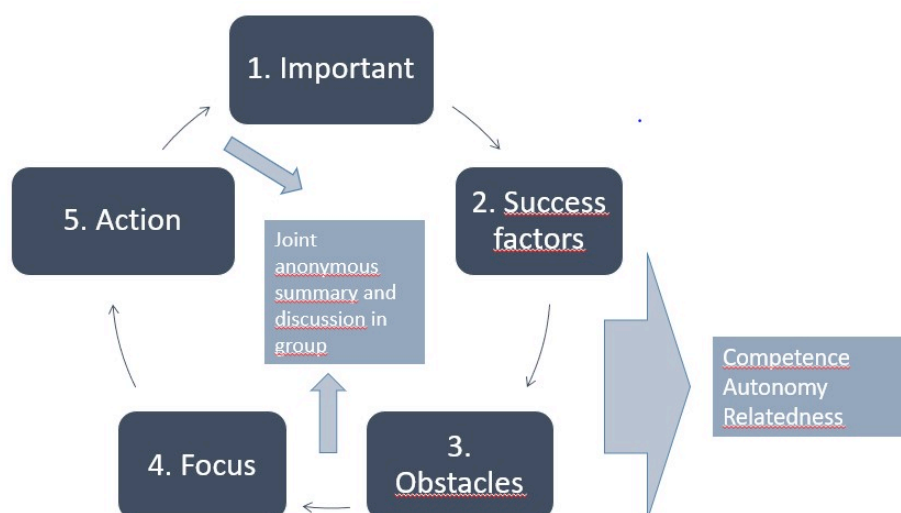
Figure 1. The Five-Step Method for Working with Student Participation, Mastery and Motivation (Previously Published in Horverak & Aanensen, 2019; Horverak, 2020).

Before the intervention including the five-step method started, the students filled in a questionnaire concerning what learning strategies they applied in mathematics. In the first session applying the five-step method, the students were first introduced to the method and factors that influence motivation in general. Then the students discussed the first question in pairs, and they summed up what was important in the chapter on numbers and algebra by making a mind map together on the blackboard. The teacher supplemented what was left out by the students. Then the students were given examples of possible success factors and obstacles, both general and subject-specific factors, and they answered questions one to three in writing in personal logbooks with anonymous codes on instead of names. The teacher collected the logbooks after the session. The point of having anonymous logbooks is that this method is supposed to support students in taking responsibility for their own learning process (Langeland & Horverak, 2021). They write reflections for their own sake, not for the teacher, and if they use names, there is a risk that the teacher takes over the control of the process.

In a following session, the students practiced different learning strategies relevant when learning algebra, for example, solving equations algebraic and using algebra tiles. The teacher and the students wrote rules in separate rulebooks. In the second session of the five-step method, the students were first presented with anonymous reflections from the logbooks from the first session, then the teacher presented division as a possible focus area for the students, as this was something several of the students found difficult, but also important. The students were asked to come up with ideas of what they could do if division was challenging. The answers were put in a mind map on the blackboard, and then the teacher presented other learning strategies the students could apply to solve equations. Finally, the students were to answer questions four and five in the five-step method, what they were to focus on and what action they were to take. The students continued their work with solving equations algebraically using both addition and subtraction, then more steps were included with division and multiplication. The students were reminded about their chosen focus areas.

In the third and final session with the five-step method, examples of action plans with focus areas and planned actions were presented - some good plans, and some that could have been improved. The students were encouraged to talk in pairs about how they could have improved these plans to make them more specific. After having filled out a questionnaire about what learning strategies they used to learn mathematics, the students were asked to choose a new focus area and a new plan for action, or improve the action plan they already had.

Measuring Instrument

The data collected in this study includes anonymous reflections from students' logbooks, answers to a questionnaire concerning learning strategies in mathematics, and self-reported data on how the five-step method worked. The questionnaire concerning learning strategies was filled in before and towards the end of the intervention. In addition, the students filled in an evaluation form after the intervention period.

In the evaluation form the students answered the following questions about the five-step method on a five-point scale from 'strongly disagree' to 'strongly agree': The method helps me find out what is important in the subject, the method makes me motivated to work with what is important in the subject, I have managed to follow my own plans, I have become better at working with what is difficult in the subject, the method makes me feel more comfortable in mathematics classes, I like using the five-step method. In addition, they were asked to give examples of something they had focused on.

Examples of student reflections on the five questions of the five-step method are presented in the results, as well as learning strategies the students applied. In addition, the students' answers on the evaluation of the five-step method are reported in a table. Some students reported that they struggled with understanding the questions in the five-step method, and this may have influenced the outcome of this study.

Results

On the first question of the five-step method, concerning what is important to learn in the chapter of numbers and algebra, the students answered: the four main types of calculations – especially division, solve equations, and learn central concepts. In addition, the students write that it is important to practice, listen to the teacher's explanations, do exercises, repetition, do homework, ask about help and to dare to try and fail. Some answers also concerned attitudes, that it was important to be interested, get enough sleep, and be concentrated and motivated. There were also elements focused on the teacher, asking the teacher to give thorough instructions and to do difficult exercises on the blackboard.

When defining success factors, the students wrote for example that they were good at finding the value of x, managing the four main types of calculations, even though some leave out division, doing homework, paying attention and keeping focus, and avoid talking in class. One student writes 'I think I am very good at using the tiles we have received, I think this makes it simpler.'

The obstacles the students write about are getting enough practices, tiredness, lack of motivation and focus, boredom, difficult exercises, difficult formulas, too much to remember, and that much is confusing, and the tempo is sometimes too high. One student writes 'we just

do easy exercises on the blackboard, therefore it is difficult to do the more challenging exercises that we are to do on our own'.

When the students chose focus areas, 27% focused on division among others. Some students chose several focus areas. Examples of chosen focus areas are to do text exercises, use more time on exercises and not give up, try to become more interested and better in mathematics, pay attention in class, find x, learn how to write calculations, and repeat the multiplication table. When the students were to consider changing focus area the second time, almost half of the group made a change. The focus areas that were chosen the second round was much related to solving equations with the methods they had practiced, as well as fraction and becoming more motivated.

The action plans are generally short and include just a few elements such as 'do it', 'practice' and 'do exercises'. Other more specific plans include to become better at division, and do exercises related to the multiplication table without using calculator. One student writes 'not just guess before thinking this is difficult, but use enough time'. Other elements mentioned are to get enough sleep and develop interest.

Learning Strategies in Mathematics

The answers to the questionnaire on learning strategies reveal that before the intervention, many students experienced instruction from the blackboard and working with exercises to be dominant in mathematics. On a question of preferred strategies, the students write using calculator, collaboration, videos and working with exercises. When doing homework, the students use strategies like using the internet, asking parents, doing exercises, watching videos, and using the book and calculator.

After the intervention, the students present a longer list of learning strategies they apply compared with before the intervention. They report using a rule book, campus increment (videos), asking for help, solving equations by using the algebraic method, in addition to the strategies reported the first time. Using calculator is the most frequently reported preferred strategy. Of the participants in this study, 57 % report that they have used either the tiles, the rulebook, videos on youtube or campus increment more than usual, during the time of the intervention.

Student Evaluations

The results of the student evaluations show that many students are unsure about how the five-step method works for them, but in general, there is a tendency towards positive responses (see table 1). Forty percent of the students agreed that the method helped them find out what is important to learn, and 13 % agreed that the method made them more motivated. Thirteen percent also disagreed that the method helped them become motivated. As much as 47 % reported having followed their own plans, and only 20 % disagreed that they had done so. Thirty-three percent reported having become better at working with what is difficult in mathematics, and 27 % disagreed to this. Twenty percent felt more comfortable in mathematics classes due to the use of the method, and 14 % disagreed to this. Most students did not have any particular opinion when it comes to whether they liked the method or not, but 13 % responded that they agreed that they liked the method, and 13 % disagreed.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree
The method helps me find out what is important in the subject.	-	-	60 %	40 %
The method makes me motivated to work with what is important in the subject.	-	13 %	73 %	13 %
I have managed to follow my own plans.	-	20 %	33 %	47 %
I have become better at working with what is difficult in the subject.	7 %	20 %	40 %	33 %
The method makes me feel more comfortable in mathematics classes.	7 %	7 %	70 %	20 %
I like using the five-step method.	-	13 %	73 %	13 %

Note: No students answered 'strongly agree' to any questions, therefore this category is left out.

Table 1: Student evaluations of the Five-Step Method (N = 15)

When asked about what they chose to focus on, the students answered taking small steps, motivation, equations, practicing on tests and keeping focus. What the students reported here did not correspond to what they wrote in their action plans during the intervention.

Discussion

The five-step method builds on the same pedagogical ideas as studies of self-regulation in mathematics (Schmitz & Perels, 2011; Dignath & Buttner, 2008; Mevarech & Fridkin, 2006), which have shown that self-regulation may be useful in mathematics. The current study reports on a very short and limited intervention, and perhaps, if the five-step method had been implemented over a longer period, the results may have been different. It may be that the five-step method has contributed to strengthening metacognitive thinking, and that this will show more over time. When looking at the results presented in this study, we see that the students have applied more learning strategies after the intervention, and some of the students report positively when reflecting on how the approach has worked. This demonstrates that the five-step approach may have the potential of creating a supportive and motivating learning environment.

This study has not examined the effect of the five-step approach, but rather how the students reflect when the method is applied, how they experience applying the method, and how this may support self-regulation and motivation. Many students report that they neither agree nor disagree in the evaluation of the method, which could mean that they are not sure about how the method works for them. Young people do not always have insight into how different strategies work, so it may be that the intervention has influenced them more than they are aware of. They may have adopted the way of thinking presented in the five-step method without being conscious about it. However, more research is needed to investigate whether the approach leads to changes in metacognitive thinking and learning behaviour.

The students perceived reflecting in this way, identifying obstacles and making action plans, as both new and difficult. As previous research has shown, setting goals and managing self-regulation takes practice (Perels et al., 2005). In addition, more work on learning strategies is

probably needed, as providing students with a list of strategies is insufficient. As pointed out by Aastrup and Johnsen (2014), students should work focused on specific learning strategies to learn them properly. Even though this was not done, some of the student reflections on how to apply strategies were quite good, and they reported applying more strategies at the end of the intervention compared with the beginning.

More of the students in the class expressed that motivation, interest and keeping focus was something they struggled with in mathematics. This could be related to what Dignath and Büttner (2008) write about sinking motivation as students progress in school. Some even chose these elements as focus areas. Working with one's own motivation is central in Zimmerman and Moylan's self-regulation model (2009). The idea in the five-step method is that students will experience mastery and motivation through identifying success factors and obstacles, and choosing focus areas and strategies to improve, and follow up on these plans (Langeland & Horverak, 2021). Following the students from this study over time would have been interesting, to find out if they improved their motivation and interest, and increased their self-regulation competence, which is something that takes time and practice (de Corte et al., 2011).

As this study presents a limited and short intervention covering three sessions, where the five-step method was applied in relation to one specific topic in mathematics, there is a need to find out how the method could be applied more extensively over time in the mathematics subject. The method may be an alternative answer to Dignath and Büttner's (2008) call for how to work with promoting self-regulation in mathematics classes. The progression in topics in mathematics may be too rapid, as we saw that the students changed their focus area to algebraic solving of equations towards the end of the intervention, when the topic of algebra was concluded. Perhaps students need more time for practice and repetition in each topic. There is a danger that the focus area will be forgotten, so preferably, the students should be given some time during class to follow up on their plans with some teacher support. Another challenge can be that as the teacher progresses to new topics, the students still want to focus on a topic that has been dealt with previously. Perhaps some students need more practice on basic mathematical skills as multiplication or division, even though the teacher moves on to more complex topics.

There is no easy solution to this dilemma - the teacher needs to keep a certain progression on to cover all topics in mathematics, and the students need more time to practice on each topic. Perhaps the teaching should be more adjusted to the students' needs, and better adjusted to the different students' needs and abilities. Applying the five-step method is not only facilitating for developing self-regulation competence, it also helps the teacher identify what the students in the class struggle with, and what they may need more time to work on. Taking the principle of student participation seriously, applying the five-step method may lead to a supportive and motivating learning environment with more adjusted teaching and progression and a better relationship between the teacher and the students.

Conclusion

This study has investigated how a group of eight-graders responded to the implementation of a five-step method, aimed at increasing a feeling of mastery and motivation through self-regulation. The students are unsure about how the method has influenced their learning, but the findings show increased use of various learning strategies after the intervention, and a tendency towards appreciation of the method. This may support the idea that applying this

approach facilitates for a supportive learning environment. For the students to experience improvement in the ability to self-regulate learning, it is crucial that they practice during a longer period, as research shows that developing self-regulation skills take time and increase over time.

It is difficult to make any certain conclusions based on the current study, as it is limited in scope and duration. There is a need for more extensive and longitudinal studies to be able to make more certain conclusions. Still, this study illustrates the potential of the five-step approach in mathematics classes, and this way of using this approach may be further developed in future studies.

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Contact email: may.olaug.horverak@birkenes.kommune.no

Using a Collaborative Modern Board Game to Characterise Problem-solving Experiences in Physiotherapy Students

Marlene Rosa, School of Health Sciences Polytechnic of Leiria, Portugal
Micael Sousa, University of Coimbra, Portugal

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Abstract
New paradigms for curriculums designing in health professions defend the inclusion of structured methodologies to train comprehensive skills for problem-solving. This paper aimed to characterize the physiotherapy students' problem-solving experiences using a collaborative modern board game (MBG). An exploratory study was performed with a purposive sample of 17 physiotherapy students recruited from the School of Health Sciences of Polytechnic Institute of Leiria. Participants were included if they were: ☉18 yrs.; physiotherapy students and agreed to voluntarily participate. They participated in a 2-hours learning experience using the MBG TEAM 3, that is played in teams of three players, with each player taking different roles: the monkey who cannot speak, the monkey who cannot see, the monkey in the middle. At the end, each participant fulfills a questionnaire about the personal experience in the following domains, using a Likert scale of 1- 7 (I total agree): Team working (TW) (personal feeling of competence to play -TW1; empathy to other players - TW2); innovative and creative thinking (ICT) (creative expression of opportunities - ICT1; freedom to experiment new things - ICT2). Descriptive statistics and the Spearman rank were calculated to characterize students' perspectives and to describe relationships between TW abilities and ICT. Participants (4 males; 20.14±4.34 yrs.) presented the following mean values ICT1(5.05±1.24); TW2(6.05±0.97); ICT1(4.95±1.40); ICT2(5.85±0.96). The TW1 was significantly correlated with ICT1 (r=0.44; p=0.048*); ICT2 (r=0.45; p=0.041*). This study demonstrated the potential of MBG to characterise and monitor personal learning experiences in problem-solving scenarios for physiotherapy students.

Keywords: Problem-solving, Health Students, Games

Introduction

Student learning in higher education has been extensively investigated, including areas such as student engagement, critical thinking, skills development for team working and problem-solving skills training (Klegeris and Hurren 2011). Problem-solving approaches stimulating the learning experience in postgraduate students, promoting motivation, leadership development and teamworking. Additionally, training problem-solving skills is an innovative and crucial response to the challenges of training undergraduate students in health courses. Its potential is recognized, however further research need to be conducted to demonstrate how these methods should be implemented and consolidated in higher education institutions (Batista et al. 2005).

There is a consensus in the literature about the importance of training different decision styles for the efficient problem-solving process in health care. In fact, understanding this process might be crucial in very complex clinical settings, such as in palliative care or in chronic disease long-term care (Kryworuchko et al. 2016) (Bloomer et al. 2018). These are very specific challenges and should be preferably trained since earlier, in undergraduate health courses (Noohi, Karimi-Noghondar, and Haghdoost 2012).

Different methods have been used for training comprehensive skills for problem-solving in health students, including creative and critical thinking within a team work format (Gould, J. Christine; Schoonover 2009). Explained by their nature, games have been highlighted as a powerful way of developing social and emotional complex skills, that are crucial for feeling competence during problem-solving training (Hromek and Roffey 2009). Specifically, board games experiences create high levels of engagement and nonthreatening yet competitive or collaborative class atmosphere (Boghian, Ioana; Venera-Mihaela Cojocariu; Popescu, Carmen Violeta; Mâţă 2019).

Despite the potential of board games for training essential problem-solving skills (communication skills in a team work atmosphere), there are not sufficient related-research in undergraduate health students (Boghian, Ioana; Venera-Mihaela Cojocariu; Popescu, Carmen Violeta; Mâţă 2019). For example, it would be important to understand how the physiotherapy students consider the experience with games to train problem solving abilities, mainly because of its importance for long term management of chronic disability, which is very common and truly challenged for these students (Parry and Brown 2009). Therefore, this paper aimed to characterize problem-solving experiences using a collaborative modern board game (MBG) in physiotherapy students.

Materials and Methods

An exploratory study was performed using a collaborative MBG for a 2-hours experience, while we collect students' self-experience during problem-solving scenarios.

Participants and Setting

Recruitment and data collection were performed during December 2020-January 2021. Physiotherapy students from the School of Health Sciences of Polytechnic Institute of Leiria that were interested in participating were invited to provide informed consent through an electronic form. Participants were included if they had more than 18 years old, if they were physiotherapy students and agreed to voluntarily participate. A purposive sample of 17

physiotherapy students accepted to participate. All procedures performed in this study complied with the ethical standards of the Institution Ethical Committee and with the Helsinki Declaration (1964) and its later amendments or comparable ethical standards.

Data Collection Instrument

The participants fulfilled a pre-experience survey that consisted of demographics information, including sex and age.

At the end of students were invited to fulfill a gaming experience survey. This instrument was created based on Bandura's instructions on how to build instruments to assess game-based experiences, since no prior survey existed, in this specific field (18). The players' experience survey was previously created by the research team, and it was divided into two different constructs: (i) Team Working (TW) and (ii) Innovative and Creative Thinking (ICT). The TW was assessed by 2 different sentences: "personal feeling of competence to play" (TW1) and "empathy to other players "(TW2). The ICT was also assessed by 2 different sentences: "I had opportunities of creative expression" (ICT1) and "I had freedom to experiment new things" (ICT2). Each of these sentences received a quotation of 1-2 (slight); 3-4 (moderate) and 5-7 points (strong).

Game-based Protocol

The research team adapted Team 3 board game to deliver a serious game approach to physiotherapy students. We followed the Design, Play, Experiences (DPE) framework (Winn 2009) with the required adaptation to include the facilitator and the analogue nature of the game. The facilitator's role was essential to explain the rules of play and the game objective. The facilitator conducted a final debriefing (Crookall 2010). This reflexive exercise helps students to fully understand the game goal and evaluate their behavior during gameplay. Only after the debriefing, the students proceed to their own evaluation of the experience, using the respective survey. Team 3 was play in teams of 3 players, each player taking different roles in terms of communication. One of the students simulated a monkey who cannot speak (A), the other simulated a monkey who cannot see (B) and finally, the middle one needs to transmit the information between both A and B (Figure 1). Obviously, during this experience the players need to solve a huge amount of communication problems to reach the final objective of Team 3. Each group has 90 minutes of the experience with Team 3, changing the role of the players, to provide the 3 different experiences to each player. The last 30 minutes were expended in performing the debriefing and the final evaluation.

Figure 1. Two Players Using Team 3 While They Are Experimenting Different Communication Restrictions (Use of Photo with Students' Permission).

Data Analysis

The players experience survey was analyzed considering a descriptive analysis of the score in TW (mean ±standard deviation of TW1 and TW2) and in ICT (mean ±standard deviation of ICT1 and ICT2). Correlations between these two dimensions were calculated using the spearman rank test ($p<0.05$). A correlation coefficient lower than 0.10 represent a weak correlation; of 0.30 were considered moderate and larger than 0.50 were considered strong.

Results

Seventeen physiotherapy students (4 males; 20.14±4.34 yrs.) participated in this study.

Self-rated Students' Score about Team Working and Innovative and Creative Thinking During Team 3 Session

Self-reported results about students' experience with Team 3 indicate greater dispersion in the answers about TW1 (sd=1.24; min.2-max.7) and about ICT1 (sd=1.39; min. 1- max- 7). The higher mean values were presented in TW2 (x=6.05) and in ICT2 (x=5.86). Table 1 presents mean values of students' self-rated about TW constructs and table 2 presents mean values of students' self-rated about ICT constructs. The percentile distribution of these values can be found in graphic 1.

Table 1. Mean Values of Students' Self-rated about Team Working Constructs

Team working (TW)	x±sd	min-max
Personal feeling of competence to play (TW1)	5.05±1.24	2-7
Empathy to other players (TW2)	6.05±0.97	4-7

Table 2. Mean Values of Students' Self-rated Innovative and Creative Thinking. Constructs.

Innovative and creative thinking (ICT)	x±sd	min-max
I had opportunities of creative expression (ICT1)	4.95±1.39	1-7
I had freedom to experiment new things (ICT2)	5.86±0.96	4-7

Graph 1. Percentile Distribution of Students' Self-rated Score about Team Working and about Innovative and Creative Thinking Constructs During the Game-based Experience.
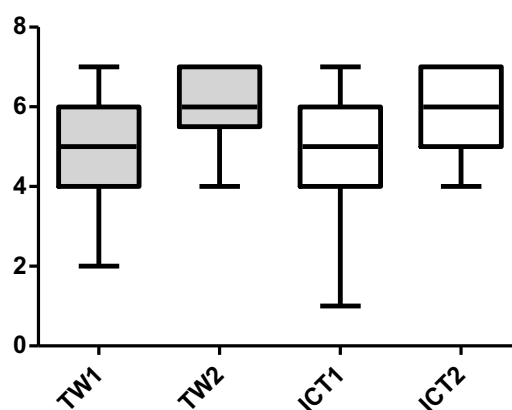
TW1, personal feeling of competence to play; TW2, empathy to other players; ICT1, I had opportunities of creative expression; ICT2, I had freedom to experiment new things.

Correlations Between Team Working and Innovative and Creative Thinking Constructs

There are moderate and positive correlations between the students' self-rated score in TW1 and ICT1 ($r= 0.44$; $p= 0.048$); and between TW1 and ICT2 ($r= 0.45$; $p= 0.041$). Correlations coefficients between TW and ICT constructs are presented in table 3.

Table 3. Coefficient Correlations Between Team Working and Innovative and Thinking Constructs During Gamed-based Experience.

	Personal feeling of competence to play (TW1)	Empathy to other players (TW2)
I had opportunities of creative expression" (ICT1)	$r=0.44$ $p=0.048$*	$r=0.00$ $p=0.99$
I had freedom to experiment new things" (ICT2)	$r=0.45$ $p=0.045$*	$r=0.06$ $p=0.79$

Discussion

A 2-hours gamed-based experience demonstrated that MBG are useful instruments to characterise and monitor personal learning experiences in problem-solving scenarios for physiotherapy students.

Greater dispersion in the students' scores about Personal feeling of competence to play Team3. This result might be explained by the natural challenge of being playing Team 3 for the first time, which naturally generate positive stress and, therefore, different sensations of competence. It is interesting to understand that despite of being a stressing experience, Team 3 does not provide a sensation of threat, contrarily to other games (Porter and Goolkasian 2019). The feeling of competence depends on the different copying strategies developed by students while they are trying to find solutions in a team format (Eizirik 2015). The

qualitative analysis of the copying strategies used by students might be an important improvement in future studies in this field.

Greater dispersion in recognizing opportunities of creative expression while students are playing Team 3. The role of modern board games on creative potential is not fully explored in research. However, there are creative and non-creative board games and Team 3 is a collaborative game and a non-specific strategy for developing creativity (Mercier and Lubart 2021). So, possibly some students interpret Team 3 as a collaborative experience that promotes creativity, but some students do not. In future experiences with Team 3 it would be important to interview students about restrictions or opportunities of this game feel creative.

In this exploratory study, students demonstrated they feel they feel more creative when they feel more self-competent during Team3 experience. In fact, previous authors have been concluded that self-competence is an important aspect of students' metacognition, and it is crucial for a positive academic experience. Metacognition plays an important role in oral and reading communication and comprehension and in problem solving performance. Furthermore, being creative is particularly important to combine elements in order to create new solutions to a problem (Tallman 2019). Curriculums designing in health courses will benefit of the inclusion of training strategies able to combine both creative and self-competence dimensions. In fact, this exploratory study creates an opportunity to design a new curriculum paradigm for health students training. New curriculums for these students may include the experimentation of adapted modern board games to train socio-emotional dimensions for ensuring quality in taking care provision. The application of modern board games for training socio-emotional training skills in health students is a new topic, however digital and analog technical games have been used for medical staff training in different scenarios, such as "learning of elementary clinical pharmacology" or "handling problems about disable people" or even "trying to make patients' diagnosis registration in online platforms"(Bochennek et al. 2007).

Conclusion

This study demonstrated the potential of MBG to characterise and monitor personal learning experiences in problem-solving scenarios for physiotherapy students. Based in these promising results we are creating an opportunity to design a new game-based curriculum paradigm for health students training. The brief experience reported in this study demonstrated the potential of a collaborative board game (Team 3) to combine creativity and personal competence feelings, both important constructs for positive academic learning and for high-quality in care provision.

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Contact email: marlene.rosa@ipleiria.pt

Research on The Learning Experience and Effectiveness of Digital Action Learning on Design Education

Shu-Yin Yu, Ming-Chuan University, Taiwan

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Abstract

In this research, based on the concept of a smart learning environment, learners use digital mobile devices to learn appropriate activities and content at the appropriate time to obtain the convenience, expediency, and immediacy of mobile learning. Design practice and skills are the core curriculum of design education, which requires a larger amount of teaching support and a communication platform. The general learning management system (LMS) has limitations. Therefore, the research uses digital technology LineBot and Line OpenChat as teaching support. It mainly investigates the learning experience and effectiveness of students in the design department with the aid of digital learning models. The research takes "learning readiness", "learning participation", "learning satisfaction and confidence" and "learning effectiveness" as variables. The results show that the use of action learning teaching enables design students to have better learning readiness, learning engagement, and learning satisfaction and confidence, and the aid of digital action learning has significantly improved learning effectiveness.

Keywords: Design Education, Digital Technology, Action Learning, Learning Experience, Learning Effectiveness

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Introduction

This research uses the concept of a smart learning environment. For designing courses that are not tested by examinations, the general learning management system (LMS) has limitations. Design practice and skills are the core courses of design education, and we need a larger number of teaching demonstrations and communication platforms. How can mobile device-assisted teaching maintain the essence of teaching and learning without becoming a game tool? Mobile device-assisted teaching can maintain the essence of "teaching" and "learning". It can make students get rid of too much Internet stimulation, and can seize the resources of students' concentration, making students pay more attention to professional learning content (Freeman, et al., 2014). Therefore, practical implementation and effectiveness research are used to test the effectiveness and application of digital technology to support design teaching.

Literature Review

Trends in Action Learning

The application of action learning in the teaching classroom changes the traditional learning style, and the use of smart phones by students has become the mainstream of action learning. Smart mobile devices increase students' participation and interest in self-regulation. The content of different teaching support makes students more mobile and collaborative (Lahiri and Moseley, 2012), but it also creates the possibility of lack of attention and distraction in learning (Klimova, 2019). For practical design education, how can intelligent auxiliary tools not lose the essence of "teaching" and "learning", or become a game tool, which can draw students' attention from the complex and visually stimulating Internet information and capture students at the same time, it attaches great importance to learning professional learning resources and teaching materials (Freeman, et al., 2014). With this as the goal, this research uses Linebot and Line OpenCaht as digital mobile teaching tools to guide students in the timely classroom teaching application, coordinate with the arrangement of learning situations, provide real-time search, feedback and knowledge acquisition channels, and open up opportunities for learners to actively explore, arouse interest and motivation to improve learning effectiveness.

Digital Technology and Teaching

Using digital tools to support teaching materials and communication in this research, students can learn independently, ask anonymously, flexible time, and an auxiliary learning tool that asks and knows immediately. A collaborative group is established by teachers, teaching assistants, clients and students, including teachers' teaching guidance, assistant technical support and customer information provision. Students can get support more quickly; teachers supervise or guide students' learning attitudes and design suggestions. Clients can also understand young people's views on products or brands with students' questions and design needs. Students, teachers and clients can communicate more directly.

Action Learning

Smart mobile devices increase the participation of students in self-regulation, and different teaching support content makes students more mobile and collaborative (Lahiri and Moseley, 2012). Students also have the possibility of lack of concentration and distraction due to mobile devices (Klimova, 2019). Social APPs (Line OpenChat and LineBot) are used as an action teaching tool, combining theoretical teaching in the classroom and practical training outside

the classroom. A digital action tool that students can check and know and discuss in time. Students can learn independently (self-directed learning), anonymous questioning, flexible time and an auxiliary learning tool that asks and knows immediately.

Learning Readiness

Learning readiness refers to the student's psychological preparation status or learning action in response to a specific situation. Learning readiness can be summarized into four aspects: self-regulated learning, classroom participation, active learning, and sense of identification.

Learning Engagement

Learning engagement refers to the degree of effort and quality of involvement when students perform learning activities. Engagement is closely related to students' learning enthusiasm, knowledge of learning, and investment time, and it is also affected by the degree of classroom participation and interactive communication.

Learning Satisfaction and Confidence

The definition of learning satisfaction in teaching research refers to a subjective feeling of satisfaction in the learning process. The greater the degree of conformity with the feeling, the higher the satisfaction.

Learning Effectiveness

Learning Effectiveness refers to the effect of learning behavior presented by learners through the process of teaching and learning. It is also the main basis for achieving the teaching goals and the expected learning goals.

Research Design

This research takes advertising design as an experimental course and cooperates with the new creation team to coordinate design activities. Incorporate the professional theories, practical skills and advertising cases of the course into action learning. Teachers use LineChat and OpenChat to provide teaching support and communication tools according to different course progress. After combining the learning experience in the classroom and outside the classroom, a questionnaire survey was conducted, including learning readiness, learning engagement, learning satisfaction and confidence, and learning effectiveness surveys.

Research Objectives

The purpose of this research is as follows:
1. Use mobile apps to strengthen students' self-directed learning.
2. Establish teaching of digital technology to support design education.
3. Understand the learning effectiveness of students through mobile devices.

Proposed Model and Hypothesis
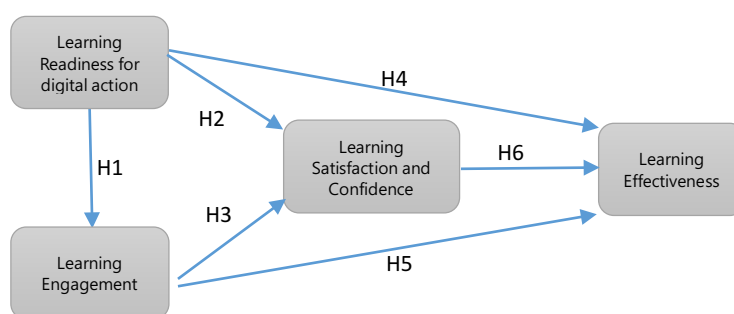
Picture 1. Proposed Model

According to the research purpose, hypotheses are as follow (see picture 1):

1.   Learning readiness has a significant relationship with learning engagement (H1).
2.   Learning readiness (H2) and learning engagement (H3) will increase learning satisfaction and confidence.
3.   Learning readiness (H4) and learning engagement (H5) have a significant relationship with learning effectiveness, respectively.
4.   When students are satisfied and confident in learning, they will have good learning effectiveness (H6).

Participants

This research is an experimental design for practical teaching, and the participants are 79 senior students at design school.

Research Method

The difference in performance of students' "learning readiness", "learning engagement", "learning satisfaction and confidence" and "learning effectiveness" will be used for item analysis and internal consistency and related analysis as item identification and homogeneity verification. The single-factor variance analysis is whether there is a difference in the scores of the test data before and after the test. It is used to understand the interactive relationship between learning satisfaction and self-confidence and learning effectiveness of students with different levels of learning engagement and teaching practice under digital learning readiness.

Questionnaire Scale and Variable Measurement

Learning readiness does not include the indicators of the system, hardware, and support (school administration). After modifying the learning readiness based on the concept of the flipped classroom, it is divided into self-regulated learning, classroom participation, and active learning. A four-dimensional scale for action learning readiness and sense of identification (Nicol, 2006; George, Kinzie, Schuh & Whitt, 2011; Roehl, 2013). The Student Learning Engagement Scale (SLES) is divided into three parts: classroom teaching, online activities, and action implementation. Classroom teaching refers to the willingness of students to discuss in class, share knowledge with peers, and operate in the classroom. Online activities are the attitude and participation of online learning, including the ability to help, share or participate actively. Action implementation is the offline implementation process active participation, assisting others. The Learning Satisfaction and Confidence Scale (SCLS) was developed by Jeffries and Rizzolo (2006). It was obtained by scholars verifying its reliability and validity

(Unver et al., 2017), including learning satisfaction (Satisfaction with current learning) and learning confidence (Self-confidence in learning) two major items, used to measure students' satisfaction with simulation activities (5 items) and learning self-confidence (8 items), a total of 13 scales. Learning effectiveness is based on eight dimensions and 26 factors proposed by Pulkka & Niemivirta (2013), of which eight dimensions include: interest, teacher function, quality of teaching materials, course satisfaction, quality of evaluation methods, student effort, and achievement as well as multiple perspectives such as classroom participation, to measure the changes in the teaching materials and content of this research.

Results

Reliability and Validity

According to the results of a single-sample T test (see table 1), each variable has reached a significant level, indicating that the participants' learning readiness, learning participation, learning satisfaction and confidence and learning effectiveness have significant differences.

Table 1. Single Sample Verification Analysis Result

	T	df	Sig	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Learning Readiness	59.698	78	.000	3.81519	3.6880	3.9424
Learning Engagement	61.969	78	.000	4.25038	4.1138	4.3869
Learning Satisfaction and Confidence	66.938	78	.000	4.17405	4.0499	4.2982
Learning Effectiveness	82.736	78	.000	4.30684	4.2032	4.4105
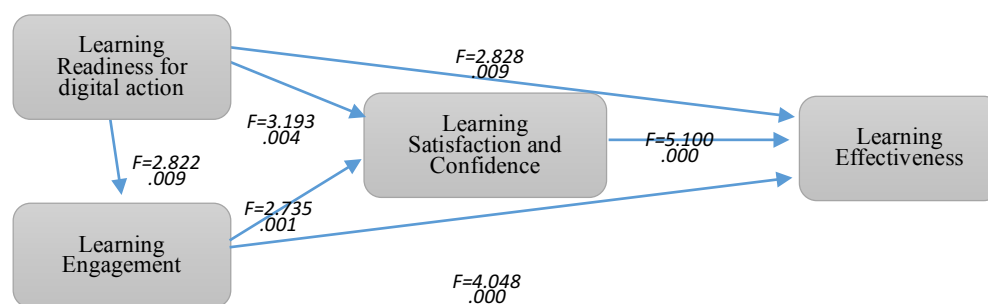
Picture 2. Verification Results Between Variables

Table 2. ANOVA of Research Variances

ANOVA of Learning Readiness

		SS	df	MS	F	p
Learning Engagement *H1*	Between group	26.203	60	.437	2.822	.009
	Within group	2.785	18	.155		
	total	28.989	78			
Learning Satisfaction and Confidence *H2*	Between group	21.903	60	.365	3.193	.004
	Within group	2.058	18	.114		
	total	23.961	78			
Learning Effectiveness *H4*	Between group	15.096	60	.252	2.828	.009
	Within group	1.602	18	.089		
	total	16.698	78			
ANOVA of Learning Engagement						
Learning Satisfaction and Confidence *H3*	Between group	15.706	32	.491	2.735	.001
	Within group	8.255	46	.179		
	total	23.961	78			
Learning Effectiveness *H5*	Between group	12.322	32	.385	4.048	.000
	Within group	4.376	46	.095		
	total	16.698	78			
ANOVA of Learning Satisfaction and Confidence						
Learning Effectiveness *H6*	Between group	15.573	57	.273	5.100	.000
	Within group	1.125	21	.054		
	total	16.698	78			

For the participant of different learning readiness, the learning engagement $F_{(60,18)}$=2.822, p=.009<.01; learning satisfaction and confidence $F_{(60,18)}$ = 3.193, p= .004<.01; learning effectiveness $F_{(60,18)}$=2.828, p=.009<.01; For the participant of different learning engagement, the learning satisfaction and confidence $F_{(32,46)}$ =2.735, p=.001<.01; learning effectiveness $F_{(32,46)}$=4.048, p=.000; For the participant of different learning satisfaction and confidence, the learning effectiveness $F_{(57,21)}$ = 5.100, p=.000. Hypothesis 1 to 6 are confirmed.

Conclusions

The result shows that learning readiness for digital action has a significant relationship with learning engagement, which can increase satisfaction and self-confidence in the course, and improve learning effectiveness. In the digital age, traditional teaching methods are constantly being updated. To improve teachers' teaching quality and build students' self-confidence in learning, it is necessary to use flipped teaching and use more flexible teaching methods to enhance students' engagement and interest. Learning and communication using digital action will be able to create design teaching with the three characteristics of "lively teaching", "real-time interaction" and "learning initiative".

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Fude Master: Japanese Writing Practice M-learning Application Based on Gamification Theory and Its Evaluation with ARCS Model

Astrid Tamara, Tokyo Denki University, Japan
Makoto Shishido, Tokyo Denki University, Japan

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Abstract
Foreign students have difficulty in learning Japanese, especially in kanji acquisition. This is caused by the difference in the writing system between the students' native language and Japanese. It is especially difficult to differentiate similar-looking Japanese characters for these foreign students. Fude Master, an m-learning app for learning Japanese with pattern recognition to judge user's handwritten input is developed to help writing practice. Gamification theory is implemented to increase user's motivation and participation. The m-learning app features game elements from gamification theory such as points, milestones, leaderboards, and more. The learning menus consist of Kanji, Vocabulary, and Sentence menus. The Kanji menu's materials are individual kanji characters. The Vocabulary menu's materials are words composed of the kanji. The Sentence menu's materials are how to use the words in a sentence. In accordance with gamification social elements, a Player Vs Player (PvP) menu is included. This PvP menu enables the user to play against another user in a timed quiz writing battle where the one who attains the highest point will win. The application is developed for smartphones with operating systems Android and iOS by using Ionic Framework. The backend system is developed with nodejs and socket.io. The application is tested on 10-20 foreigners whose native languages do not use kanji characters. Before using the application, a pre-test is held. Then after using the application, a post-test is held to measure the difference with the pre-test, and the respondents are asked to answer a questionnaire based on ARCS Model of motivation.

Keywords: ARCS Model, Gamification, Japanese Language, Kanji Acquisition, M-Learning, Writing Practice

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Introduction

Japanese is one of the most difficult languages in the world, especially for people whose native languages do not use kanji (Paxton & Svetanant, 2014) (Librenjak, Vučković, & Dovedan, 2012). The main cause is the difference between the writing and reading system of kanji and their native languages (Paxton & Svetanant, 2014). Japanese writing system incorporates simultaneously two different scripts: kana (hiragana and katakana) and kanji (Paxton & Svetanant, 2014) (Kim T. , 2014). The two kana scripts, katakana and hiragana, are composed of 46 characters with some similarly looking characters that are hard to be differentiated by foreign students (Ogawa & Enokida, 2014) (Istiqomah, Diner, & Wardhana, 2015). Furthermore, there are thousands of kanji, each with several meanings and readings, which causes learning kanji more challenging than hiragana and katakana (Paxton & Svetanant, 2014) (Librenjak, Vučković, & Dovedan, 2012) (Ogawa & Enokida, 2014). As of 2010, Japan Ministry of Education, Culture, Sports, Science, and Technology (MEXT) designated 2316 kanji as the required *jōyō* kanji (文部科学省, 常用漢字表, 2010). As such, kanji acquisition is still a prevalent problem for foreign students (Paxton & Svetanant, 2014) (Librenjak, Vučković, & Dovedan, 2012).

The increasing usages of smartphones and mobile devices have caused the e-learning market to expand steadily (Docebo, 2016). Current learners grew up with technology and therefore have a different approach to learning (Kiryakova, Angelova, & Yordanova, 2014). This causes a challenge for teachers to use different teaching methods so students will actively participate with strong motivation and engagement in their learning (Kiryakova, Angelova, & Yordanova, 2014).

Gamification has been implemented to increase users' participation and motivation by incorporating game elements such as points, leaderboards, and giving immediate feedback (Figueroa, 2015). According to Kiryakova, Angelova, & Yordanova (2014), implementing game techniques and mechanisms in learning could be done to achieve certain learning objectives, increase learners' motivation to complete the objectives, and incite friendly competitiveness in learners.

To measure the effectiveness of the e-learning system based on gamification theory, the ARCS model will be used. ARCS model of motivation includes four areas for promoting and sustaining motivation in the learning process: Attention, Relevance, Confidence, and Satisfaction.

For the author's bachelor thesis research, an e-learning system for learning Japanese was developed. The e-learning features pattern recognition so that users can practice handwriting Japanese characters directly on the phone screen. The application received positive feedback, notably for the convenient usage at any time and anywhere and the mnemonic feature that aided memorization (Tamara, Rusli, & Hansun, 2019). The research concluded with future research suggestions, such as improving the pattern recognition accuracy, adding more lesson materials, and provide a more engaging learning experience.

Therefore, continuing from previous research, an e-learning system for practicing handwriting is developed. The e-learning system implements gamification theory to increase learners' motivation and is evaluated by using ARCS model.

Hypothesis

The proposed e-learning system improves user's Japanese language ability to know at least 160 kanji and measure attention, relevance, confidence, and satisfaction level with ARCS model.

Goals

To develop an e-learning system for learning Japanese based on the gamification method and measure its effectiveness. The system includes:
−   Using the developed e-learning application, users are able to improve their Japanese skill ability in understanding kanji, vocabulary, and usage in a sentence.
−   The developed e-learning application provides an enjoyable learning experience.

Literature Review

Gamification

Gamification is the implementation of game elements and game to non-game activities (Kiryakova, Angelova, & Yordanova, 2014). The game elements are described in Table 1.

Table 1. Game Elements (Figueroa, 2015)

No.	Game Elements	Description
1.	Points	Numeric accumulation based on certain activities.
2.	Badges	Visual representation of achievements for the use shown online.
3.	Leaderboards	How the players are ranked based on success.
4.	Progress bars/ Progression	Shows the status of a player.
5.	Performance graph	Shows player performance.
6.	Quests	Some of the tasks players have to fulfill in a game.
7.	Levels	A section or part of the game
8.	Avatars	Visual representation of a player or alter ego.
9.	Social elements	Relationships with other users through the game.
10.	Rewards/ reward system	System to motivate players that accomplish a quest.

Gamification provides the advantage of promoting an increased level of commitment and motivation of users (Kiryakova, Angelova, & Yordanova, 2014). Despite not being directly linked to knowledge and skills, gamification can contribute to the students' knowledge and skills growth by affecting their behavior, commitment, and motivation (Kiryakova, Angelova, & Yordanova, 2014).

ARCS Model

ARCS model of motivation includes four areas for promoting and sustaining motivation in the learning process: Attention, Relevance, Confidence, and Satisfaction (Poulsen, Lam,

Cisneros, & Trust, 2008). These four aspects are explained below (Poulsen, Lam, Cisneros, & Trust, 2008):

1.   Attention

Attention refers to the learners' interest in incorporating the taught concepts or ideas. Attention is the most important aspect because it is the starting point to motivate the learners.

2.   Relevance

Relevance must be established by using language and examples that the learners are familiar with. If attention is not sustained and relevance is not conveyed, learners will not be motivated to learn.

3.   Confidence

The confidence aspect's focus is to establish learners' positive expectations for success. The confidence level is often associated with motivation and the effort to achieve a performance goal. Confidence is built through personal achievement's positive reinforcement, by giving well-timed and relevant feedback.

4.   Satisfaction

Satisfaction must be gained by learners from the learning experience, such as a sense of achievement, praise from a higher-up, or mere entertainment. When learners appreciate the results from feedback and reinforcement, they will be motivated to learn.

System Development

Development Environment

The e-learning system is developed for smartphones with the operating systems Android and iOS. The development was carried by using the Ionic framework and programming language Typescript for the mobile application. For the backend, node.js and socket.io were used. MySQL is used as the database.

System Flow

The e-learning system has three main learning menus, which are the Kanji, Vocabulary, and Sentence menus. There's also a My Word List menu for the user's favorite words, as well as a PvP (Player vs Player) menu where the user can compete with other users through a quiz battle. Figure 1 depicts the Main Menu and the relevant game elements as listed in Table 1.
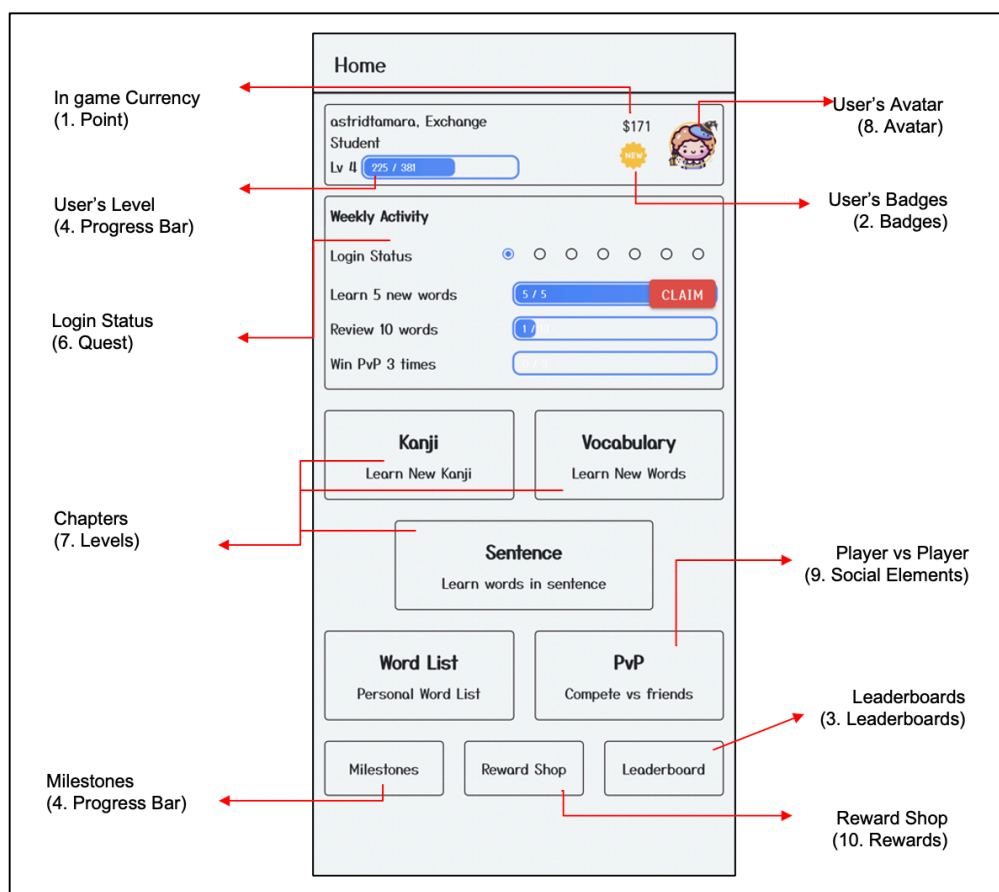
Figure 1. Main Menu

The Kanji menu contains learning materials of individual kanji characters, included are their readings, stroke order, meanings, and example words. Handwriting practice can be done on a rectangular canvas in the middle of the screen. After clicking the button on the bottom right screen, the server will be able to determine the correctness of the handwriting. Figure 2 depicts the Kanji menu.
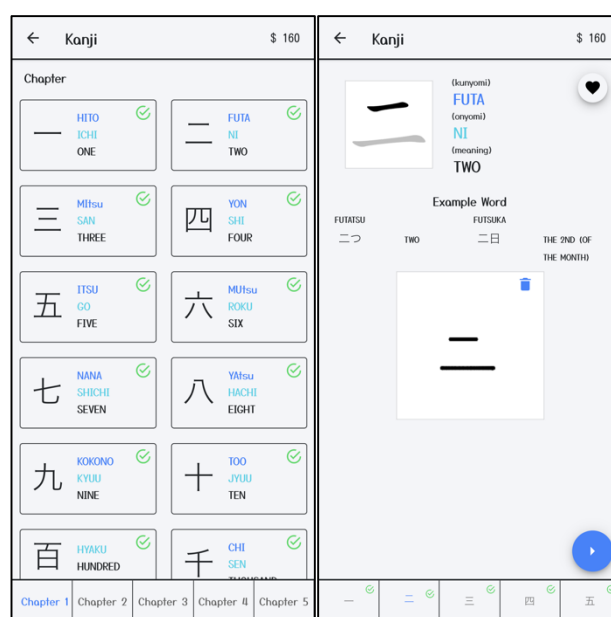
Figure 2. Kanji Menu

The Vocabulary menu contains learning materials of words composed of individual kanji characters in Kanji menu. Similar to the Kanji menu, a rectangular canvas is present in the middle of the screen for users to practice writing and get the server's feedback. The Vocabulary menu is shown in Figure 3.

Figure 3. Vocabulary Menu

The Sentence menu contains learning materials about using the words in the Vocabulary menu correctly in a sentence. Similar to the Kanji and Vocabulary menu, the Sentence menu also includes a rectangular canvas for handwriting input. The Sentence menu is shown in Figure 4.

Figure 4. Sentence Menu

In the PvP menu, the user can play against another user in a battle to answer questions by writing on the canvas. The user with the faster time and more correct answers will win. However, there are several items that user can use to boost own's progress or hinder

opponent's progress. The PvP menu is shown in Figure 5.
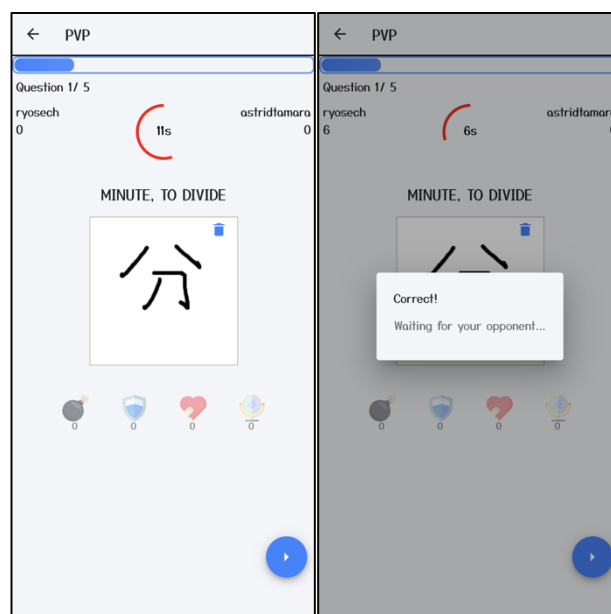
Figure 5. PvP Match

The Milestone lists the user's progress with each challenge. When the users reach a 100% completion rate on the challenge, they may unlock the badge and title associated on the challenge. By practicing writing, the user may accumulate in-game currency that can be spent to buy avatar frames, application themes, and PvP items. The Milestones and Reward Shop are shown in Figure 6.
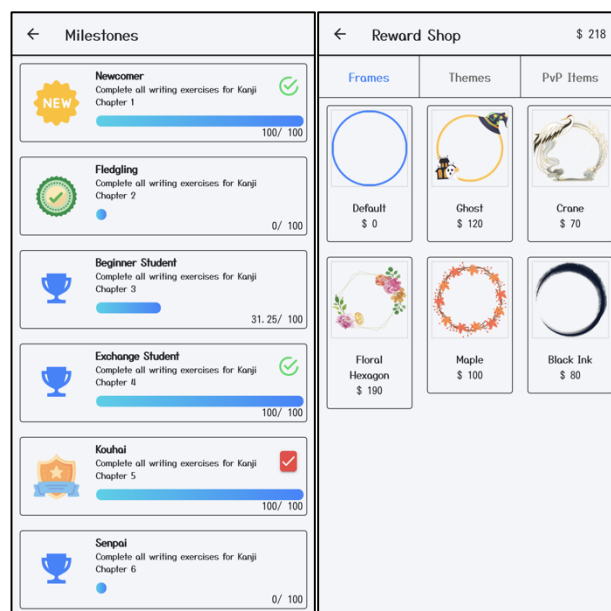
Figure 6. Milestones and Reward Shop

The user's Profile screen shows the user information and the number of PvP wins and losses. On this screen, the user can also freely choose their avatar, badges, and title that are shown on their profile. The number of PvP wins and losses is also reflected in the Leaderboard Screen, where the users are listed by the highest win count and lowest loss count. The Profile and Leaderboard screens are shown in Figure 7.
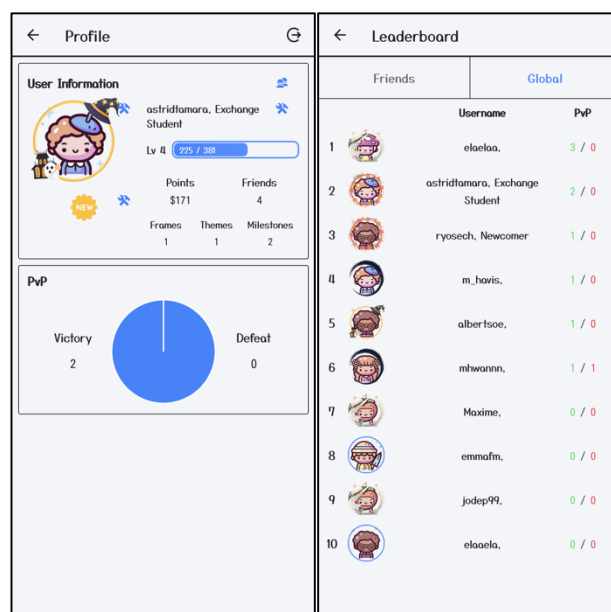
Figure 7. Profile and Leaderboard Screen

Evaluation

Experiment Flow

The experiment to evaluate the application was held between June 1st, 2021, until June 8th, 2021, for a total of five sessions. Each session lasted for around 1 hour to 1.5 hours and was participated by three to six people via online video meeting. In total, the experiment was participated by 22 volunteers whose native languages do not use kanji and have not taken any JLPT. Each session schedule and total participants are listed in Table 2.

Table 2. Experiment Session Schedule Table

No.	Begin	End	Total Participants
1.*	June 1st, 2021, 00:15 JST	June 1st, 2021, 02:45 JST	4
2.	June 4th, 2021, 03:00 JST	June 4th, 2021, 04:00 JST	3
3.	June 7th, 2021, 22:30 JST	June 7th, 2021, 23:30 JST	5
4.	June 8th, 2021, 00:00 JST	June 8th, 2021, 01:00 JST	5
5.	June 8th, 2021, 01:15 JST	June 8th, 2021, 02:25 JST	5
Total			22

*The first session had a break of approximately one hour because of technical difficulties.

The experiment session began with an introduction to the research and experiment flow. This was followed by a pre-test, to measure their initial Japanese language ability. After the pre-test, they were asked to study Japanese by using the application. Afterward, a post-test was held to measure the score difference with the pre-test. Finally, the respondents answered a questionnaire based on ARCS Model of motivation.

The pre-test and post-test were held using Kahoot, a learning platform to facilitate real-time quizzes. This was done to ensure that the tests were done at the same time for every respondent.

The pre-test and post-test are composed of 15 questions which are taken from the learning materials available in the application. The test questions are the same for both pre-test and post-test, to measure the score difference before and after using the application.

The questionnaire based on the ARCS model was distributed to measure the effect of the application. The questionnaire is composed of 36 questions, with 6 questions each corresponding to the Attention, Relevance, Confidence, and Satisfaction aspect of the ARCS model. A 5-scale Likert scale is used to measure the score, ranging from 1 (Not true) to 5 (Very true).

Table 3 lists questions about the Attention part of the ARCS model. The questions revolve around things that help keep the users retain their interest in using the application.

Table 3. Attention Questions Table

Attention	
1.	The way the chapters are arranged helped keep track of my progress.
2.	I want to unlock all milestones and collect all themes and frames.
3.	Using items in PvP made me excited.
4.	I like playing a match against another student (PvP).
5.	Being able to write on screen helped me remember how to write the kanji.
6.	I want to keep learning Japanese using this application.

Table 4 lists questions about the Relevance part of the ARCS model. The questions are about things that let the users feel that they can connect the things they learn from the application with themselves.

Table 4. Relevance Questions Table

Relevance	
1.	Kanji, Vocabulary, and Sentence materials included words that I want to learn.
2.	The kanji stroke order, *kunyomi*/*onyomi* reading, and example word gave me more understanding about the character.
3.	I believe my Japanese language competency will improve by using this application.
4.	I think this application is useful for me.
5.	I can use the knowledge I gained from this application in real life.
6.	Using the application helped me overcome the difficulty of learning Japanese words.

Table 5 lists questions about the Confidence part of the ARCS model. The questions are about their motivation and effort to achieve success in learning Japanese.

Table 5. Confidence Questions Table

Confidence	
1.	The lesson materials were suitable for a beginner's competency level.
2.	As I practice writing on the screen, I was confident that I could learn the words.
3.	Winning PvP mode gave me confidence that I understood the lesson well.
4.	Losing PvP mode made me want to practice more so I can win next time.
5.	Completing the exercises and accumulating points gave me a satisfying feeling of accomplishment.
6.	If I keep learning using the application, I believe I can pass a test on it.

Table 6 lists questions pertaining to the Satisfaction part of the ARCS model. The questions revolve around the satisfaction they feel while learning, such as feeling rewarded and enjoying their progress.

Table 6. Satisfaction Questions Table

Satisfaction	
1.	With the points I have accumulated, purchasing themes, frames, and PvP items gave me a satisfying feeling of accomplishment.
2.	Unlocking milestones achievement made me feel I have improved.
3.	Attaining a high rank on the leaderboard made me feel proud.
4.	I take pride in winning PvP matches against other students.
5.	Practicing writing kanji was enjoyable by using this application.
6.	Getting points for practicing and playing PvP made me feel rewarded.

Respondents' Information

The experiment was participated by a total of 22 respondents. Out of 22 respondents, 45.5% (10 people) are male and 54.5% (12 people) are female. Their age range falls into 10-19 years old (2 people) and 20-29 years old (20 people). All these respondents' native languages are not languages that use kanji, 86% (19 people) are Indonesians while 14% (3 people) are French.

All of them have not taken JLPT and therefore are beginners in the Japanese language. The gender, age, native language, and JLPT level of respondents are displayed in pie charts in Figure 8.
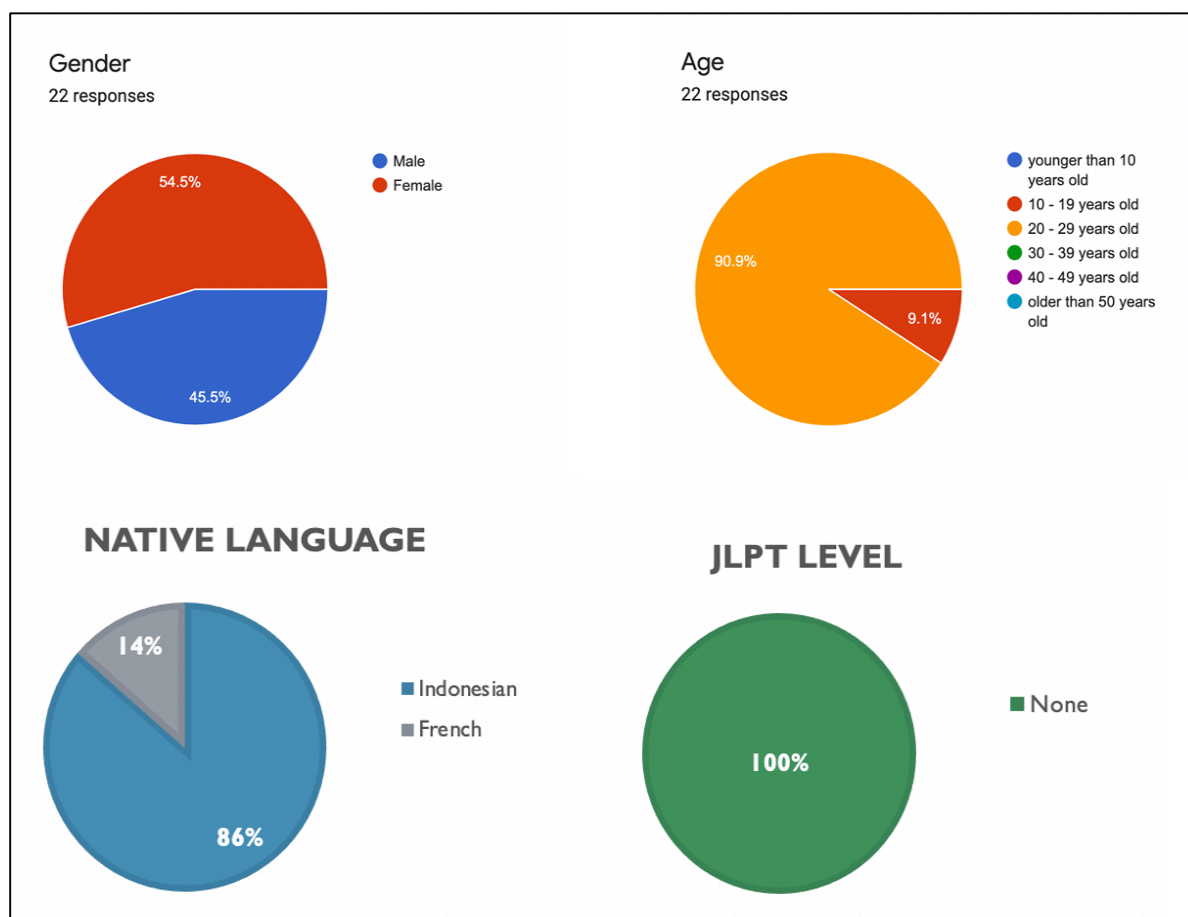
Figure 8. Respondents' Gender, Age Distribution, Native Language, and JLPT Level Distribution Pie Charts

Pre-Test and Post-Test Result

The result of the pre-test and post-test is shown in Table 7. With 15 as the perfect score, the pre-test average is 7.27 and the post-test average is 12.05. The minimum score for pre-test is 2 while for post-test is 8. The maximum score for pre-test is 14 while for post-test is a perfect score of 15. The respondents' score improves by 4.77 points on average which means their Japanese language ability improves after using the application. Every respondent had their scores improved, except one person, but the person had a high enough score in the pre-test (only 2 mistakes). The highest score difference is 13, by which the respondent got a perfect score during the post-test.

The pre-test and post-test score differences are visualized in a bar graph in Figure 9. The graph is ordered by pre-test score in ascending order. By looking at the graph, it is apparent that the lower pre-test score produced a greater improvement than the ones with a high pre-test score.

Table 7. Pre-Test and Post-Test Result Table

No.	Name	Pre-Test Score	Post-Test Score	Difference
1	YTH	2	15	13
2	A	3	12	9
3	J	4	12	8
4	KTW	5	8	3
5	M	5	9	4
6	R	5	11	6
7	L	6	10	4
8	M	6	11	5
9	M	6	14	8
10	F	7	11	4
11	AS	7	12	5
12	R	7	14	7
13	N	8	11	3
14	JD	8	12	4
15	SS	8	12	4
16	MH	8	15	7
17	D	9	12	3
18	E	9	12	3
19	G	10	12	2
20	W	10	12	2
21	JCY	13	13	0
22	JD	14	15	1
Average		7.27	12.05	4.77
Minimum		2	8	0
Maximum		14	15	13
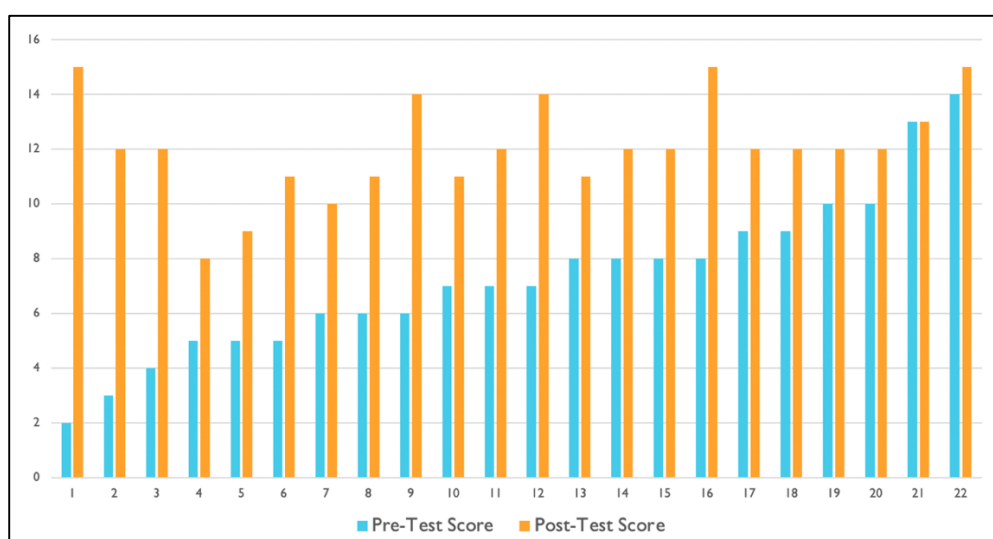
Figure 9. Pre-Test and Post-Test Result Bar Graph

The dispersion graph in Figure 10 shows that most of the respondents fall into the top middle area, which means that those whose pre-test scores are in the middle range had improved to a certain degree. Three people in the left bottom area (Low to Low circle) scored low on pre-test and post-test, which means they improved although not significantly. Two people in the top right area (High to High circle) scored high on both pre-test and post-test, one person managed to improve and gain a perfect score on post-test while the other one managed to maintain the score. Three people in the top left area (Low to High circle) scored low on pre-test and high on post-test, which means that they had a significant improvement in Japanese ability after learning with the e-learning system. None are in the bottom right area, which means all respondents oversee a certain degree of improvement in Japanese ability after using the e-learning system.
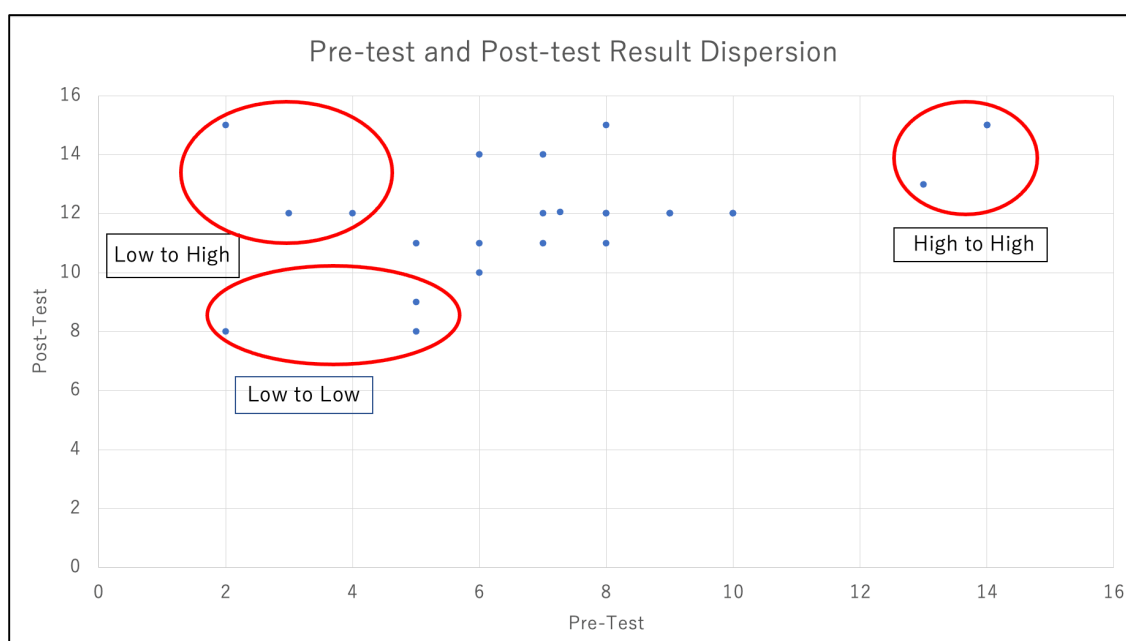
Figure 10. Pre-Test and Post-Test Result Dispersion Graph

Based on the result of the pre-test and post-test, Table 8 shows a breakdown for each kanji's correct answer. During the pre-test, the Kanji with the lowest correct answers are 赤 (aka, red) and 米 (kome, rice) at 5 points. However, both kanji saw significant improvement during the post-test. The kanji 赤 (aka, red) improved to 17 correct answers, making a 12 point difference. The kanji 米 (kome, rice) improved to 15 correct answers, making a 10 point difference. The kanji with which the respondents are most familiar is 一日(tsuitachi, the first day of the month) with 17 points at the pre-test. At the post-test, the kanji is 一日 saw an improvement to 21 points, which is one point short of the perfect score (22 points).

During the post-test, the kanji with the lowest correct answer is 南口(minamiguchi, south exit), which also has the lowest difference between pre-test and post-test of 3 points. This shows that it is the hardest kanji to learn. Meanwhile, during the post-test, the kanji with the highest correct answer is 円(en, round/yen) and 川(kawa, river). The kanji 円(en, round/yen) has the highest difference of 13 points, making it the easiest kanji to learn. The kanji 川(kawa, river) has the second-highest difference of 13 points, making it the second easiest kanji to learn.

Table 8. Pre-Test and Post-Test Kanji Correct Answer Table

No.	Kanji	Pre-Test	Post-Test	Difference
1.	円	9	22	13
2.	赤	5	17	12
3.	今	15	19	4
4.	北	9	18	9
5.	川	10	22	12
6.	九日	15	20	5
7.	日本	13	17	4
8.	電車	9	13	4
9.	去年	11	20	9
10.	好き	12	18	6
11.	一日	17	21	4
12.	南口	8	11	3
13.	米	5	15	10
14.	安い	13	16	3
15.	中国	9	16	7
Average		10.67	17.67	7
Min		5	11	3
Max		17	22	13

The pre-test and post-test kanji correct answer is visualized in a graph in Figure 11. The graph is ordered by the kanji appearance in the test. The result is further visualized in the dispersion graph in Figure 12. The kanji 赤 (aka, red) and 米 (kome, rice) occupy the top left area remember (Low to High circle) which means it is easier to. The kanji 一日(tsuitachi, first day of the month), 九日(kokonoka, ninth of the month), and 今(ima, now) occupy the top right area (High to High circle). which means many respondents could recognize the kanji in pre-test and post-test. Looking at the center area (Low to Low circle), the kanji 南口 (minamiguchi, south exit) and 電車(densha, train) were correctly answered in lower numbers in both pre-test and post-test, making them the hardest kanji to learn. As there are no kanji located in the bottom right area, all kanji saw improvement between pre-test and post-test.
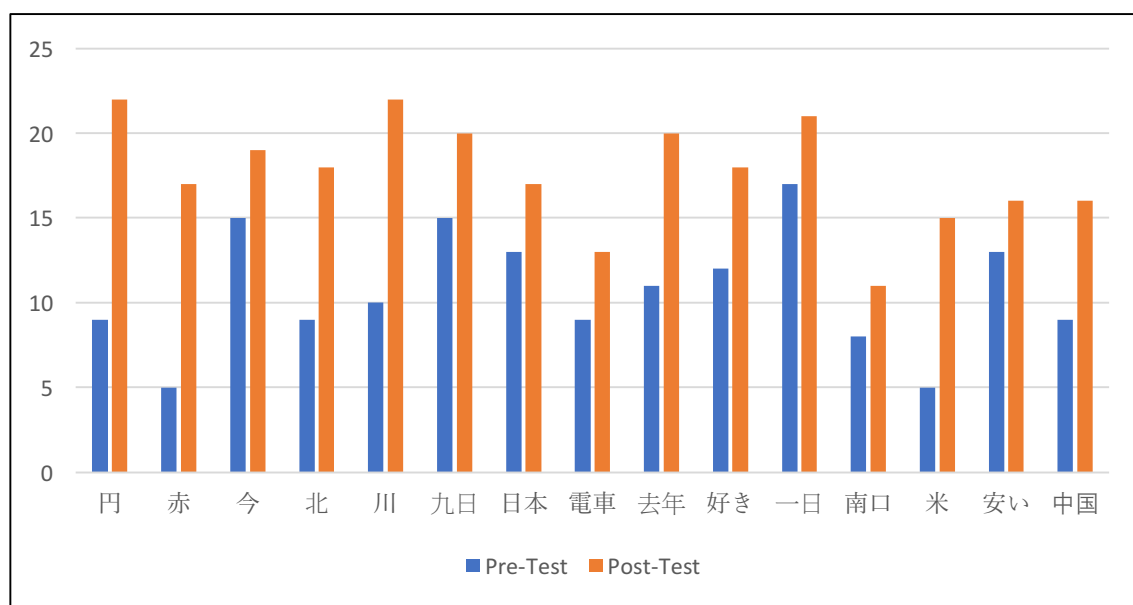
Figure 11. Pre-Test and Post-Test Kanji Correct Answer Bar Graph
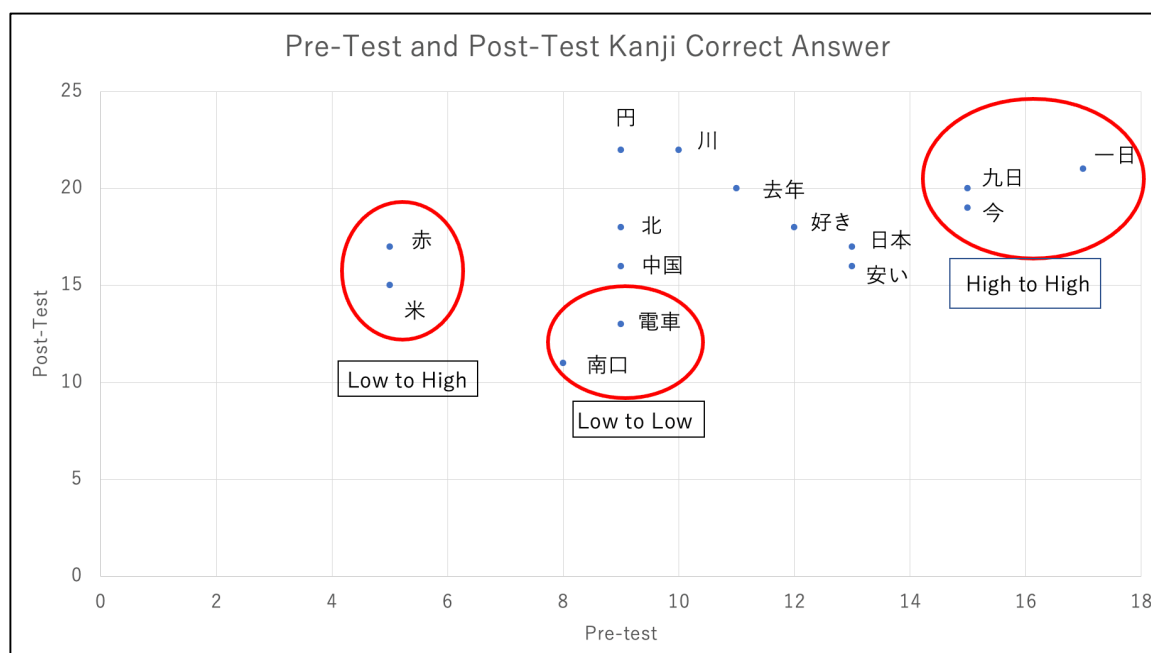
Figure 12. Pre-Test and Post-Test Kanji Correct Answer Dispersion Graph

Questionnaire Result

The questionnaire's ARCS score is depicted in the bar chart in Figure 13. The score for Attention is 4.64, Relevance is 4.63, Confidence is 4.58, and Satisfaction is 4.71. The average score of all four aspects of ARCS is 4.61 out of 5. This falls into the range of 4 (Mostly True) and 5 (Very True), which means that the application has successfully conformed to the ARCS model of motivation. The questionnaire's result shows that the application can retain the respondents' attention to learn, the respondents understand the lessons and feel they are relevant, the respondents build their confidence and are motivated to achieve more, and the application provides enough reward for the respondents to feel satisfied and enjoy the learning process.
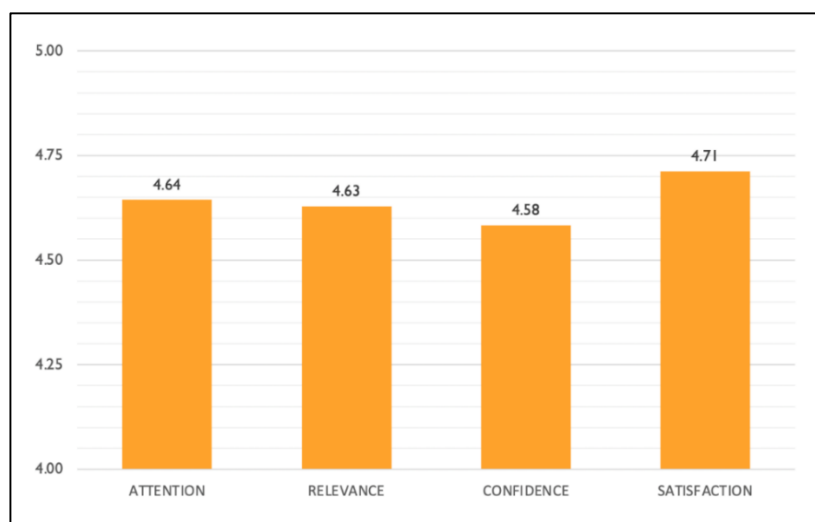
Figure 13. Graph of Questionnaire's ARCS Score

Conclusion

The e-learning system for learning Japanese based on Gamification Theory has been completed. The e-learning system is developed for both Android and iOS operating systems. There are three main learning menus, the Kanji, Vocabulary, and Sentence menus. In each menu, the user can practice handwriting the Japanese character by writing on the screen and getting immediate feedback from the server.

An experiment to evaluate the application's effect was held via an online meeting between June 1st to June 8th, 2021. It was participated by 22 volunteers whose native languages are not using Kanji and have not taken JLPT. The experiment conducted pre-test, application testing, post-test, and questionnaire in order.

The pre-test and the post-test result show that the respondents' test scores improved after using the application. The questionnaire based on ARCS Model shows that the application can motivate the respondents to learn Japanese enjoyably.

Future Works

Based on the feedbacks written by the respondents, there are suggestions to:
– Add more reward variations and challenging milestones.
– Improve the User Interface (UI) and User Experience (UX) for easier to use.
– Improve PvP part to allow multiplayer and make it better.

Acknowledgments

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Financial Autonomy of Schools in Kazakhstan: International Comparison and a National Perspective

Liz Winter, Cambridge University, United Kingdom
Rita Kasa, Nazarbayev Universit, Kazakhstan

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Abstract
This paper has relevance for any nation seeking to reform its model of funding through decentralization and a neoliberal agenda that permits marketization of public services such as education. It adopts a case-study approach to locate and discuss where Kazakhstan, a country undergoing considerable educational reform, is currently positioned regarding one specific aspect of school autonomy; that of school-level decision-making in terms of budget allocations. The first part of the paper compares Kazakhstan's school principals' fiscal responsibilities to global counterparts. This establishes a starting point to reflect the national situation in 2018. The method of comparison is by secondary data analysis of publicly available data from TALIS 2018 (Teaching and Learning International Survey). The second part of the paper analyses primary data captured through a small online survey to school principals in March 2020. Significantly, this research took place during transition from a norms-based distribution of funds by regional authorities to a direct government-to-school per-capita model of finance. Learning from school principals' in-vivo experiences to capture the successes and barriers to implementation of per-capita funding is not only timely but highly useful as wider roll-out proceeds. Furthermore, exploring the national position in 2018 and the local situation in 2020 will be of use to revisit the national situation in 2024 when implementation of per-capita funding should be complete. Findings show that decentralization has significantly altered school principals' roles and responsibilities revealing an important need for professional development to confidently manage budgets efficiently in order to target and achieve school improvement.

Keywords: Per-capita School Funding, School Autonomy, Kazakhstan, TALIS, School Leadership

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Introduction

The questions of school autonomy, accountability and student performance have been on the agendas of national educational policymakers and the international research agenda since 1980s with the rise of The New Public Management Policy paradigm (Hood, 1991; Lane 2000; Olsen, 2008). This policy paradigm implies that schools need to be given autonomy to manage their operations, and they need to be accountable for their performance results. Devolution of school management decision-making from the central to local governments and to schools has become a global characteristic of educational policies due to dissemination of these approached by international organizations such as Organisation for Education and Cultural Development (OECD) (Verger & Curran, 2014) and the World Bank (Sholderer, 2017). Advancement in the area of school autonomy and accountability is promoted and measured by international education studies conducted by OECD such as *Teaching and Learning International Survey* (TALIS) and the World Bank's assessment scale for benchmarking school autonomy and accountability (SABER) (Arcia et al, 2011).

Kazakhstan stands out as a prime example of policymakers' belief in a neoliberal agenda to develop human capital through improvement and marketization of its education system (Nechayeva & Upabekov, 2016). The drive for Kazakhstan to establish itself as a modern independent nation has led to much policy borrowing and attention on measures of progress such as those offered by OECD and The World Bank (Steiner-Khamsi, Silova & Johnson. 2006). Increasing school autonomy chimes well not only with a neoliberal agenda but also with international opinion that setting budgets locally can better target money towards the areas holding students back (Grubb & Allen, 2011). Hence it is unsurprising that Kazakhstan is introducing per-capita funding for schools (MoESRK 2017). This reform not only allows public schools more freedom in making budget allocation decisions to target school improvement but also facilitates remuneration of private entities offering public education. Kazakhstan, therefore, serves as a worthy case study to typify and illustrate how greater school autonomy may impact on student performance through fashioning the conditions for individual schools to steer their own development and by creating competition between schools. This approach is driven by international comparisons such as the Programme for International Student Assessment [1] (PISA) which examines performances in reading, mathematics and science. In the 2018 version of these measures (PISA 2018), Kazakhstan demonstrated much room for improvement since the resulting level of students across all three domains of assessment were well below the OECD average (OECD 2019a).

Definitions of School Autonomy

The concept of school autonomy has evolved over years (Eurydice, 2007). In 19th century Europe and well into the 20th century, the concept of school autonomy was associated with academic freedom. In 1980s, school autonomy reforms were linked to efforts to strengthen democratic participation that emphasized the need for schools to be more open to their local communities. In 1990s, in addition to the responsiveness of schools to their communities, concerns of efficient management of public funds started dominating the conversation. A solution proposed by New Public Management (NPM) was to introduce private sector principles in the management of public sector. One of the measures taken in this context was the devolution of responsibilities from the central government to local communities. It was expected that decentralizing the decision-making to local communities and schools would

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[1] https://www.oecd.org/pisa/

increase the efficiency of school management and heighten its ability to respond to local circumstances and needs. This philosophy guided the reforms in public sector of countries in Eastern and Central Europe emerging from the previously highly centralized system of public administration (Pollitt, 2011; Silova, 2011).

In the 21st century, the concept of a school as an organization which would benefit from organizational autonomy and the engagement with the local community has become part of the mainstream educational philosophy. School autonomy is defined as "a form of school management in which schools are given decision-making authority over their operations, including the hiring and firing of personnel, and the assessment of teachers and pedagogical practices" (Arcia et al, 2011, p. 2). The concept of School Based Management (SBM) describes the situation where in the result of decentralization, the school makes majority of managerial decisions with participation of parents and the community through school councils (Arcia et al, 2011), known as school boards (pop-soviet) in Kazakhstan.

The results of School Based Management implementation have not been universally successful. Arcia and colleagues (2011, p. 3) quote empirical evidence of SBM failure to achieve significant gains in learning in Latin America, while producing positive results in some European countries. Reasons for different outcomes for school autonomy is one of the subjects examined by researchers world-wide. Sholderer (2017) cites studies which indicate that a range of factors including income inequality, low economic development in a country, lack of accountability mechanisms in a school and a low social capital decreases the benefits of school autonomy. In her on research on the relationship between school autonomy and performance in eight post-Soviet countries, Sholderer (2017) finds that in countries with more interpersonal trust and cooperation school autonomy has a stronger positive effect on school performance than in countries that have lower levels of the mentioned social capital of trust and cooperation.

A comparative study of school autonomy in Europe (Eurydice, 2007) has shown that the level of school autonomy differs from country to country and by the area of the decision-making. For example, a school can enjoy full autonomy in making decisions about allocating day-to-day operations budget but has no authority to decide about investing the funds in developing its physical infrastructure. Also, today in most countries school autonomy is seen as a way to improve the quality of teaching and learning. There is more attention to pedagogic autonomy which seems more closely linked to raising achievement at school (Eurydice, 2007, p. 12). Therefore the umbrella term of school autonomy is not always appropriate and for the purposes of this article our focus is on school fiscal autonomy albeit budget allocation schemes that give bonuses to reward good teaching are clearly related not only to fiscal autonomy but also autonomy in educational content, pedagogic practices and staffing decisions.

Methodology

This article employs Kazakhstan as a case study of decentralization in schools' fiscal management. Kazakhstan is deemed a relevant focus to inform on the topic of reform in the allocation of school budgets since, not only is much wider reform underway, it is a nation with considerable focus on improving students' performances in international measures such as PISA (Bridges 2014). The case study is formed by combining and analyzing two datasets: one comprising secondary data and one comprising primary data. Effectively, the article first describes and analyses the international landscape of school fiscal autonomy. Next, it

presents detail of Kazakhstan's school leaders' attitudes towards managing school budgets in order to effect school improvement.

Details of Secondary (TALIS) Data Used for Analysis

The source of secondary data is Teaching and Learning International Survey (TALIS) as one of the major international instruments for monitoring school autonomy to form a comparative, international perspective. TALIS was first introduced in 2008 by OECD with participation of 24 countries[2]. At that time, TALIS was the 'first international survey to focus on the working conditions of teachers and the learning environment in schools' (OECD, 2009, p. 18). The aim of this OECD-led research was to help countries to review and develop policies that 'foster the conditions for effective schooling' (OECD 2009, p. 18). TALIS was created as an instrument for making meaningful international comparisons of the school environment and factors that improve learning. Importantly, to assure attitudes represent schools as accurately as possible, TALIS includes two separate surveys: one for school principals and one for teachers at each participating school. The sample of schools included in the study needs to be characteristic of the school system in the country. Questions that measure school autonomy were present in all three rounds of TALIS survey of 2008, 2013, and 2018. School autonomy was measured in the dimension of budgeting or financial autonomy, school autonomy for staffing, educational policies, and instructional policies. Kazakhstan's schools participated in TALIS for the first time in 2018.

As a companion piece to TALIS, learning or school performance is measured by Programme for International Student Assessment (PISA) that assesses 15 year-olds' abilities in reading, mathematics and science. To connect these two international comparative studies, OECD coordinates the methodology of TALIS and PISA.

Three sets of TALIS data were used for secondary data analysis; those from 2008, 2013 and 2018. Data were downloaded from the online portals provided by OECD for each year[3][4][5] into three IBM SPSS v26 files. TALIS survey items were examined for consistency across the three datasets with note taken of the countries/administrative regions taking part in each of the three TALIS surveys. Only 13 countries[6] participated in all three administrations of TALIS. The data from these 13 countries were used as indicative of change over the period 2008 to 2018. Item responses for these nations were directed towards a MS Excel spreadsheet in order to collate data and present longitudinal trends. As the most recent data and since Kazakhstan only took part in TALIS 2018, this dataset forms the focus for most of the more detailed analysis of school autonomy measures that follow: once overall international trends have been presented. 48 nations/regional administrative organisations took part in TALIS 2018 so results are presented for these as averages across the OECD dataset through original analysis of the online data. Additionally, 13 nations deemed by the authors to be good contrast points for Kazakhstan were identified and results for these are also presented. The criteria for selecting these 13, alongside Kazakhstan, were: those with a similar background

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[2] Australia, Austria, Belgium (Flemish Community), Brazil, Bulgaria, Denmark, Estonia, Hungary, Iceland, Ireland, Italy, Korea, Lithuania, Malaysia, Malta, Mexico, Netherlands (data not used for international comparisons), Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain and Turkey

[3] https://www.oecd.org/education/talis/talis-2008-data.htm

[4] https://www.oecd.org/education/talis/talis-2013-data.htm

[5] https://www.oecd.org/education/talis/talis-2018-data.htm

[6] Australia, Austria, Belgium (Flemish Community), Brazil, Bulgaria, Denmark, Estonia, Italy, Korea, Mexico, Norway, Portugal, Slovak Republic

(Estonia, Georgia, Latvia, Lithuania, Romania, Russian Federation, Slovenia, Slovak Republic); topmost performers in PISA 2018 (Singapore, Finland, Japan); a nation with very low school autonomy (Belgium) and one with a well-understood and long-standing model of per-capita funding (UK). 78 nations took part in PISA 2018 with the results for those taking part for the 14 nations/regions under comparison extracted from the OECD published online data[7] to link school autonomy with performance.

Details of Primary Research Conducted

The firsthand data used in this research is drawn from an online survey to school principals in March 2020 as part of a collaborative research project between the authors' institutions in UK and Kazakhstan. Data collection occurred during the second year of implementation of per-capita funding in the read capitol city of Kazakhstan, Nur-Sultan and during the first year of implementation in the two next-largest cities of Almaty and Shymkent.

125 school principals in total contributed data. Of these, 53 worked in Shymkent, 57 in Almaty and 15 in Nur-Sultan. Permission was granted by the relevant regional educational departments for recruitment to take place by means of direct email requests to school principals. All schools in the three cities were approached. From the 126, 201 and 82 schools in Shymkent, Almaty and Nur-Sultan, respectively, the related response rates were 42%, 28% and 18% to give an overall response rate of 30%. One explanation for the lower response rate in Nur-Sultan than elsewhere could be that requests for participation were slightly later to be during the first outbreak of the COVID-19 pandemic rather than before.

The anonymous (other than by region) survey comprised several sections: information on the school size and its operation; parental and student background; attitudes towards the introduction of per-capita funding; principals' main activities; role of the school board; and, attitudes towards the current priorities in education. The data used in this paper stems from open response items that garnered attitudes towards past and future benefits of the various funding models.

Findings

School Autonomy and Performance Across Nations

Figure 1 presents the results of secondary data analysis of TALIS 2018 results to illustrate the % of principals reporting high responsibility in making various fiscal and teaching decisions over time.

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[7] https://www.oecd.org/pisa/data/
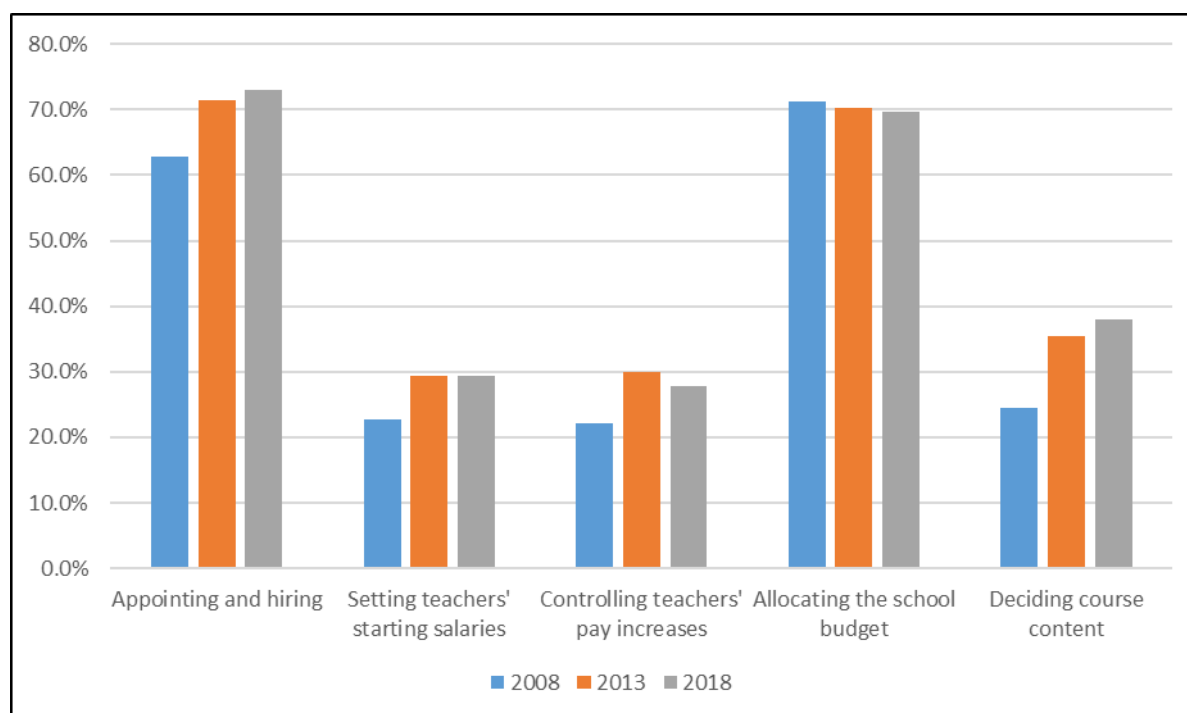
Figure 1: TALIS 2008-2018 Trends in School Autonomy - Averages of 13 Consistently Participating Countries / Administrative Regions by Year

Interrogating the level of school autonomy reported by school principals from TALIS 2008, 2013 and 2018 datasets, suggests an international trend for increasing responsibility for course content and the appointment and hiring process. Also, to lesser extents, appointing and setting the salaries of new teachers along with pay increases. However, the allocation of the school budget overall appears almost constant with, if anything, a small downturn in the perceived responsibility principals feel they hold from 2008 to 2018. This is an interesting feature since overall school autonomy through a collapsed value appears to be increasing; yet in the critical area of control over budget distribution, principals seem less or at least no more involved. In addition, since the overwhelming proportion of a school's budget tends to be salaries of staff, it suggests that if responsibility of school principals in this dimension is increasing, responsibilities for fiscal decision-making over other matters might be declining, an issue which needs further examination.

Analysis of the most recent TALIS data from 2018 shows a large variation in the way nations split responsibilities between central agencies and schools across different aspects of fiscal decision-making. For example, England, Finland and Singapore have roughly similar levels of principals making decisions over the allocation of budgets in schools (83%, 84% and 87% respectively) but very different approaches to the appointment and pay awards to teachers. Indeed, 90% of appointment decisions are made by the schools themselves in England versus only 51% in Finland and a mere 15% in Singapore. Table 1 illustrates the proportions of principals' responses for key finance-related items in TALIS 2018 across a select group of countries.

Country taking part in TALIS 2018	Proportions of school principals reporting school level decision-making as opposed to regional/national					No. of schools in TALIS sample
	Appointing or hiring teachers	Establishing teachers' starting salaries	Determining teachers' salary increases	Deciding on budget allocations within the school	Determining course content	
England (UK)	90%	73%	78%	83%	81%	319
Estonia	96%	77%	49%	63%	71%	195
Belgium (Flemish Com.)	99%	3%	3%	88%	19%	184
Finland	51%	13%	13%	84%	41%	148
Georgia	96%	29%	24%	97%	23%	328
Japan	11%	4%	10%	57%	34%	393
Kazakhstan	90%	43%	30%	48%	34%	331
Latvia	96%	49%	53%	44%	43%	137
Lithuania	99%	48%	49%	65%	56%	195
Romania	42%	9%	7%	20%	15%	199
Russian Federation	97%	25%	28%	78%	45%	230
Singapore	15%	11%	12%	87%	17%	169
Slovak Republic	98%	61%	46%	73%	51%	180
Slovenia	96%	30%	30%	79%	26%	254
Average values for 14 countries included above	73%	33%	30%	66%	39%	3262
Average values for all 48 countries in TALIS 2018	59%	27%	28%	63%	36%	15980

Table 1. Results from Analysis of TALIS 2018 Data Regarding School-level Versus Regional or National Decision-Making

According to the OECD reports, the level of autonomy experienced at school level by the 331 principals in Kazakhstan taking part in TALIS 2018 compared well across several areas (OECD, 2019b). Our analyses confirmed this. Decisions were made at school level well above the 48-country average for the appointing of teachers and their starting salaries with determining teachers' pay increases once they had been hired was reported to be very similar to the international average. Determining course content at school level in Kazakhstan was again in line with the international average. However, deciding on budget allocations was below the international average for Kazakhstan at just less than half of school principals (48%) reporting they were free to do this compared to the TALIS 2018 average of two-thirds of schools (66%) having freedom to set their own budgets.

The comparison of TALIS 2018 with PISA 2018 to examine the relationship between the level of school autonomy and school performance (measured as 15-year-old student achievement in reading, math, and science) shows the following situation. For TALIS measures of autonomy, Kazakhstan appears to be similar to the international picture (Table 1), however, in terms of student achievement results these lag below the international average in all three domains of PISA 2018 assessment (Table 2).

	Average PISA scores			Rank of performance in relation to the 78 other participating countries			No. of schools in PISA 2018	No. of students in PISA 2018
	Read	Math	Sci.	Read	Math	Sci.		
England (UK)	504	502	505	14	18	14	471	13,818
Estonia	523	523	530	5	8	4	230	5,316
Belgium (Flemish Community)	493	508	499	22	15	20	288	8,475
Finland	520	507	522	7	16	6	214	5,649
Georgia	380	398	383	70	66	73	321	5,572
Japan	504	527	529	15	6	5	183	6,109
Kazakhstan	387	423	397	69	54	69	616	19,507
Latvia	479	496	487	30	24	29	308	5,303
Lithuania	476	481	482	34	35	31	362	6,885
Romania	428	430	426	47	52	55	170	5,075
Russian Federation	479	488	478	31	30	33	263	7,608
Singapore	549	569	551	2	2	2	166	6,676
Slovak Republic	458	486	464	41	32	41	376	5,965
Slovenia	495	509	507	21	14	13	345	6,401
Average for above 14 countries	469	484	477	29	27	28	4,313	108,359
Average for all 78 countries participating in PISA 2018	487	489	489	39	39	39	21,452	598,795

Table 2. PISA 2018 Results by Nation and Domain of Testing

Figure 2 summarises an examination of the possible association between the proportion of school principals reporting autonomy to allocate the school budget and the average national achievement in PISA. This is to assess the relationship between school autonomy and school performance as a prelude to Kazakhstan changing its model of funding. Clearly, this is something that can be examined in more detail as implementation develops and becomes more widespread over time. However, at this point in time, the authors feel it is worth noting the baseline position in 2018 and contextualizing that internationally before changes occur.
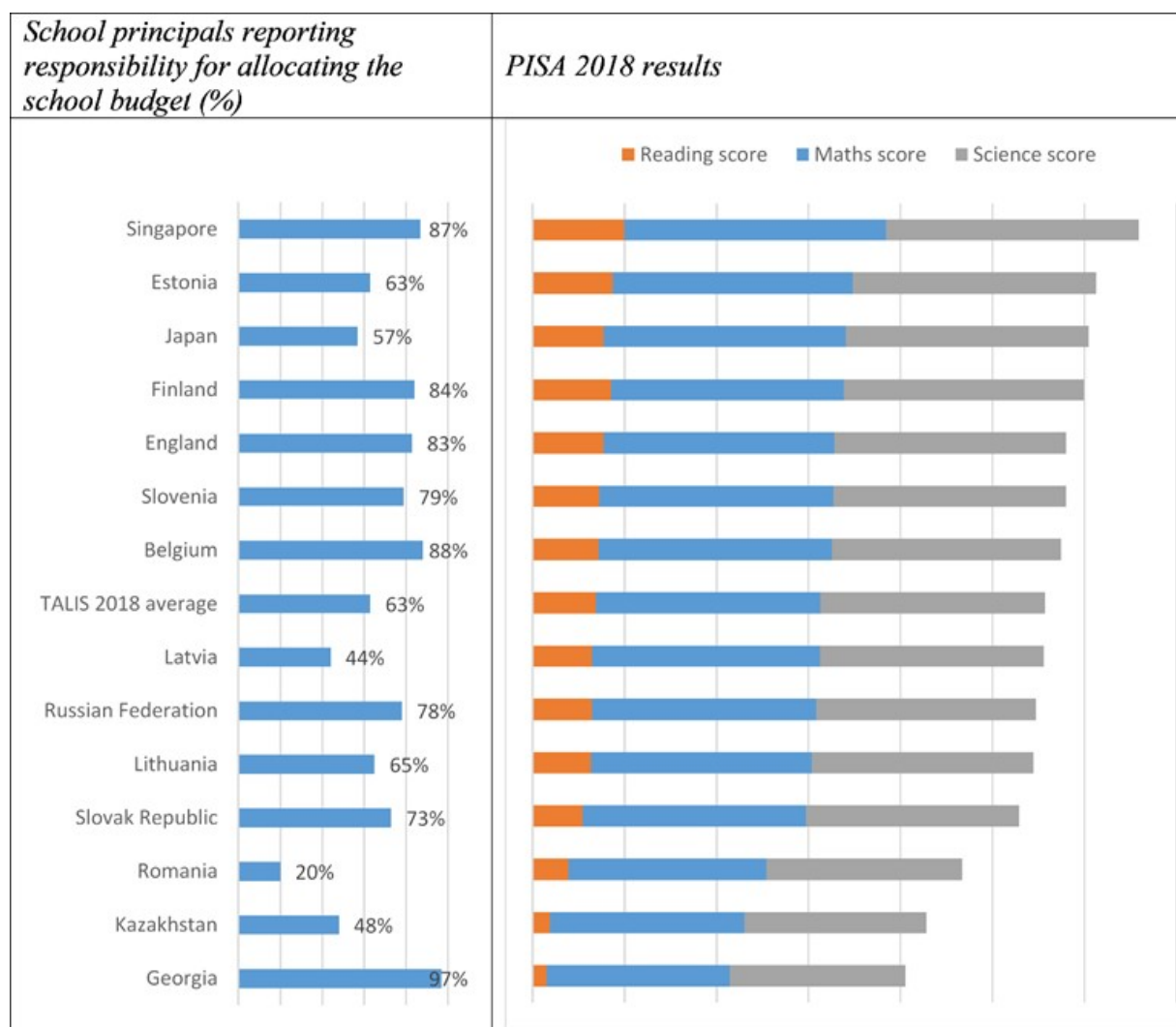
Figure 2. Proportions of School Principals Reporting School-level Budget Allocation
Autonomy against National PISA 2018 Results

From our 14 comparison nations, seven countries had student achievement in PISA 2018 above the average of the overall 78-nation score. For these seven, the autonomy of principals to allocate school budgets ranged from 57% in Japan to 88% in Belgium. In the seven countries (including Kazakhstan) that fell below the PISA 2018 average, the range of school budget allocation autonomy covered a wide range. In Romania, only 20% of school principals reported school financial autonomy whilst in Georgia, 97% of principals reported that they are responsible for allocating the school budget. In 2018, Kazakhstan was positioned in-between these two extremes with 48% of school principals indicating fiscal autonomy. As can be seen in Figure 2, no specific attitude towards school fiscal autonomy alleviated Romania, Kazakhstan or Georgia from being the worst performers in the 14 selected countries or being among the worst in the overall 78 countries taking part in PISA 2018.

International comparison of the level of school autonomy reported by school principals in Kazakhstan and other countries' PISA results in reading, math, and science achievement confirm that there is no "one size fits all" solution for establishing what is an appropriate level of school autonomy to boost student learning. Research on the underlying factors explaining why in some contexts school autonomy boosts learning and in some it does not;

suggests the importance of local social factors (Sholderer, 2017). Empirical research is needed to discover what these factors are for Kazakhstan and how this knowledge "can contribute to improved policy and practice" (Arnove, 2013, p. 17) as school funding and autonomy reforms move forward.

Perspectives of School Principals in Kazakhstan on Changes in School Fiscal Autonomy

Responses to open questions in the on-line survey of principals in Almaty, Nur-Sultan, and Shymkent conducted in 2020 revealed an overall positive reception to per-capita school funding. However, some specific concerns were evident regarding school financial autonomy and school management which might impact school performance.

The initial experience of per-capita funding implementation produced contradictory assessment of financial autonomy granted to schools. One of the principals said that per-capita funding presented an opportunity for the schools "*to manage finances independently*" while another principal stated that "*There is no [financial] autonomy*". All principals who commented on school autonomy were in support of more freedom for schools to make budgeting decisions. One area that several principals commented on concerned the prescriptive procedures stemming from state procurement laws. One suggestion was to reduce the need for many tenders, "*each school has the right to purchase school supplies directly, without a tender*". Despite the more direct financial route from government to schools by the introduction of per-capita payments, several school principals were critical of what they saw as a continuing restrictive effect of municipal education departments, with one participant writing:

> "The school should have autonomy in making decisions about financial opportunities. [I recommend] Removing district education departments as an unnecessary and inhibiting link on school development."

This request for more financial autonomy was accompanied with the recognition that schools need to be free to invest in their teachers in order to improve educational quality. One of the principals who positively assessed the fit of per-capita funding to meeting the needs of the school, said: "*The material base of the school will improve and there will be an opportunity to encourage the teaching staff*" Increasing teachers' compensation and improving the work conditions was the most frequently mentioned urgent issue that needs to be addressed in the context of per-capita funding.

The adequacy of funding is essential for achieving school improvements (Barrett, 2014) and was emphasized by the principals in this study as well. When evaluating the amount of money school principals received in per-capita funding model, half of principals from Nur-Sultan who implemented per-capita funding since 2018, said that the funding has increased or is sufficient, while the other half said the funding was not sufficient or even decreased "*due to the adjustment coefficient*" applied to schools with the number of students exceeding the physical capacity of the school. Among principles from Almaty and Shymkent who started the implementation of per-capita funding in 2019, 46 expressed their satisfaction with the level of funding increase under-per-capita model, nine principals said there was no difference in the amount of money received, and three principals said the financial situation had become harder. One principal stated that an increase in funds would benefit both the conditions for and actual teaching in the school "*The material base of the school will improve and there will be an opportunity to encourage the teaching staff.*"

The link between the number of students and sufficiency of funding is explicit in per-capita funding model and school competition for students emerged as a theme. Several principals expressed concerns that per-capita funding would result in winning and losing schools (In Russian: viigravshix i proigravshix) because of social environmental factors beyond the control of the school. One such factor for schools in parts of the city with a lack of modern housing was outflow of residents to other parts of the city with better housing conditions:

> "The transition to per-capita funding that creates competition between schools presents a difficulty for our neighborhood because the local homes do not meet modern standards. The number of children from year to year is decreasing due to parents relocating. It is a nomadic (Kazakh) tradition to seek better pastures."

Several principals stated that to be able to implement school-based management and perform well in the conditions of per-capita funding, they need training in human resources management, financial and marketing literacy. The development of the overall management skills was mentioned as an important current need to be addressed for changing the way schools to achieve holistic school improvement. One school principal mentioned that an important issue that needs to be addressed sooner than later is "*Strengthening Boards of Trustees and applying new forms of management*"

As this data shows, school principals from Almaty, Nur-Sultan, and Shymkent embrace financial autonomy of schools and are critical of restrictions that exist for schools making financial decisions. At the same time, they acknowledge the need for developing their managerial skills to lead school improvement. Concerns were also raised with regard to equity and competition between schools that could drive the standing of some schools even lower in the minds' eye of parents.

Conclusion

The global position on schools having responsibility for managing their own budgets appears virtually unchanged from 2008 to 2018. Over this ten-year period, around two-thirds of all school principals consistently declared they had prime responsibility for allocating the school budget. Meanwhile, over the same period, other types of school autonomy such as decisions on staffing and defining content have leant towards growth.

Kazakhstan's position in 2018 on schools' financial autonomy was below the international average with less than half of all school principals declaring it applied to them. This suggests that it was timely in 2019 for Kazakhstan to comply with the international norm of a higher proportion of its schools operating with strong fiscal autonomy. Hence, if Kazakhstan is striving for modernisation, implementation of per-capita funding seems a judicious move. One caveat of judging the success of decentralization through measures such as TALIS in nations such as Kazakhstan is that with the large number of small rural schools which may sit outside simple single school per-capita schemes, care has to be taken in interpreting proportionate measures of change that use numbers of schools rather than numbers of students.

The most recent cross-national TALIS 2018 results for fiscal autonomy show great variation but still present some interesting patterns in relation to student performance data. It is noteworthy that countries, like Kazakhstan, that have a minority of school principals declaring responsibility for budgetary decisions tend to be positioned, like Kazakhstan, among the worst-performing nations in PISA 2018.

As Kazakhstan moves towards decentralization of school finance, a 2020 survey of school principals in the three cities in Kazakhstan introducing the new per-capita model of funding were positive about its effects and showed interest in developing autonomy further. Many school principals showed awareness that school autonomy could lead to better performance by encouraging good teachers and improving school facilities. The most significant finding was that to achieve the full potential that fiscal autonomy could reach, principals were explicit that they need training on various aspects of organizational management in order to lead and improve change more effectively.

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Contact email: Liz Winter eaw53@cam.ac.uk

Macro Factors Determining Transition of Vietnamese International Students Mobility

Tran Hoang Nam, Tokushima University, Japan
Jin Cheng-Hai, Tokushima University, Japan

Abstract
With constant increasing in numbers of students studying abroad, Vietnam is on the way to become one of the largest contributors to the world's international student mobility. The overall picture was changed from several thousand students sent to the Eastern bloc during the cold war to about 200,000 students currently studying in Japan, Australia, US, Europe etc. This paper reviews the factors that affect the transition of trends and mobility of Vietnamese international students in the modern time. By examining related studies and literature, we demonstrated that transition of studying abroad in Vietnam is not subjectively resulted by decision of the students themselves or of their families, but it is strongly influenced objectively by external determinants including cultural, social, political, foreign relation, economic, educational factors in the country. The results found five macro factors that influence the transition trends of Vietnamese international students over time, including number of students, study destinations, career after graduation and impact on society.

Keywords: Study Abroad, International Student Mobility, Push Factors, Vietnam

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Introduction

International student mobility has become a trait of globalization. The question of why students take their education overseas has been a long-time topic for many studies conducted in various settings and circumstances. There is no conclusive theoretical framework for factor-determinants to the study abroad. Some studies use the background of the Theory of Planned Behavior to create a model that predicts study abroad intentions (Goel et al., 2010; Presley et al., 2010). Other studies classified the factors influencing demand for study abroad into internal factors, which related to individual's motivation and perceptions, and external factors which come from surrounding environment (Chemsripong, 2017). Other research looking at political, economic, social, cultural, educational factors (Liu & Wang, 2008). The most common theory for investigating the study abroad destination outcome is the "push-pull" model, which sees international student mobility outcome as the result of push and pull factors. Push factors are coming within the source country and urge students to go abroad for study. Pull factors exist in a host country, or in a particular host university for attracting international students (Mazzarol & Soutar, 2002). In this paper, we take a particular setting of a country and investigate the push factors at macrolevel, which tent to be related to historical context and its transformation through out the whole process to reach the current magnitude.

Vietnam is a country located in South-East Asia which has a long history of being influenced by global powers before setting itself on the path of fast-growth economic development during the last several decades. Economic reforms launched in 1986, have brought Vietnam a rapid economic growth, transforming the once among the poorest nations into a lower middle-income country (WB, 2021). Fairly integrated with global economy, the Vietnamese economy has been suffered by the Covid-19 pandemic but has still shown remarkable GDP grew by 2.9% in 2020. This economic development provides Vietnamese youths with more opportunities for study and working abroad. In fact, more and more young Vietnamese students go abroad for study remarkable during the last 30 years. Along with economic growth, recently, number of Vietnamese students studying abroad increases drastically (Tienphong, 2020a), making it on the path to become one of the top sending countries. However, economic growth has permitted increases in the scale education, but the current education system could not meet the actual needs (London, 2011). Regardless of economic achievements, education sector is not capable of producing skilled workers. Education reforms often end in crisis. Education sector's performance could result in broad implications for the country's social, political, economic, and cultural development.

Vietnamese students going overseas for study has been recorded since the end of 19th century (H. C. Nguyen, 2013; Welch, 2010a). Since then, for more than a century, process of study abroad of Vietnamese students has been slowly evolved with significant differences in magnitude and destinations between the periods. Many studies already have showed that the mobility of Vietnamese students to western and Asian countries has been shaped by political and socio-economic changes in Vietnam, as well as by global factors and factors in the host countries.

It could be observed from the past that the Vietnamese studying abroad outcome has been not always subjectively resulted by decision of the students themselves or of their families, but it is strongly influenced objectively by external determinants including cultural, social, political, foreign relation, economic, educational factors, and policies in the country. There is still little understanding about in what circumstances these macro factors have influence on the study

abroad outcome and whether Vietnamese young people could choose to challenge their education overseas instead of study in their home country as an individual decision. This paper is aiming to explore the factors at macro level that affect the study abroad outcome of Vietnamese international students in the past and present, and the implications of these factors in the outbound and return flow outcome.

Method

This paper analyzes the literature collected from official documents issued by the Vietnam government, including the Ministry of Education and Training (hereafter referred to as MOET) etc., research papers published in English, books published in English, research papers published in Vietnamese, Vietnamese public media, new articles, study abroad forums and internet sources. Basically, study abroad could be a matter of any level and form of education, but in this paper, we look at study abroad as the flow of Vietnamese people to a foreign country in pursuit of a higher education degree, including both undergraduate level and graduate level. We used the proposed framework as shown in Figure 1 to sort out the macro and micro level factors from the literature sources. From the data found, we analyze qualitatively to exclude the global factors and pull factors from the host countries and higher education institutions (hereafter referred to as HEIs). We also exclude micro level factors related to individuals and close circles of family and friends. We consider only macro level push factors from the sending country perspective. Finally, we propose five macro factors that have influenced outbound student mobility and revise the reference for each factor.
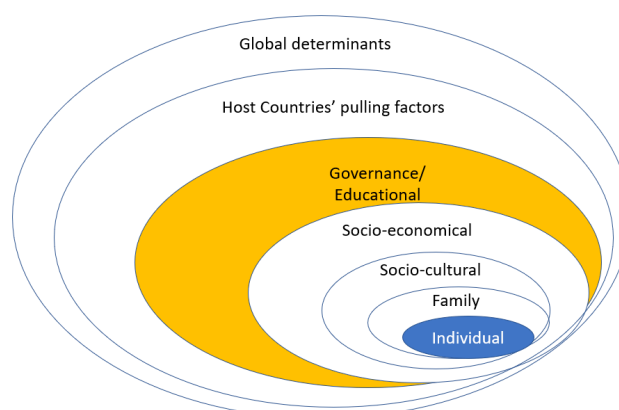
Figure 1: Layers of Push Factors for Study Abroad

Figure 1 shows our proposed conceptual framework of determinants of study abroad outcome. Factors such as globalization, trade, immigration, global human resource, domination of English etc., are listed as global factors, which also could be seen as pull factors that draw the students out from the sending country. Host country's pulling factors are the items specific to a particular host or a group of such, such as bilateral trade, economic partnership, diaspora of immigrants etc., in connection with the sending country. The factors exist in the sending country are of particular interest in this paper. The first group of factors of interest are the ones related to education governance and policy such as laws, strategic plans, national program, enforcement of plans, government funding, government scholarship, encouragement study abroad by study abroad centers, quality assurance of local tertiary education. The second group of factors of interest are the socio-economic factors such as two-child policy, small family, elderly population, economic growth, formation of high-income class, formation of returnee diaspora, increase of foreign investment and international companies, higher salary level of foreign companies etc. Besides, the

socio-cultural factors, which are related to common belief and behavior of the society, such as Confucianism, degree-driven mentality, xenophile mentality, income-driven mentality etc. are also the factors of interest. The factors at individual and immediate circle of people such as study motivation, looking for new experience, intention for immigration, family income, numbers of siblings, having relatives studying abroad etc. are excluded from the scope of this paper.

Results

Determinants of Study Abroad Outcome Prior to 1990

No records have been found about Vietnamese studying abroad before 19th century. Some traces could be found about the Vietnamese student outbound during the French colonization mid-19th century to 1954, when the Geneva accord put the end to the French domination in Vietnam. During this period, study abroad motives had been under influence of political factors and ideological factors, rather than by individual motivation, and study destination of study are often a power opposite to France, such as Japan, China, or Russia. Notably, the Dong Du (east bound) had been the first major movement in the 1905-1908 led by Phan, a nationalist, who tried to counter the French domination by renovating the political management through the technological support from Japan. The movement ended up with sending 200 Vietnamese students to study technology and military science in Japan (Nguyen, 2013), but later failed to continue. Later, some other study abroad movements had been started in relation with international communist movement during the early 20th century. Some groups of students had been sent to China, another groups to Russia for studying Marxism and military studies, laying foundations for establishment of communist parties later (Vu, 2008). Nevertheless, most talented students and students from wealthy families were attracted to France (McConnell, 1989).

After the Second World War, Vietnam had been divided into two countries. The north established foreign relations with socialist countries and others such as Sweden, India, etc. The government selected excellent students with upright political and family background (Vasavakul, 1994), then students were sent to study abroad with scholarships by the socialist countries. This pattern remained the dominant feature in the international student mobility in the north during this time. The USSR was the biggest destination with an estimated number of 40,000 Vietnamese graduates during the Cold War (Nhan Dan, 2021). In contrast, the south could gain better access to domestic higher education (Dommen, 2001). In addition to France and the USA, the south sustained foreign relations with other capitalist countries, and the best students were sent to these countries via inter-governmental scholarships. The Colombo Plan - the best-known sponsorship program was started since 1950, Australia, USA, UK, Canada, and New Zealand became the major destinations in this plan (Colombo Plan, 2021). Again, political, and ideological factors had continued to be determinants for study abroad in north Vietnam during this period, while the south had taken more liberal policy to allow private study abroad. After the reunification in 1975 until the end of the Cold War, the study abroad situation had been continued in the way it had been implemented in the north, sending students to socialist countries with the government's screening and scholarship.

Since 1986, Vietnam started economic reform known as the open-door policy and adopted a market-oriented socialist economy (Thayer, 1999). After the dissolution of the socialist bloc, Vietnam stopped to send students to ex-socialist countries in 1991 by governmental treaties. Sending students overseas has become the government's strategy to improve human capital

for industrialization since the late 1990s. Since then, trend of study abroad had followed the new education policy, open for students to apply for foreign government and private scholarship, or on own expenses, in addition to Vietnam government scholarship. Students also could choose more diversified destinations for study, mainly in the western countries.

Current Situation of Vietnamese International Students Abroad

There is no official government statistics about the transition of Vietnamese international students over years. However, ad hoc estimation was found from various sources. Some secondary sources specified the number 63,703 in 2006 (Kuroda et al., 2018), 40,000 in 2006~2007 and 130,000 in 2016~2017 (Vo & Shi, 2017), and to 200,000 in 2018 (L. H. N. Tran, 2019).
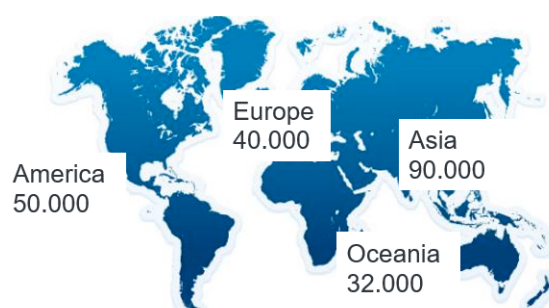
Figure 2: Estimated Number of Vietnamese Int'l Students in 2019~2020.

Figure 2 shows number of Vietnamese international students according to estimation from the MOET in Mar. 2020 (Tienphong, 2020a). Accordingly, there are about 190,000 Vietnamese students abroad, of whom about 40,000 in the European region (UK 12,000, Germany 7,500, France 6,500, Russia 6,000, Finland 2,500, Italy 1,100, Netherlands 1,000, Spain 600, Hungary 550). About 50,000 are in America (US 29,000, Canada 21,000), over 32,000 are in Oceania (Australia 30,000, New Zealand 2,500). In Asia there are about 70.000 (Japan, China, Korea, Malaysia, Singapore). In Africa there are only 50. Other sources mentioned about 200,000 students abroad hallmark in 2018 (Ashwill, 2018b). Top five host countries for Vietnamese students worldwide are Japan (73,389, 2017); US (29,788, 8-18); Korea (27,061, 4-18); Australia (22,565, 7-18); and Canada (14,095, 2017). In total 155,180 in the top five countries above, 57% of them in East Asia (Ashwill, 2018a). In 2018, number of Vietnamese students ranked 2nd in Japan, 4th in Australia and 6th in the US.
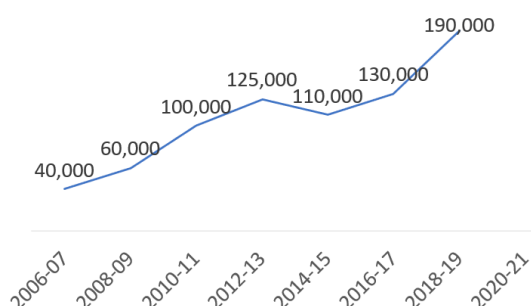
Figure 3: Transition of Vietnamese International Students

Figure 3, which combined data from MOET and other sources, shows the rapid increase in number of Vietnamese international students, which reached 5-fold for a 15-year period, after a plateau from 2012~2016, the curve becomes very steep during the last several years until

the outbreak of Covid-19.

Macro Factor 1: Unmet Demand for Higher Education

Until 2019, Vietnam has 237 HEIs, including 65 private institutions (MOET, 2021). As the National College Entrance Exam has been abolished since 2015, the admission to HEIs will be based on the high school GPA and results of the secondary graduation examination. According to MOET, in 2019, 887,173 students took high school grad examination, among whom 653.000 applying for college (74%). These students, together with other examinees were competing for the total admission capacity of 489,637 slots for college admission, 7.5% increased to the previous year. This number revealed that annually, about 400,000 high school graduates do not continue to study in colleges. According to some estimation, Vietnam has low college enrollment rate of 185 students/10,000 populations. College enrollment rate among 18~29-year-old population is 28.3%, much lower than surrounding countries such as Thailand at 43% (Tuoi Tre, 2019). These data show that there is a gap between the increased need for college education among population, and the admission capacity of the HEIs.

Interestingly, as shown in Figure 4, the total college enrollment is slightly down during the period 2013~2019. In the breakdown, there is a slightly increase in the private sector, while it decreases in the public sector (MOET, 2021). Interestingly, although an increase in college education and increase in total college admission capacity, the actual enrolled number is decreased. This phenomenon could be explained by the increased preference of students to choose study abroad. On the other hand, Vietnam applies the two-child policy since the Cold War and achieved a population growth rate of 1.14% per year during period 2009~2019 (GSO, 2019). This fact explained that population growth could be a partial reason for increasing need for higher education. In short, the gap in quantity between demand for college education and domestic supply represents one of the determinants for students to look for study abroad.
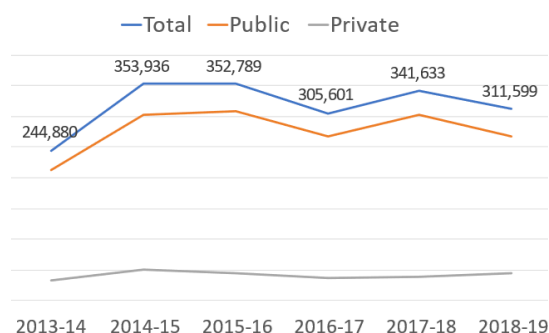
Figure 4: Transition of College Enrollment

Macro Factor 2: Inadequacies of Domestic Higher Education

Higher education in Vietnam has undergone a long transition process from Soviet model towards a western-styled system (Welch, 2010a). There are still gaps between national goals and actual achievement. Decentralization is still not far progressed and as the HEIs are not given enough autonomy from MOET. HEIs are suffering from shortage of qualified faculty (Lam, 2013; London, 2011; L. T. Tran et al., 2014; T. B. K. Tran, 2014). Too many ineffective changes and reforms (Harman et al., 2010; Lam, 2013), along with outdated curriculum and unnecessary subjects, unavailability of programs in English, shortage of well-qualified teachers, unreasonable salary for faculty staff, increasing cost for study/tuition fees etc. are

the challenges which make the domestic education less attractive. Many students could not find the program they want to study in domestic settings. In terms of internationalization, Vietnam's higher education is still lags in many aspects, including low number of inbound students, non-internationalized campus environment, shortage of international exchange and cooperation, shortage of English programs, lack of quality assurance standard among the other things (Dang & Glewwe, 2018; Harman et al., 2010; T. B. K. Tran, 2014; Welch, 2010a). Another challenge is that higher education in Vietnam is overwhelmingly undergraduate level. In 2005, only 3% of new students enrolled at graduate courses (Hayden, 2010). In 2019, this ratio is increased to 7.6% (MOET, 2021). Although attempts to strengthen research capacity of HEIs, only 1 university of Vietnam are placed in top 1000 by THE, and another two in the 1000+ (THE, 2021). Only about 25% of the professors are active in research (Dang, 2020). In the lack of a consistent world-standard research institution within the country, many students must seek a graduate education outside the country.
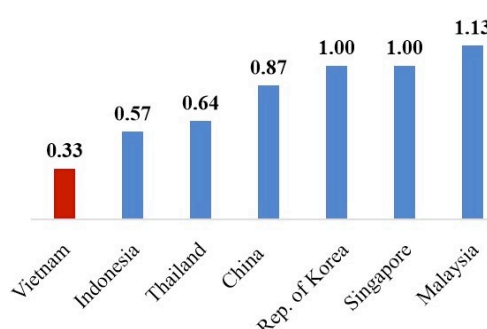
Figure 5. Public Expenditure (% of GDP) for Higher Education in 2016

It had been reported that despite expanded in number, the quality of higher education had not met the market demand. Domestic graduates, who lack of skills required by the market, struggled to get employed. Among about 200.000 college graduates per year, only 50% could find employment, and merely 30% of them are on the right specialty (T. B. K. Tran, 2014). Despites ambitious plans, the actual public expenditure on higher education is inadequate. Vietnam allocates about 5% of public spending on education sector, but only 0,33% of spending is for higher education. Figure 5 shows the rate of expenditure on its higher education lagged behind the other countries in the region (Vietnamnet, 2020), and there is no evidence that a workable strategy has been developed to finance the growth of the system and its quality (Harman et al., 2010). In short, the gap in quality between demand for college education and domestic supply represents one of the determinants for students to look for study abroad.

Macro Factor 3: Social Norms and Mentality

In its long history, Vietnamese value, and respect intellectuals and respect education. Like in China, this "love to study "(hieu hoc) tradition is strongly influenced by Confucianism (London, 2011). Parents encourage and give the most priority to fund the children to study, as well as to ensure their children to enter the best schools. On the other hand, long history of isolation has influence on the mindset of people to prefer foreign made over local products. This xenophile (sinh ngoai) mentality is not different towards foreign education (Giao Duc, 2019). During 20th century, before and during the cold war, gaining a scholarship to study abroad had been considered as an outstanding achievement not only for the student himself but for the whole family. Before the end of the cold war, foreign-degree returnees have had a high chance to become a high-ranking official. This mentality is not changed yet even

nowadays. In the most positive variant, excellent students are encouraged to get a prestigious scholarship for study abroad to gain knowledge and skills, research ability and modern work style in developed countries, then return and contribute to the country's development. In case the students are not very bright to compete for a scholarship, they are still encouraged to study abroad if the parents are stable financially. In case of poor families, sometimes students are encouraged to go abroad doing parttime jobs and side business for repaying the cost under the form of loan. Parents see investment in study abroad is a long-term investment to the child to ensure the best, long term social and economic benefit. In short, the tradition of respect education, the mentality of foreign degree preference, in addition to non-preference perception towards local education together define social norms towards study abroad.

Macro Factor 4: Economic Factors

After the cold war, Vietnam took decisive changes its foreign policies to befriend with all countries follow the course of global integration (T. B. K. Tran, 2014), (Bui, 2016). GDPs growth has well reflected into increased family income, which is the main source to fund for studying abroad of the children (WB, 2021). A boom of foreign investment and foreign-owned companies has led to higher chance for employing student-returnees with higher salaries (Hirasawa, 2019). The open economic market in Vietnam brings better economic conditions for Vietnamese. The well-off families hope children can enjoy the sound educational environment in developed countries through studying abroad. Number of middle-class families, who can afford funding for a study abroad is increasing firmly. Some parents even send children to study abroad since they are in junior high school because they think it is better for children to learn languages and adapt to foreign countries (Vo & Shi, 2017). Raising of domestic tuition fees is also a factor to make students consider study abroad (RFA, 2021). Nevertheless, low-income families also consider economic perspective of study abroad with emigration intention. In short, from economic perspective, study abroad becomes more affordable while domestic education becomes more expensive may drive more students to choose study abroad.

Macro Factor 5: Government Policy and Scholarships

Since late 1990s, MOET started to actively promote study abroad, which at first focused on countries like US, France, UK, and Russia, then later expanded to other countries such as Australia, Germany, Singapore, and China. MOET allowed public and private channels to support study abroad information, encouraging students to seek scholarship or to choose self-funding. Students can access information through internet or through consulting centers. MOET even established its subsidiary center for promoting study abroad (CIEC, 2021). MOET advocated establishing the Vietnamese international student groups, to provide a platform for overseas students to exchange with each other. Not only for admission, but administrative procedures for going abroad also had become eased. These study-abroad policies have great influence on students who have intention to study abroad. Open door policy since 1986 allowed all private sector to develop in concurrent with state-run sectors. In the field of education, since late 90s', private universities and foreign-owned universities such as RMIT are permitted to operate (TT, 2021). Although having more options, as shown in Figure 3, total domestic enrollment seemed slightly decreased, while private domestic enrollment is slightly increased, in the contrast of drastically increased number of students overseas.

The government's commitment to send students overseas had been realized by numerous scholarship schemes. It needs to look at three major scholarship programs managed by MOET. Project 322 had been implemented during period 2000~2010 to fill the gap for sending students to study abroad after 1991, with total budget approximately USD 50 million. The project finished with 4.590 students sent (among which 2.268 sent for doctoral study, who supposed to continue their previous position at public institutions. The project was criticized for ineffective management of students who dropped out or not returned to their workplace and get their education cost refunded. Moreover, after returning to previous workplace, many of them could not work effectively, facing problems such as reverse work culture shock, low salary, poor funding for research which forced many of them to leave government job (Vietnamnet, 2011). Project 911 had been planned for implement the education human resource plan 2011-2020, according to which by year 2020 Vietnam's HEIs need 75,800 lecturers (30% doctoral, 50% master's degree), starting from only 14% of lecturers have doctorate in 2011. With the budget of VND 14.000 billion (approximately USD 600 million), this ambitious project set a goal for producing 20.000 doctoral holders, half of whom to be trained abroad. Unfortunately, this project had been stopped by government in 2017, with total enrollment rate in 2016 of 20%. It was criticized for unrealistic planning due to lack of feasibility study, low standard of domestic doctoral "incubators", and inability to get refund from the students who dropped out abroad etc. (Nguoi Lao Dong, 2018). Project 89 is the new scholarship program planned for period 2019-2030, in which HEIs are authorized to manage funding and student recruitment. This project is ambitious again with the goal to train 10% of HEIs' teaching staff (~7300 lecturers) for doctoral degree, 70% of whom to be trained abroad (Vietnamnet, 2021). In short, the government effort is one of the decisive factors, especially for staff of public sector to get degree abroad.

Discussion

International student flows are often characterized as having a "South" to "North" polarity (Shields, 2013), especially to English-speaking countries. However, some evidence suggests that growth rates in incoming students to Asia has dramatically outpaced that of established destinations (Welch, 2010b). In the case of Vietnam, the same pattern could be seen clearly by the outbound flow. Negative correlation between economic prosperity in sending countries and the volume of international student flows (McMahon, 1992) was not found in case of Vietnam, where economy is growing by 6~7% per year, but outbound number of students is still on increasing trend. In case of Japan as a host country, relative size of Vietnam's economy is increasing, however, outbound number of students is increasing too. It may need further analysis about how the identified macro factors contribute to these patterns.

Students with government scholarship consist of about 5%~10% of total student number are required to return to their previous workplace. A major part of students, who are on own expenses or private scholarship, usually don't want to return home. For the former, some think they may get government promotion while others think it cannot meet their requirements in working conditions to return home to work because of the low living standard and poor treatment. At present, there is no effective policy from government to attract overseas graduates to return. A MOET survey indicates 70% of self-funded overseas students are willing to work in a developed country (Vo & Shi, 2017). Study has shown that 100% of international graduates want to stay in the host country to study and work, regardless of their economic status (Pham, 2019). The same study specifies that returnees face difficulties after returning. What they learn abroad cannot be applied to their work in

Vietnam. It may need further analysis about how the identified macro factors affect the returnees.

The outbreak of Covid-19 pandemic has made tremendous global impacts to international student mobility. It has impact also on Vietnamese international students, as some students had to discontinue study plan, while others could not outbound (Laodong, 2021; Tienphong, 2020b; VOV, 2021). While Covid-19 seems to be a macro factor that strongly affect the mobility, the evidence is still insufficient, so we leave it to a future investigation.

Conclusion

Vietnam is on the way to become a major contributor to the world's international student mobility. This paper reviews the push factors that affect the outbound trends of Vietnamese international students in the modern time. By examining related studies and literature, we demonstrated that transition of studying abroad in Vietnam is not only resulted by decision of the students themselves or of their families, but it is strongly influenced objectively by layers of determinants. This paper shows that Vietnam's outbound trends for higher education has been affected by many factors throughout history. Up until the end of cold war, political and ideological factors were the dominant force for driving students to study abroad. Recently, the situation is influenced by more diversified factors, which could be grouped into five macro factors as suggested by the results of this paper: (1) unmet demand for higher education; (2) inadequacies of domestic higher education; (3) social norms and mentality; (4) economic factors; (5) government policy and scholarships. These results show that there is an increasing need for study abroad pushed by multiple factors. These factors, together with external pull factors could influence the outbound mobility over time, including number of students, study destinations, career after graduation and impact on society, contributing to diversity, multiculturalism and internationalization and regional development.

Acknowledgement

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Contact email: tran@tokushima-u.ac.jp

A Study of Students' Engagement on the Zoom-based Synchronous Online-teaching

Ka Man Pang, University of Wollongong College Hong Kong, Hong Kong

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Abstract

The outbreak of the COVID-19 created a chaos of global health crisis and campus health. To avoid class suspended, the Wollongong College Hong Kong (UOWCHK) has shifted most classes to a Zoom-based synchronous online learning environment. It includes one of my taught modules named 'Introduction to Programming'. However, there is a lot of problems specific to online learning having been discussed in diverse studies. It includes that learning comes to be 'passive', 'isolated' and 'unengaged'. Along with these problems, a study was organized concerning whether students can mentally engage with the Zoom created new learning environment stably across all the learning topics of this module. This study used a rating scale and anchoring survey method to collect quantized qualitative data on students' feelings with five bipolar mental specifications, 'Boring–Stimulating'; 'Did Not Learn Much-Learned Much'; 'Not Engaged in Learning Process-Engaged in Learning Process'; 'Not Much Work Done-Much Work Done', and 'Could not Experience Good Learning- Experienced Good Learning'. Students were asked to rank against these mental specifications in 1-7 bipolar points upon completion the teaching weeks of week-2, week-5, week-9, and week-12. The responses on this study were analysed with the one-way repeated measure ANVOA and mean analysis descriptive methods. The outcome of this research is inspiring. It shows that students could stable engage to all major learning topics with a positive engagement. This result significantly provide evidences that students in this module were not restricted by using the Zoom to learn, and also the use of synchronous online teaching could be a supplementary learning approach and provide a flexible approach for instructional design.

Keywords: Zoom, Synchronous Learning, Online-teaching, Learning Engagement, Learning Environment, Introductory Programming, Pedagogy, Repeated Measure ANVON

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Introduction

There is a lot of problems specific to online teaching including diverse mental engagement problems having been discussed in diverse studies. While there was one of my teaching modules named 'Introduction to Programming' adopted to use Zoom-based synchronous online teaching, this paper reports a research focused on students' learning with this teaching mode. It particularly concern of students' mental engagement on using Zoom to teach. The targeted module is a year-one module offered in two two-year associate degree programmes, named 'Associate of Science in Information Software Development' and 'Associate of Science in Network and System Administration'. This module consists of thirteen 3-hour teaching weeks aiming to provide students basic knowledge on computer programming, including the topics of variables/constants, decision/looping controls, array, program modernization and object-oriented programming concept. They are all major contents introduced in the introductory programming.

Background of this Study

This study focuses students' mental engagement to a new created Zoom-based synchronous online learning environment. This focus is defined based on the concern of there is a lot of learning mental problems specific to online teaching particularly in learning of introductory programming. For example, regard to effective of instructional design, online teaching is difficult to be achieved as it requires substantial changes on the scaffolding to maintain students' engagement which could be pursued in normal teaching approach (Adedoyin & Soykan, 2020; Best, 2020; Breivik, 2016; Joshi, 2020). As reported by many studies, engagement to the learning environment is a major property for motivating students to learn, reducing the mental difficulties on the learning processes, while a new software, environment is used (Belland, Kim, & Hannafin, 2013). Moreover, in an online teaching environment, teachers are limited by the poor capacity of creating an effective communication channel to regulate the learning process, facilitate collaborative learning, group discussions (Adedoyin & Soykan, 2020; Joshi, 2020). It consequently comes up those teachers feel the learning process will be 'out-of-control'. It gives a great challenge on instructional delivery (Sarikas, 2018), and also adversely affect the process of developing formative assessment, class collaborative activities, and provide pertinent helps for students (Shabani, Khatib, & Ebadi, 2010).

The mental problems specific to online teaching also includes students feeling of isolation (Iskander, 2007; Kats, 2010), frustration, low involvement, and discouraging with poor student-teacher communication to get immediate helps (Best, 2020; Boulos, Maramba, & Wheeler, 2006). This outcome of mental difficulties specifically affecting students' achievement while they are highly required to visualize the abstractive of programming logics, semantics to be an understandable model in their mind. As pointed by Gomes and Mendes (2007), the reasons of students' poor understanding on the complexities of program semantics are mainly due to their poor taxing mental efforts. This mental problem is caused by the incapability of learning activities that could not encourage learners positively engage to the learning environment when software based online learning tool is used.

Another study from Piteira and Costa (2013) provides similar conclusion. This study claimed that the major reason of students' low performance in online teaching is due to students' paucity of the abstract thinking in programming logics. While the isolation of teacher and students causes a lot of difficulties to establish an effective way, this problem of paucity cannot be easily improved. Study from Piteira and Costa continuingly pointed out that such poor mental

engagement problem comes up to be a major reason of high drop-out rate in year-1 Computer Studies (CS1). This study aligns with the findings from Mhashi and Alakeel (2013), it indicated that the high drop-out rate in introductory programming is due to students' frustration from the poor supportive learning engagement, in which they feel isolated and boresome by lacking pertinent helps immediately. This problem eventually highly restricted students' achievements on the learning.

Methodology

This research applied the quantized qualitative research method. Students were required to rank from 1 to 7 against to the two polarities of five bipolar mental specifications, which were defined with referencing some practical works and studies focused on effectiveness of instructional delivery for learning computer programming (Tsai & Chiang, 2013; Tsai, Shen, & Fan, 2013). The specifications are sp1: Boring – Stimulating; sp2: Did Not Learn Much – Learned Much; sp3: Not Engaged in Learning Process – Engaged in Learning Process; sp4: Not Much Work Done – Much Work Done, and sp5: Could not Experience Good Learning – Experienced Good Learning at four surveyed points, which are the teaching weeks of week-3, week-5, week-9, and week-12. By curriculum, these teaching weeks are focused on the topics of 'basic concept', 'program controls', 'array and file data structure' and 'object-oriented concept' respectively. These topics are presented at different difficult levels in introductory programming, therefore data collected at these points can be reflected students' engagements varying at different times with the learning difficulties corresponding to the topics.

These mental specifications also focus on students achievements corresponding to the mental difficulties on learning computer programming in an online teaching environment (D. R. Garrison, 2006; D. Randy Garrison & Cleveland-Innes, 2005). The use of bipolar rating scale can minimize the disruption to students by allowing them to make generic ranking on every surveyed teaching week while it would not quizzed or required students spending time to complete a long survey (Robert et al., 2009). Students' responses on the specifications in all surveyed teaching weeks were analysed with one-way repeated measure ANOVA (Mhashi & Alakeel, 2013; Spector, Lockee, Smaldino, & Herring, 2013). It is an effective data analysis method for repeatedly comparing the variation of a set research variables (Field, 2012). For this study, the major goal is to show the variances on students' responses on all surveyed teaching weeks being not significantly. It means most students can stably, mentally engage to the Zoom created new learning environment across the module. Otherwise, the high variances on the engagements to all surveyed teaching weeks may show students are restricted by the Zoom-based asynchronous online teaching.

Data Analysis and Discussio

The outcomes analysed by one-way repeated measure ANOVA provides evidence that students are possibly engage to the module's learning activities. The detail result of individual specifications is presented in the follows.

sp1. Boring – Stimulating

The Mauchly's Test of Sphericity for the specification 'Boring-Stimulating' is observed. It shows that the sphericity can be assumed with the Mauchly's value of W=0.954, $X^2(5)$=3,632, p=0.604 (>0.05).

The Test of Within-subjects' Effects is illustrated in the Table 1. It shows that with the F-value is $F(3, 234)=1.532$, $p=0.207$ (>0.05), the variance of students engagement between the surveyed teaching weeks is not significant.

Source		Type III Sum of Squares	df	Error (df)	Mean Square	F	Sig. α=0.05
Students Responses	Sphericity assumed ($X^2(5)=9.54$, p=0.604)	7.823	3	234	2.663	1.532	0.207

Table 1. The Test of Within-subjects' Effects on the Specification 'boring to Simulating' (n=80).

sp2. Did Not Learn Much – Learn Much

The Mauchly's Test of Sphericity for the specification 'Did Not Learn Much-Learn Much' is observed. It shows that the sphericity can be assumed with the Mauchly's value of W=0.934, $X^2(5)=5.148$, p=0.398 (>0.05).

The Test of Within-subjects' Effects is illustrated in the Table 2. It shows that with the F-value is $F(3, 231)=2.391$, $p=0.069$ (>0.05), the variance of students engagement between the surveyed teaching weeks is not significant.

Source		Type III Sum of Squares	df	Error (df)	Mean Square	F	Sig. α=0.05
Students Responses	Sphericity assumed ($X^2(5)=5.148$, p=0.398)	14.163	3	231	4.721	2.391	0.069

Table 2. The Test of Within-subjects' Effects on the Specification 'did Not Learn Much-learn Much' (n=80)

sp3: Not Engaged in Learning Process – Engaged in Learning Process

The Mauchly's Test of Sphericity for the specification 'Not Engaged in Learning Process – Engaged in Learning Process' is observed. It shows that the sphericity can be assumed with the Mauchly's value of W=0.889, $X^2(5)=9.118$, p=0.104 (>0.05).

The Test of Within-subjects' Effects is illustrated in the Table 3. It shows that with the F-value is $F(3, 237)=0.048$, $p=0.986$ (>0.05), the variance of students engagement between the surveyed teaching weeks is not significant.

Source		Type III Sum of Squares	df	Error (df)	Mean Square	F	Sig. α=0.05
Students Responses	Sphericity assumed ($X^2(5)=9.118$, p=0.104)	0.312	3	237	0.104	0.048	0.986

Table 3. The Test of Within-subjects' Effects on the Specification 'not Engaged in Learning Process – Engaged in Learning Process' (n=80).

sp4. Not Much Work Done – Much Work Done

The Mauchly's Test of Sphericity for the specification 'Not Much Work Done - Much Work Done' is observed. It shows that the sphericity can be assumed with the Mauchly's value of $W=0.942$, $X^2(5)=4.631$, $p=0.463$ (>0.05).

The Test of Within-subjects' Effects is illustrated in the Table 4. It shows that with the F-value is $F(3, 237)=5.169$, $p=0.002$ (<0.05), the variance of students' engagement between the surveyed teaching weeks is significant.

Source		Type III Sum of Squares	df	Error (df)	Mean Square	F	Sig. $\alpha=0.05$
Students Responses	Sphericity assumed $(X^2(5)=4.631, p=0.462)$	27.575	3	237	9.192	5.169	0.002*

Table 4. The Test of Within-subjects' Effects on the Specification 'not Much Work Done - Much Work Done' (n=80)

sp5. Cannot Experience Good Learning – Experience Good Learning

The Mauchly's Test of Sphericity for the specification 'Cannot Experience Good Learning – Experience Good Learning' is observed. It shows that the sphericity can be assumed with the Mauchly's value of $W=0.957$, $X^2(5)=3.364$, $p=0.644$ (>0.05).

The Test of Within-subjects' Effects is illustrated in the Table 5. It shows that with the F-value is $F(3, 237)=0.048$, $p=0.986$ (>0.05), the variances of students engagement between the surveyed teaching weeks is not significant.

Source		Type III Sum of Squares	df	Error (df)	Mean Square	F	Sig. $\alpha=0.05$
Students Responses	Sphericity assumed $(X^2(5)=3.364, p=0.644)$	0.179	3	237	0.060	0.038	0.990

Table 5. The Test of Within-subjects' Effects on the Specification 'cannot Experience Good Learning – Experience Good Learning' (n=80).

In summary, the outcome of the specifications Boring - Simulating (p=0.207<0.05)', 'Did Not Learn Much - Learn Much (p=0.069 > 0.05)', 'Not Engaged in Learning Process - Engaged in Learning Process' (p=0.986 > 0.05), and 'Cannot Experience Good Learning – Experience Good Learning (p=0.990 > 0.05)' is able to indicate students being generally engaging to the Zoom created new learning environment across the learning of this module. However, as indicated in individual specification, there are still some concerns, as discussed in the follows.

The major purpose of one-way repeated measure ANVOA can identify the level of stability of students' engagement upon using the Zoom-based synchronous online teaching. However, it is unable to identify whether this engagement is positive or not. To know of it, a further analysis on the means of students' responses on individual specification in all surveyed teaching weeks is used. The result is presented in the Table 6 in below.

Mental Specification	Week-1 M (SD) (n=80)	Week-5 M (SD) (n=80)	Week-9 M (SD) (n=80)	Week-12 M (SD) (n=80)	Average of All Means
sp1. Boring – Stimulating (n=79)	5.00 (1.30)	4.77 (1.35)	5.22 (1.31)	4.96 (1.42)	4.98
sp2. Did Not Learn Much – Learn Much (n-78)	5.40 (1.24)	4.86 (1.51)	5.01 (1.49)	5.28 (1.34)	5.13
sp3. Not Engaged in Learning Process – Engaged in Learning Process (n=80)	5.01 (1.35)	4.93 (1.60)	4.96 (1.59)	4.98 (1.22)	4.97
sp4. Not Much Work Done - Much Work Done (n=80)	4.81 (1.31)	4.94 (1.48)	5.23 (1.37)	5.58 (1.25)	5.14
sp5. Cannot Experience Good Learning – Experience Good Learning (n=78)	5.12 (1.32)	5.06 (1.32)	5.13 (1.33)	5.10 (1.36)	5.10

Table 6. The Descriptive Statistic Outcomes on All Specifications' Mean Value on All Study Points.

The Table 6 shows that all the means of the specifications for individual surveyed teaching week are over 4.77, and up to 5.58 (the columns of week-1, week-2, week-9 and week-12). Besides, together with the outcome shown in the last column, 'Average of All Means', that values are   range at 4.97~5.14, the overall outcome presented in table 6 could be seen is positive. In this view, it could be concluded that the outcome of students' engagement indicated by one-way repeated measure ANVOA is positively presented.

Regard to students' responses on the specification 'Not Much Work Done - Much Work Done', while this specification indicates variance between all surveyed teaching weeks are significantly different (p=0.002 < 0.05), as show in the Table 4. It needs a more insight on why this significant difference presented. Focus again to the Table 6, in the row of 'sp4. Not Much Work Done - Much Work Done', the means of this specification in all surveyed teaching weeks are 4.81, 4.94, 5.23, 5.58 for week-1, week-5, week-9 and week-12 respectively. It shows a pattern on the differences which is stably increasing from 4.81 to 5.58 from week-1 to week-12. This outcome can be interpreted as students' achievement during learning in this module, as this specification relates to 'Much Work Done' instead of to be an adversely effect of students' stability of engaging to the learning environment. These responses perhaps are expected in a learning module.

Conclusion

Although the one-way repeated measure ANVOA shows significant variance on sp4 'Not Much Work Done – Much Work Done' across the surveyed teaching weeks, however with the positive responses on other specifications, the sp1, sp2, sp3 and sp5, this research can be concluded that students were able to engage positively, mentally to learning environment throughout the whole module while use the Zoom-based asynchronous online teaching. In this view, although students used Zoom to learn, and lecture used the Zoom to teach, students were still willing to spend time on learning, able to positively engage most learning processes, and stably across all major topics in this module. They were also experienced a good learning approach. More importantly, this research focused on mental engagement, while it is a crucial factor to students on developing their understanding on programming logics (Belland et al., 2013; Linnenbrink & Pintrich, 2003). The result of sp1 'Boring-Stimulating' therefore importantly providing evidences the use of online teaching does not restricted students' interest,

and boresome on learning computer programming while they both are major reason of students' frustration on learning computer programming.

This research does not intend to suggest a scaffolding on synchronous online teaching. Instead, it is to evaluate whether the use of synchronous online teaching with the Zoom created environment will deteriorate students' learning achievement owing to the poor mental engagement to this environment. This finding is crucial as a positive outcome, as indicated in this research, can provide ideas for teachers considering an alternative way for instructional delivery by rethinking the application of a mix-mode teaching approach, while resume to normal class learning when Covid-19 comes to be controllable, or may be use it as a supplementary teaching approach to provide a more flexible instructional and scaffolding design. However, base in this research, there are some gaps need to be concerned. Firstly, the pros and cons of mix-mode approach have been discussed in many studies while there is not conclusive theory provided (e.g.,Sooriamurthi, 2009; Teague, 2011). Moreover, many of these studies were not defined based on the background of Covid-19 outbreak. In this sense, further research relating to this study's outcome are recommended to wider the focuses on extending students' achievements in respect to different subject areas by using empirical studies. These works are valued, as class suspension due to some reasons like Covid-19 outbreak in this time is foreseeable in the future. We need strategy to cope with it by introducing an effective new and alternative learning approach to academic learning.

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Contact email: kmpang@uow.edu.au

Teenpods: Production of Educational Videos as First Step in a Transmedia Educational Project about Positive Youth Development

Laura Fernández-Rodrigo, University of Lleida, Spain
Arnau Erta-Majó, University of Lleida, Spain
Eduard Vaquero Tió, University of Lleida, Spain

Abstract
Teenpods is the name of a Transmedia-Educational-Project (TEP) performed by the Chair Education and adolescence from University of Lleida. This project aims to promote the Positive-Young-Development (PYD) approach on educational contexts. It has 12 pods about different topics linked with adolescence. Each Teenpod is set to include several transmedia objects addressed to education practitioners. The first step in each pod design was elaborating an educational video about the selected topic. This communication aims to describe this experience: the elaboration process of Teenpods and the reflection on the followed principles for the design of educational videos as a part of a TEP. Methodologically, transmedia objects have been produced following a Design-Based-Research (DBR), characterized by iterative cycles of analysis, design, development and refinement via tight collaboration among researchers, practitioners and audio-visual producers. Results show that video resources as part of transmedia objects design process is linked with principles of TEP production: choosing scientific content about educational topics, adapting content to a synthesized and dynamic discourse, taking care of the graphic design and multimedia content, and planning the launching of the final product on the internet. This study contributes to fill the gap in the literature about TEP to train professionals. It offers guidelines to promote the self-learning processes through transmedia open resources for educational practitioners on the field of Educational Technology. Additionally, it presents an example to promote PYD through video educational objects. Finally, future research is needed to deeply analyse the impact of these resources on the Internet.

Keywords: Transmedia Education, Adolescence, Practitioner Training, Educational Videos, Open Educational Resources

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Introduction

Through the paradigm of **Positive Youth Development** (PYD) adolescence stage can be defined as a fundamental life cycle, of growth, construction and consolidation of the personality, full of opportunities and possibilities, taking into account a series of competencies, values, key skills that all teenagers need to have (Lerner, Phelps, Forman, & Bowers, 2009). It moves beyond the negative and deficit view of youth and it is about adopting a perspective focused on the well-being of the adolescent (Curran & Wexler, 2017).

The literature show many experiences about the promotion of PYD in different educational contexts (Curran & Wexler, 2017). However, there is a lack of knowledge in practitioner's whole performance, especially in Catalan educational context (Spain).

In order to respond to this lack, it is proposed the development of a Transmedia Educational Project (TEP) which promotes the self-managed training of education practitioners about PYD through an open, interactive and flexible virtual learning method.

1.   Background

A **Transmedia Educational Project** (TEP) is an educational project that aims to produce an educational object. This object is formed by multimedia elements spread across media platforms and channels, which the learner can navigate with an active role to consume, edit, interact, or even publish (González-Martínez et al., 2019). The utilization of a transmedia object as a cornerstone of the project allows the educational project to be in a constant expansion, since the narrative expansion is one of the transmedia main traits (Scolari, 2013).

A TEP can promote **Self-managed Training** (SmT) when the content of transmedia objects have the aim to provide, create or promote knowledge about a specific topic. SmT facilitates the autonomous interaction of the subject with transmedia objects, allowing users to choose the timing and the order of interaction with resources (Madden & Hardré, 2016). It is open when the learning transmedia objects are offered in virtual environments without restrictions and without privacy, without requiring any type of registration to access. In this sense, the TEP can provide **Open Educational Recourses** (OER).

The literature shows how organizations offer training resources through virtual environments for education practitioners, such as texts, documents, explanatory videos, learning materials and resources for practice (Fernández-Rodrigo, Vaquero & Balsells, 2019). Studies show that professionals benefit from SmT due to the easy accessibility to resources, the flexibility to consult them, and when resources are offered in an organized way, for example, through modules (Ghoncheh, Gould, Twisk, Kerkhof, & Koot, 2016; Resko et al., 2017).

The studies about **Micro-learning** defend the importance of provide information in "small doses", interacting with **Micro-Content**, which is a small unit of digital information (Jomah, Masoud, Kishore, & Aurelia, 2016). This type of learning engages the user, due to respects the way the brain takes information, without feeling stress. Micro-learning is an emerging practice in practitioner's training, due to the recent research about the topic.

2.   Aims and Methodology

Characteristics about Self-managed Training (SmT) have been taken into account in the elaboration of a Transmedia Educational Project (TEP) for education practitioners about Positive Youth Development (PYD). In this sense, the aims of this study are:
a.   To describe the elaboration process of a TEP.
b.   To generate principles for the design of a TEP.

It was performed a Design-Based Research (DBR) methodology, which pretends to address complex problems in real educational contexts through collaborative work, with the aim of elaborating innovative solutions with ICT (Amiel & Reeves, 2008).

To develop the TEP following a DBR it was required to conform a work team with different profiles:
a.   **Main researcher:** Managing the study, the project and being author of this paper.
b.   **University teacher:** Delivering a topic related to PYD theory in University degrees.
c.   **Audio-visual and technical staff:** Gives support elaborating and managing transmedia tools and resources.
d.   **Education practitioner:** Validating the content of the project, considering their working experience in educational institutions with teenagers.

In total, 14 participants were involved in the project. However, they could have more than one profile, as it is shown in Table 1.

Table 1. Number and Profile of Work Team Participants

Nº of participants	a) Main researcher	b) University teacher	c) Audio-visual and technical staff	d) Education practitioner
1	x	x	x	
1	x		x	
1	x	x		
3		x		x
7		x		
1				x
14	3	12	2	4

3.   Procedure

The process of TEP design has been performed following the phases of design based research methodology, described in next sections.

3.1.   Analysis of Practical Problems by Researchers and Practitioners in Collaboration

In the first phase, it was identified a lack of knowledge in education practitioners' training of specific topics related to PYD: children's rights, Academic Resilience Approach (ARA), gender perspective, communitarian participation, positive use of technology, ex-ward youth, the cinema to promote PYD, positive parenting, forced marriages, foster care and mental health.

3.2.   Development of Solutions Informed by Existing Design Principles and Technological Innovations

Firstly, it was considered the background of Transmedia Educational Projects and Self-managed Training as main pedagogical methodologies, offering OER and promoting micro-learning.

Secondly, it was considered the principles of TPACK model for the design of an educational process through technology. According to Koehler & Mishra (2006), it is needed to stablish a relationship between the pedagogical methodology, the knowledge content and the technological tools. In this sense, next steps where followed:

a.   **Knowledge content writing:** Each university teacher wrote in 2.000 words the content about a specific topic related to PYD, which was developed through scientific publications and own research.

b.   **Transmedia channels choice:** The content was reviewed by the audio-visual and technical staff and all the team work was agreed in start creating open educational videos about each topic, as first step in the transmedia project.

c.   **Content transformation:** Audio-visual and technical staff started producing the videos in collaboration with university teachers, considering principles of micro-learning.

3.3.   Iterative Cycles of Testing and Refinement of Solutions in Practice

Audio-visual and technical staff produced a first version of the videos for the validation of all the work team members. Practitioners, researchers and teachers gave a feedback for the second edition. Some of the videos needed a third edition.

At the same time, it was followed the same production and validation process to develop the main open virtual environment to contain all the videos and future transmedia objects.

3.4.   Reflection to Produce "Design Principles" and Enhance Solution Implementation

In the fourth phase, it was stablished 9 Principles that pretend to address the design of a TEP promoting SmT:

1.   To stablish a multidisciplinary work team, considering all potential participants and target audience.

2.   To identify educational needs of the learners or users.

3.   To transform educational needs into learning aims.

4.   To stablish the knowledge and learning content of each transmedia resources.

5.   To agree a pedagogical methodology or approach, as a framework of educational activities through transmedia resources.

6.   To choose the suitable media channels to promote learning according to the content.

7.   To consider the potentialities of open educational resources and micro-learning.

8.   To design a virtual environment to host all the transmedia educational resources.

9.   To work collaboratively producing and validating the transmedia educational resources.

4.   Results

The result of this study is a Transmedia Educational Project structured in twelve independent pills, which addresses major topics on teenagers' education and wellbeing according to PYD.

The object was named Teenpods, a word formed by the terms "pod", that states the spirit of this project for summarizing the content in short and easy to understand formats, and also the term "teen", referring to teenagers.
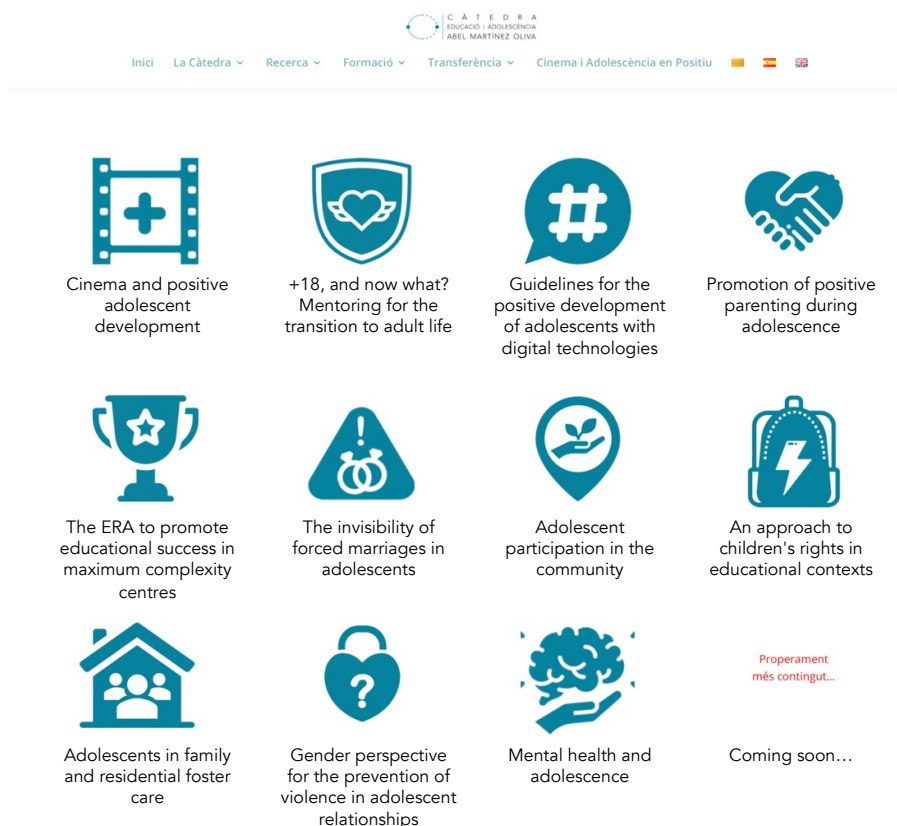
Figure 1. Screen Capture of the Homepage of Teenpods
Source: Chair Education and Adolescence (2021)

Currently, the transmedia object is hosted in the Chair Education and Adolescence (2021) server its own webpage, which consists of a homepage that presents the project and gives way to the twelve Teenpods main pages (Figure 1). There, can be found an introduction, a video, external resources linked, and an infographic (Figure 2). The launching data is set on September 2021.
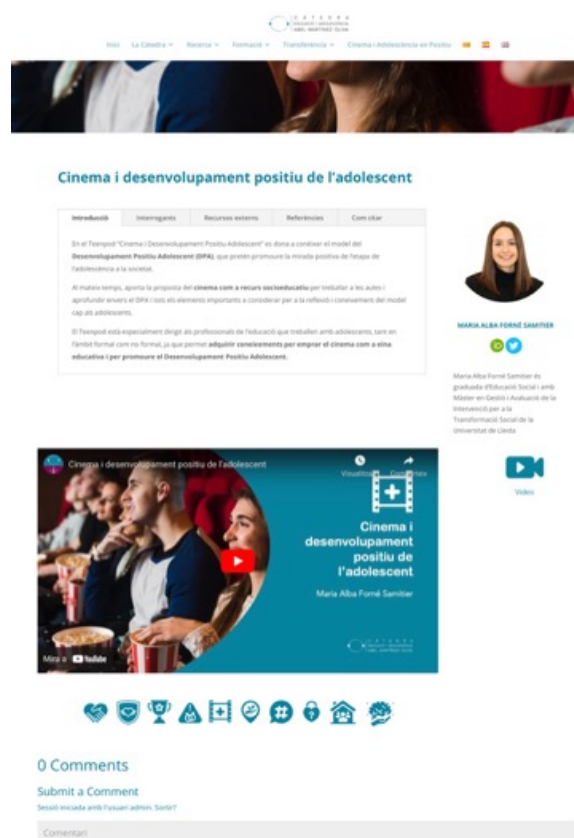
Figure 2. Screen Capture of the Teenpod "Cinema and Positive Youth Development"
Source: Chair Education and Adolescence (2021)

Conclusions

The project shown is the first stage of three for the development of a complete transmedia educational object (Figure 3). The project will continue following the stages progressively through time, promoting the collaborative learning and disseminating the positive young development through transmedia resources.

Figure 3. Transmedia Educational Project Complete Stages
Source: Own elaboration according to Scolari (2013). Icons of Flaticon.

This study contributes to fill the gap in the literature about TEP to train education practitioners about Positive Youth Development. It offers guidelines and 9 Principles for the Self-managed training processes through transmedia open resources. At the same time, the study can have an

important implication on the field of Educational Technology, due to the response to this need through innovative solutions.

The main limitation of this study is not having an exhausting validation of each Teenpod. The validation process was done through discussion meetings and the proposed changes were described in the proceedings.

Future research is needed to deeply analyse the impact of these resources on the Internet and, at the same time, to explore its impact on the education practitioners training about Positive Youth Development.

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Contact email: laura.fernandez@udl.cat

The Processes of Educational Communication in Primary Schools Determined by the State of Emergency in the Czech Republic

Dominika Provázková Stolinská, Palacký University Olomouc, Czech Republic
Iveta Filípková, Palacký University Olomouc, Czech Republic

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Abstract
The paper focuses on the current methods of educational communication in primary schools in the Czech Republic. As a result of the Covid-19 pandemic, the educational conditions have dynamically transformed in our country. It has even been reported that pupils' absence from full-time attendance is the longest in Europe. Some pupils (including primary school pupils) have been taught online for approximately 10 months. This situation has had a significant impact on educational communication which is considered an essential aspect and means of effective teaching in primary schools. The paper reflects on the current level of educational communication between primary school teachers and their pupils.

Keywords: Teacher, Primary School, Communication and Its Function, Education, Covid-19

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Introduction

The Covid-19 pandemic significantly affected the organization and the course of education on a global scale. In the Czech Republic, on 10 March 2020 an emergency measure was issued prohibiting the presence of pupils and students in elementary, secondary, higher vocational schools and higher education institutions which entered into force on the following day.

On 18 November, pupils in the first and second grades returned to their schools. On 30 November, all elementary school pupils returned. However, the subsequent pandemic situation significantly deteriorated and after Christmas holidays pupils had to stay at home again. They remained without school attendance until spring 2021.

This situation has had a significant impact on educational communication which is considered an essential aspect and means of effective teaching in primary schools. The paper reflects on the current level of educational communication between primary school teachers and their pupils.

1.   Impact of the Covid-19 Pandemic on the Organization of Primary Education in the Czech Republic

The closure of schools had a significant impact on the organization of education which moved to the home environment in the form of the so-called distance education. This offered a range of organizational forms (for example online, offline, synchronous, asynchronous, etc.) However, all of these forms required special conditions that had to be ensured by the family. Every pupil was dependent on the technical equipment of the household. The crucial instruments required for pupils' active involvement in online education were mobile phones, laptops, computers, webcams, printers and high-quality internet connection. A strong emphasis was on children's autonomy, which would otherwise be obtained gradually. The individualized approach was limited due to teachers' lack of opportunities for observing their pupils (Kment, 2020).

A research study conducted in spring 2020 suggested that during the first months of distance education, a total of 5.8% of households with school-aged children did not have the necessary technology to participate in online learning (Federičová, Korbel, 2020). An analysis of the Czech School Inspectorate (2021) reported 15% of primary school pupils without digital technology. In March 2020, around 250,000 learners were identified as not having access to online learning. Nevertheless, they performed their tasks and communicated with the school in a different way. In spring 2021, this figure decreased to a fifth. However, during the whole period of school closure, there were cases of families not communicating with the school despite having been offered various methods and alternatives.

2.   Limitations of Distance Education and Guidelines of the Ministry of Education, Youth And Sports of the Czech Republic

The reason for school closure was clear – protecting the population in the entire country. However, nobody was prepared for this in advance. This applied to both teachers and laws that did not include the term distance education in the system of primary schools. The guidelines of the Ministry of Education, Youth and Sports of the Czech Republic were developed "on the fly".

The implementation of distance education pointed to a number of issues including organizational and technical aspects. According to Andrys (2020), the general organizational problems included particularly the overall restriction on all activities that teachers had prepared for full-time education but were unable to use due to the transition to distance education, including for example physical activity. This was also related to the limited opportunities for keeping children's attention. There was also a lack of clarity and demonstration. Teachers had to rely just on pictures and videos. Another negative consequence was the impossibility of direct interaction between pupils which is desirable and required in many subjects including group work. Problems were also in subject-related aspects, including for example conversation in a foreign language which was often limited by poor internet connection and it was impossible for the teacher to check correct pronunciation. In natural history, national history and basic humanities and natural science, teachers encountered a low level of pupils' motivation.

On the basis of a number of research studies, the following practical recommendations were formulated (MEYS, 2020, selected items):
• 　　　Fixed distance education timetable;
• 　　　Reduced learning content;
• 　　　Cooperation between arts and humanities teachers with the class teacher;
• 　　　Regular feedback from parents and pupils.

The above reflected primarily the organization of distance education. However, little attention was paid to the reflection of the process – not just the content. Our research study focused on the **processes of educational communication and their effects on the didactic structure:**
1. 　　　Designing distance education;
2. 　　　**Learning conditions in distance education;**
3. 　　　Learning supported by the teacher in distance education;
4. 　　　Provision of feedback in distance education;
5. 　　　Reflection of distance education.

The paper focuses only on a part of the research – analysis of the learning conditions in the context of distance education and their effect on the social classroom climate.

3.　　　Research on Teacher Communication in Distance Education in Primary Schools in the Czech Republic

Educational communication is considered to be an important precondition for the implementation of the educational process. It is not only about transmission of information but primarily about developing a stimulating classroom climate and promoting the relationship with pupils.

Our intention was to identify **how educational communication was used in distance education, what opportunities it offered and what processes it blocked**. Subsequently, we analysed **the impact of these processes on the social classroom climate.** We focused on what aspects teachers should be prepared for, what they should expect or what strategies should be sought to eliminate the risks associated with the implementation of distance education. This form of education could become a standard under certain circumstances (for example for the purposes of educating learners with long-term illness).

The research was conducted by means of in-depth interviews (Hendl, 2008, Švaříček, Šeďová, 2007) with four primary school teachers with more than 10 years of experience. The data was

subsequently processed according to a qualitative analysis methodology (Juklová, In Skutil et al., 2011). The methodology was structured as follows: commented transcription, segmentation, coding and categorization. In the classes of these teachers (grade 2, 3 and 4 of primary school) we used the standardized instrument My Class Inventory. The classes included a total of 137 pupils. The data were collected during the period of distance education and in the following period of full-time education. The data were then compared, quantitatively processed and presented using descriptive statistics.

Below are the results of the research study that model the process of educational communication during distance education in primary schools.

1.   Specific Forms of Educational Communication During Distance Education

Promotion of education by means of verbal communication – distance education is dominated by this form over the other two. Nevertheless, there are some limitations. They include for example sound quality, poorly observable articulation and especially insufficient space for interactive feedback during a conversation.

This may impair the adequacy, clarity, unambiguity, material as well as language correctness or accuracy of the communication.

Promotion of education by means of non-verbal communication – in distance education the number of non-verbal expressions is limited – for example mimics, eye language or gestures. Some expressions are even impossible – haptics, proxemics, kinesics. This has a significant impact on the development of pupils' affective component.

The fact that some elements of non-verbal communication cannot be used at all or to a limited extent may result in insufficient interpretation on the part of the teacher concerning the adequacy of the learning content and its form as well as interest and concentration of pupils. On the side of the teacher, a great disadvantage is the absence of haptic expressions that can be used as a praise by patting, fist bump, stroking, etc.

Promotion of education by means of act – communication through act in distance education often replaced non-verbal communication. An example could be a virtual nudge to catch a pupil's attention.

2.   Functional Elements of Educational Communication and Its Application in Distance Education

Asking questions – this was simplified during distance education as people believed in was a temporary period. Questions in non-personal meetings were not as extensive as in personal meetings.

Compliance with communication rules – teachers agreed that distance education was generally less organized or structured. Communication rules were frequently violated – for example when pupils did not wait for an instruction to respond, more pupils answered at the same time, or when reproached by the teacher they logged out or turned the teacher off. It was difficult to impose sanctions as it was difficult to proof the intention.

Humour – at the beginning of distance education, a more encouraging and supportive function was used because teachers thought it was a short-term issue. The first few weeks of school closure were in the spirit of a 'corona holiday' and humour was used by teachers to support pupils' mental stability, helpfulness, self-criticism, etc. Humour was aimed at identifying unusual associations, was rich and revived communication. However, when the period of school closure was longer, teachers shifted their attention to the dampening and reducing function of humour and focused on mental instability, submissiveness, uncertainty, etc. As a result, humour played a role rather in conventional practices and stereotypical activities. All with a clear intention – to support pupils instead of deepening their uncertainty.

Pathological manifestations of communication – inappropriate pupils' activities were often observed during distance education including changing the volume of sound (one's own, teacher's or classmates'), not respecting their responsibility to join educational activities, etc. Pathological manifestations of communication became even more serious as a result of distance education with pupils thinking that they were safe 'at a distance'.

3.   Interactivity and Social Aspects of Educational Communication During Distance Education

Direction of educational communication – distance education of primary school pupils was dominated by one-way communication from the teacher to the pupils but often the direction was from the pupil to the teacher. However, this mainly included a single question rather than a two-sided conversation. Multi-directional communication was completely absent.

Other aspects of educational communication – education aimed at the overall cultivation, socialization and personalization of pupils; in this process, educational communication is understood as a necessary functional element of implementation, which, in addition to providing an educational offer, allows the following:
- **Continuous monitoring of the pupil's activity –** pupils can be monitored through the camera but not their activities (for example in workbooks),
- **Responding to educational situations –** this is a huge limitation as the situation in the online environment is quite confusing,
- **Supporting collaboration –** here, teachers tried to give assignments to groups who could work in an alternative virtual room, but younger pupils would often not return to the original teaching process and generally teachers did not have control over them. In the case of offline group work, part of the assignment often remained unaccomplished due to a lack of cooperation, etc.

A deeper analysis of teacher communication in distance education is presented by Provázková Stolinská, Filípková (2021).

Then we analysed the impact of the quality of educational communication on the social classroom climate. Primary school pupils responded to identical areas in two different periods – at the time of blanket distance education in Czech primary schools and at the time of full-time education directly in schools.

First, we focused on how pupils felt in their class. Graph 1 presents several monitored variables that show that pupils feel better and more confident in the school environment. They enjoy learning much more compared with online education and enjoy their friendships much more. These results can be confronted with the conditions of educational communication which

significantly limit these categories. What pupils would appreciate in both periods was more fun. This implies a lack of teachers' humour. However, it is important to consider the period of the research. Presumably, teachers focus on more conservative communication.

Graph 1: Satisfaction in the Class
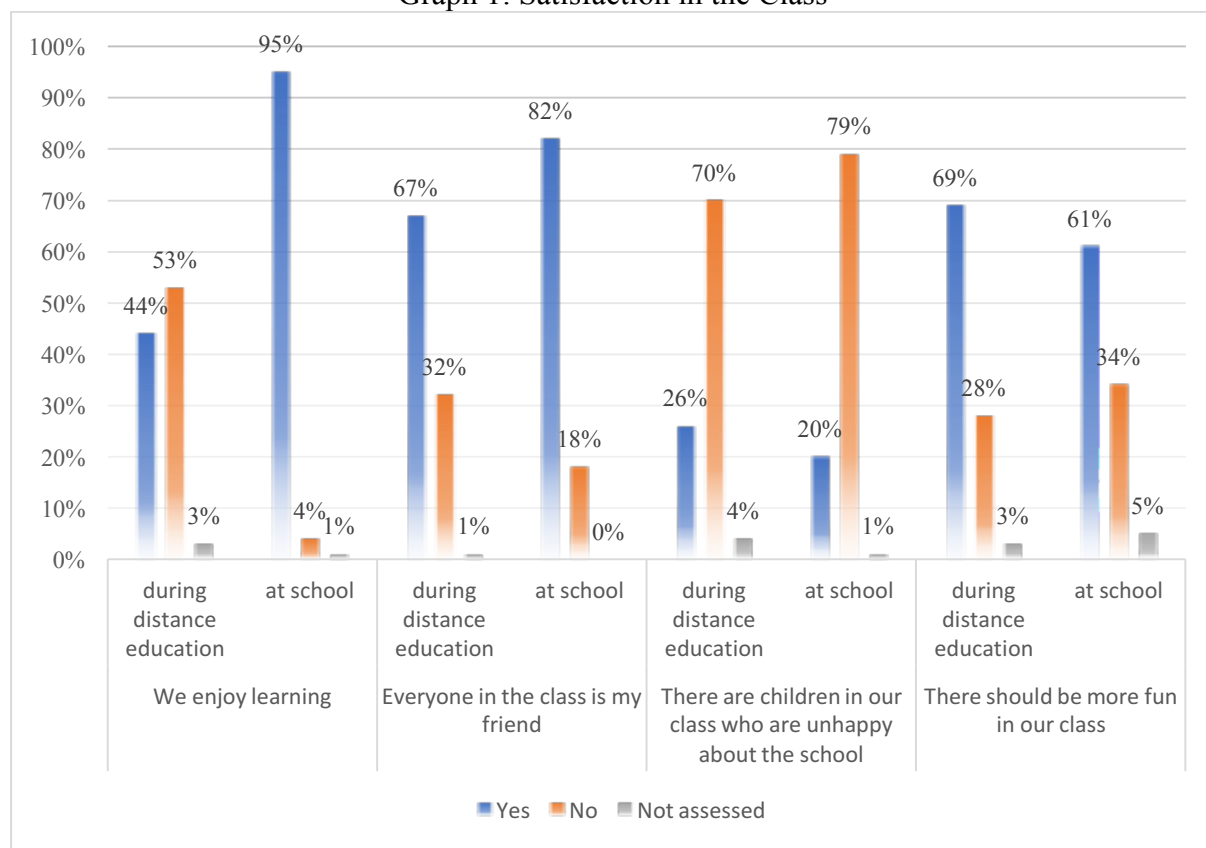
As far as the following two categories are concerned, they were not significantly affected by the pandemic. We focused on justice in education, which is a characteristic feature of young schoolchildren. We focused on the perception of the individual needs of classmates. Graph 2 suggests that in the school environment pupils are more aware of the need for individualization for some classmates. However, this manifestation is also evident in the distance environment.

Graph 2: Disputes and Competitiveness in the Class
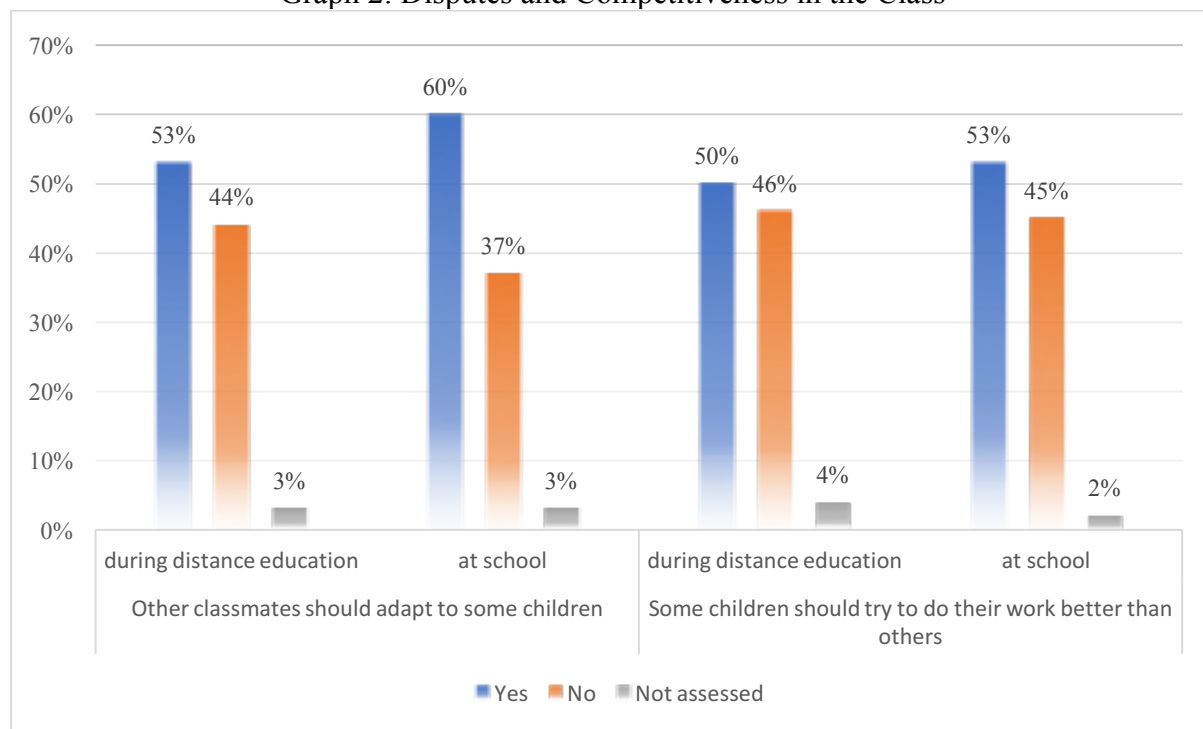
In the difficulty of learning category there were no significant differences in pupils' opinions between the period of distance education and full-time education. Neither was there a significant difference in pupils' opinions about the difficulty of the teaching process. However, during the period of distance education negative responses slightly prevailed. Generally, however, pupils assessed themselves positively in the area of coping with teaching activities and demonstrated self-confidence.

Graph 3: Difficulty of Learning
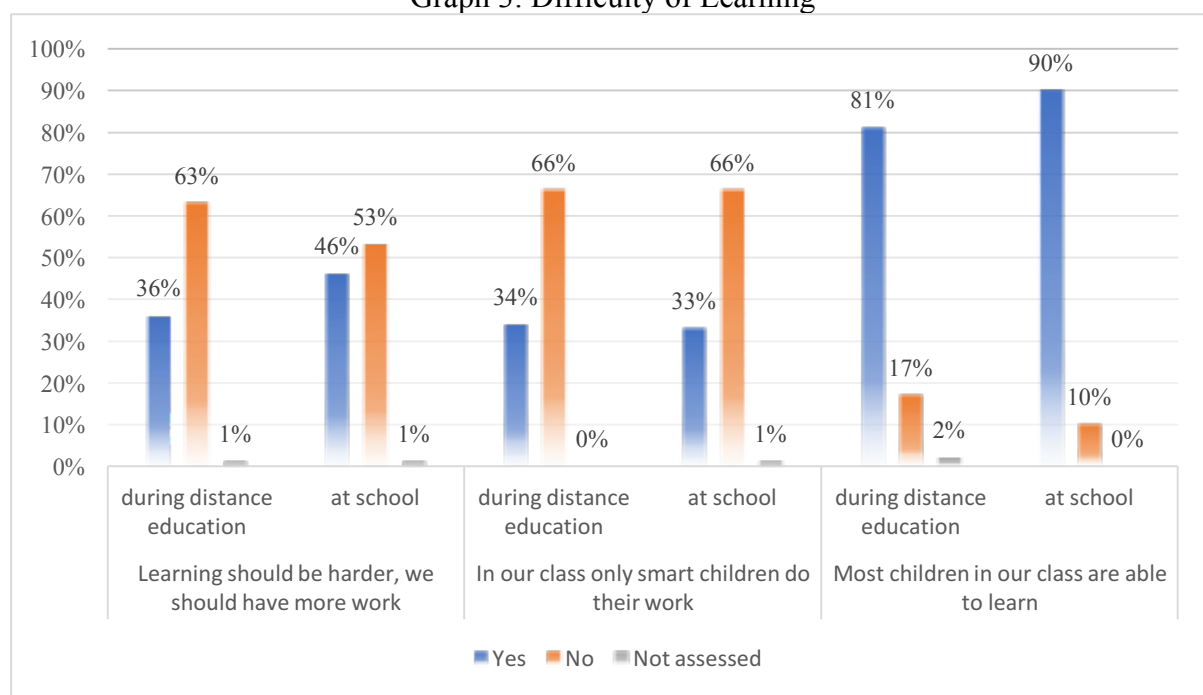
Conclusion

The environment in which education takes place influences the nature of interaction and requires specific ways of communication. Distance education has transformed the conditions of education and significantly determined and limited the educational interaction characteristic of every class and teacher.

The term distance education itself suggests a number of barriers that restrict educational communication. Distance education disrupted interpersonal communication between teachers and pupils as well as between pupils. It significantly limited cooperation, clarity as well as practical application of the learning content.

Another disadvantage as suggested by teachers was the absence of direct communication with pupils including a number of non-verbal means to show agreement or encourage attention and activity. This is not to say that pupils should be afraid of punishment for inaction but it was impossible during distance education to observe the rules to an extent usual in personal meeting.

At the beginning, pupils were excited about learning a new way of using information technology and not having to go to school. Some even felt some kind of relief from their duties. However, after some period of time, they started to feel a lack of fulfilment and were frustrated as a result of the absence of social contact with classmates and teachers. Their lives lost clear leadership in learning and a regular school regimen. However, according to the results of the research, the basic level of the social classroom climate has not been significantly disturbed from a long-term perspective. After their return to school, pupils became stabilized again.

The reason for choosing distance education is clear – anything is better than nothing. One of the benefits is filling the gaps. However, it is important to understand that primary education requires personal contact and distance education can only be recommended for a short period of time. Without personal contact, educational objectives are achieved only partially and there is a lack of especially affective objectives which are crucial to the development of pupils' key competences.

Acknowledgements

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Inclusive Foreign Language Assessment in Trying Times: Pre-service Teachers'
Attribution Mechanisms and Their Implications for Inclusive Emergency Remote
Teaching

Julia Weltgen, University of Bremen, Germany
Joanna Pfingsthorn, University of Bremen, Germany

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Abstract
The main goal of foreign language education (FLE) to foster intercultural communicative competence implies the need to include and connect diverse learners (e.g. Council of Europe, 2001) and thereby aligns itself with key principles of inclusive education. Yet, the pursuit of communicative competence (CC) is a task that often divides rather than includes. In the German context FLE was long regarded not worth pursuing among students with special educational needs (cf. Kleinert et al. 2007; Morse 2008; Dose 2019). As a construct, CC is also multifaceted enough to display considerable individual differences between learners. In research, "good learners" have been linked with higher levels of FL success compared than to "low-achieving" or "poor" learners (e.g. Ganschow & Sparks 1995; Nunan, 1995). Such categorizations can hardly be considered inclusive (Clough & Corbett 2000). In fact, attributing "poor" observable behavior (e.g. "does not keep a conversation going") to dispositional traits (e.g. "is a poor leaner"), rather than to external factors (e.g. "does not like the task") is one of the most commonly documented biases in social perception research, called the fundamental attribution error (Ross, 1977). Errors of this sort are likely to happen when assessment takes place under uncertainty or is based on limited contact with learners, e.g. in emergency remote teaching settings. This contribution presents the results of a quantitative questionnaire study which confirms that (pre-service) FL teachers are indeed prone to the fundamental attribution error in their evaluation of FL learners and discusses implications for remote emergency assessment.

Keywords: Foreign Language Education, Inclusive Education, Fundamental Attribution Error, Attribution in Assessment

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Introduction

Inclusive educational settings ensure that all learners, and especially those with special educational needs or vulnerable to marginalization, can actively partake in learning (cf. Booth & Ainscow 2002). In such learning environments teachers need to be able to engage in careful, fair, evidence based pedagogic observation and evaluation of their students, which is not necessarily an easy goal to achieve (cf. Corbett 1999; Barton & Slee 1999; Hall, Collins, Benjamin, Nind & Sheehy 2004). In concrete terms, teachers need to be able to diagnose learning prerequisites and processes and support pupils in an appropriate manner, to advise them and their parents, as well as to recognize developmental stages, learning potentials, learning obstacles and learning progress within individuals in a reliable manner (cf. KMK 2016 for the German context).

However, research into social psychology suggests that individuals often misattribute causes of observed behavior of other people or events that involve them. Individuals – including teachers in inclusive educational contexts – tend to fall prey to the so-called fundamental attribution error (Ross 1977), or Correspondence Bias (Jones & Davis 1965). Fundamental attribution error stands for the tendency to overemphasize the role of dispositional and personality-based explanations of behavior, while underemphasizing situational explanations. Because attribution in general tends to be a fast and automatic process, it is not necessarily under the control of the individual (cf. Fiske & Taylor 2016).

In this paper, we take a closer look at attribution processes involved in the assessment of written performance in a foreign language classroom. We explore the question to what extent prospective (foreign language) teachers have the tendency to attribute the observed language performance of a pupil to his or her disposition rather than to external or situational factors, and thereby commit fundamental attribution error. In this way, we pose the question to what degree prospective foreign language teachers are able to offer fair, evidence-based and objective, and hence inclusive assessment to their pupils. By extension, we also focus on the question to what extent foreign language teachers falsely assign labels to pupils, which runs the risk of stigmatizing or marginalizing them.

Theoretical Background

In social psychology, attribution refers to the process by which individuals assign causes to behaviors and events. It is a fast and automatic process that becomes apparent to the individual only through explicit reflection (Fiske & Taylor 2016), meaning that our perception of causality is error prone and subject to cognitive bias. An example of such bias is the so-called fundamental attribution error (Ross 1977), or Correspondence Bias (Jones & Davis 1965). It stands for the tendency to overemphasize the role of dispositional and personality-based explanations of behavior, while underemphasizing situational explanations. In other words, instead of assuming that external forces – such as situational demands, social norms or pressure – are the factors that drive behaviors, people tend to believe that behavior of others reflects their stable personality traits or qualities. Empirical studies also suggest that corrections of these first attributions are particularly challenging: Conclusions about a person are often influenced by the first impression in the long term (see Fiske & Taylor 2017; Wilson & Brekke 1994). In this sense, fundamental attribution error depends on whether the observer reflects on the meaning of the observed behavior. If the observer engages in such an action, individuals tend to adjust the dispositional inferences that they make to situational constraints (Weary et al. 2001).

Although fundamental attribution error is assumed to be relatively stable, a number of factors may modify its intensity. Firstly, the occurrence of fundamental attribution error may depend on the disposition in question. Reeder and Brewer (1979) suggest that some personality characteristics, e.g. friendliness, curiosity or cooperativeness are typically associated with a relatively wide spectrum of behaviors. This implies that we are likely to accept that a friendly person may sometimes act moderately or possibly even very unfriendly in some situations, without losing the general label of being friendly. At the same time, we tend to conceptualize other dispositions, such as extroversion, leadership or abilities to perform a certain task in reference to a different schema. Here, we tend to assume that the observed extreme behavior is sufficient to determine the attribute, i.e. a single win of a chess player is informative of his or her talent for chess and a single extremely dishonest example of behavior is "sufficient to produce a confident attribution that the actor is dishonest" (Reeder & Brewer, 1979: 68).

In addition, fundamental attribution error depends on cognitive load. With more cognitive load, people tend to neglect less salient contextual features and focus on the most meaningful aspects of a situation (Chun et al. 2002). Dispositional attribution also depends on the perceived accountability of judgment. When people feel accountable for their judgment, they tend to reduce dispositional attributions (Tetlock, 1985). Last but not least, the level of familiarity influences the likelihood of dispositional attribution. The stronger the familiarity, the more non-dispositional factors are taken into consideration when judgment is made (Idson & Mischel, 2001; Wellbourne 2001; Reeder et al 2004). All of these factors become especially relevant under emergency remote teaching conditions, which frequently cause stress, diminish the amount of learner-teacher time, leaving less space for teachers to engage in careful consideration of what causes could be behind students' performance (Misirli & Ergulec, 2021).

The specific case of foreign language education exemplifies why fundamental attribution error can exert a negative influence on fair assessment. The rationale behind it has to do with the complexity of the subject matter, learner diversity that is associated with it and how learners have been labeled in the literature. These dependencies are delineated in the following section.

European educational policy makers envision the development of communicative competence to be the main goal of institutionalized foreign language education (Council of Europe 2001; KMK 2012). They presuppose that functional communicative competence in a foreign language encompasses the development of a number of subcompetences: linguistic competence, which covers the use of lexical, phonological and syntactic knowledge applied in various modalities, sensitivity to social conventions of language use, e.g. in terms of politeness, situationally appropriate use of various language forms and functions as well as intercultural competence, i.e. the 'knowledge, motivation and skills needed to interact effectively and appropriately with members of different cultures' (Wiseman 2002, p. 8). This relatively long list of various competences, types of knowledge and affective variables turns the subject matter into a quite complex and multidimensional construct, which cannot be learned easily by everyone in a straight-forward and comparable manner.

Individual differences observed between various foreign language learners have spurred efforts to create profiles of 'good language learners', who experience higher levels of success at foreign language learning (Brown 2001; Nunan, 1995; Ushioda 2008). 'Good learners' have been believed to e.g. develop strategies to keep a conversation going, learn different styles of speech to vary their language according to the needs of the situation, make intelligent guesses, use their linguistic knowledge of the mother tongue and the world to help themselves through the learning process, be creative and experiment with language, also outside the classroom

(Nunan 1995). Moody (1988) additionally claims that language students pursuing a degree in a foreign language tend to show personality traits typically associated with introversion, e.g. being oriented towards the inner world and considering deeply before acting to a lesser degree than other college samples. By extension, learners who do not qualify as 'good' experience learning difficulties in a number of areas. In fact, substantial research attention has been given to populations of learners classified as 'low-achieving', 'poor', or 'at-risk for learning' (e.g. Ganschow & Sparks 1995). Some of the learning patterns observed among these populations can be associated with Sparks and Ganschow's (1991) Linguistic Coding Differences Hypothesis, which proposes that if problems with certain language rule systems occur in the mother tongue, they will carry over onto the foreign language because of their neurological, behavioral, cognitive and environmental complexity. One such common learning difference is dyslexia, which has indeed been shown to act as a challenging factor in the foreign language learning process (Brady & Shankweiler, 1991; Nijakowska, 2008; Ramus et al., 2003). Other investigations suggest that foreign language learners who are less likely to succeed tend to lack positive appreciation of their abilities and chances of success, or self-confidence (Bandura, 1986). Masgoret and Gardner's (2003) meta-analysis also shows a modest but significant correlation between motivation and achievement in foreign language learning. Students experiencing learning difficulties tend to lose their motivation to learn languages (Kormos & Csizér, 2010) and develop symptoms of language anxiety (Sparks & Ganschow 1991). Language anxiety – due to worry and intrusive thoughts – has also been shown to negatively affect working memory capacity and consequently reduce the processing of input and production of output (Eysenck & Calvo, 1992).

The results of these studies provide an insight into what has been identified as more and less favorable conditions or traits that make the learning of a foreign language easier or more difficult. Some of these efforts have relied on the use of labels or categorization of learners, which inadvertently could lead to the perpetuation of the conviction that foreign language learning is not meant for or essential to everyone (c.f. Kleinert, Cloyd, Rego & Gibson 2007), or that some learners may underperform just because they exhibit certain traits. In fact, as Dose (2019) documents in her study, German foreign language teachers of English express that they do in fact place different expectations on different groups of students in inclusive settings, especially with respect to their educational goals. Although some English teachers seem to be somewhat dissatisfied with their actions, they do engage in a pre-selection of contents and topics for learners with special educational needs (Dose 2019: 212). They also differentiate their perception of how important different sub-competences are for different groups of learners. For example, competences such as writing or translating are regarded as 'less important', especially for learners with target-specific training (ibid. 200). In addition, although the basic mode of instruction is English only, learners labeled as needing special support receive it in German (ibid., 153ff). In this sense, teachers seem to be prejudging their students' chances of success at foreign language learning based on their profiles.

Foreign language teachers of English in German inclusive school systems also report a significant perceived burden of responsibility, for which they rarely find support in possible teamwork with inclusive teachers, as other subjects are considered more important (cf. ibid.). In particular, it is emphasized that inclusive teachers (i.e. the possible supportive agents) are often responsible for all classes of different grades, which increases their burden of preparation, implementation and evaluation. Especially if less than 50% of the lessons per class are scheduled to be taught, these teachers have to teach many more classes than subject teachers (ibid. 144ff.). This means that establishing a well-functioning social environment, in which cooperative learning is fostered is difficult. However, it is precisely this relationship work that

is seen as an essential criterion in order to be able to provide good teaching (c.f. Dose 2019), next to the availability of resources, suitable teaching material and individualized teaching (Springob, 2016).

In summary, scientific discussions in foreign language education have encouraged assigning labels to learners related to their success at the subject matter, classroom behavior, affective states, cognition and affective states. This poses the risk that foreign language educators operate under this premise and are potentially unfair in their assessment or inaccurate in their attribution if the prejudge their students based on these categories. In addition, some inclusive settings (e.g. in Germany) show that teachers feel overwhelmed in their quest to support all learners in their foreign language learning processes, which can potentially lead to excessive levels of stress and/or cognitive load. This has posed a particular challenge in the remote emergency teaching during the Covid-19 pandemic: In the German context it has been reported that pupils with a disability or special educational needs could not benefit from the regular personal contact with teachers and classmates as well as from a typical daily structure during the lockdown, which meant that they were deprived of some crucial elements of their educational experience (Goldan, Geist & Lütje-Klose, 2020). Even before the lockdown, some teachers reported excluding certain pupils from the foreign language learning experience either by providing them with alternative materials, less input in the target language or by offering them no possibility to participate in the foreign language classes at all. Teachers also reported that forming meaning relationships with students can be difficult – these challenges were not made easier under the conditions of the pandemic. Tying these results back to the findings discussed in the sections above, it becomes apparent that these conditions are favorable to the occurrence of fundamental attribution error.

In view of this, the empirical part of this paper explores the questions of the extent to which prospective (foreign language) teachers attribute the observed language performance of a pupil to his or her disposition rather than to external or situational factors.

Method

A total of 53 university students filled out a questionnaire. 53% were enrolled in the study programme Inclusive Pedagogy (IP); the vast majority of students, namely 74%, were pursuing a Master's degree in Education. 34 students stated that they were studying with the goal of becoming a foreign language teacher of English.

The questionnaire recorded demographic data of the participants and measured their attribution tendencies. To measure the extent to which participants were able to avoid committing the fundamental attribution error, they were presented with an example of a student's written performance. The text was elicited as a response to the following prompt: 'Please write a short text about yourself and your hobbies! Who are you? Where do you live? What do you like to do?' and was taken from an empirical study of written production in English as a foreign language among German pupils (Gerlach, 2019).

The task of the participants was to assess the performance of the pupil and decide on the probability of various causes that might have led to it. The possible causes that were presented were divided into external (i.e. the student did not like the task, the student was distracted, had a bad day) or internal (i.e. the student is not motivated, dislikes English classes, does not work in a disciplined way) ones. The possible answers that participants could choose from were very unlikely, unlikely, open, likely and very likely.

The evaluation of the probability of potential causes that the observed behavior can be attributed to have been used in empirical studies, which generally relied on presenting participants with scenarios of individuals with particular personality-traits being placed in a particular situation. The dependent variable was an estimate of the probability that a certain trait-related behavioral pattern is likely to occur in the future in various situational contexts (e.g. Nisbett, Caputo, Legant & Maracek 1973; Ross & Nisbett 1991).

Results

Figure 1 shows the response frequencies to the suggestion that the observed written performance of the pupil could be attributed to external factors such as liking the task, having bad day, or being distracted. The data reveal that about 35% of the prospective teachers that took part in the study consider liking the task to be (very) unlikely. In addition, only about 4% of the participants believe it likely – based on the pupil's performance – that he or she might have had a bad day when writing the text. About 38% consider it (very) unlikely that the pupil might have been distracted while writing the task (see Fig. 1).

Figure 1: Assessment of External Factors as a Cause of the Pupil's Performance, Relative Frequency, N = 53, Presented without No Response

Since only a single example of performance in assessment situations is unlikely to serve as a decisive basis for attributing a concrete cause, it is precisely these answers that almost categorically exclude external factors as a cause that are to be evaluated in this context as symptoms of attribution errors.
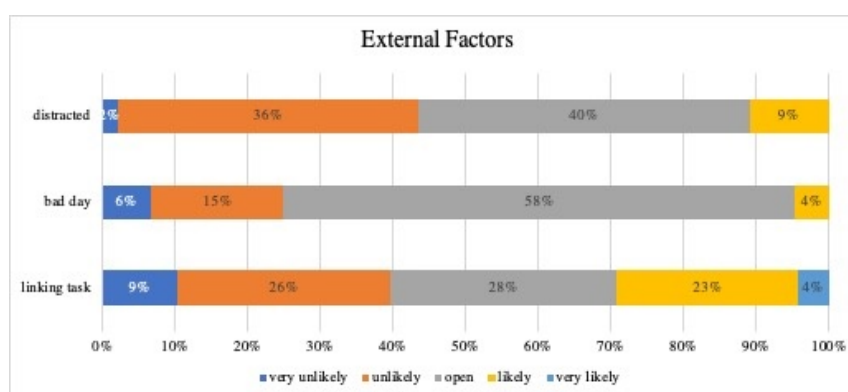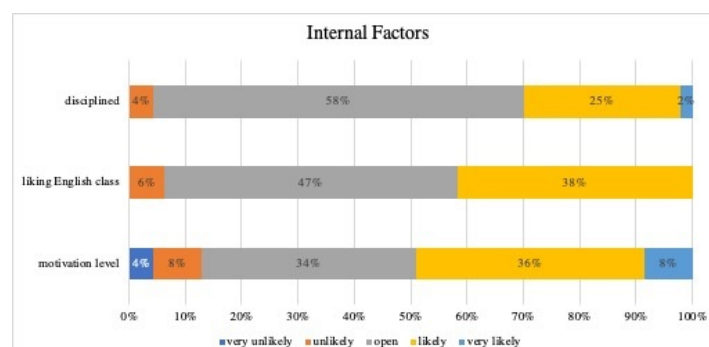

Figure 2: Assessment of Internal Factors as a Cause of Student Performance, Relative Frequency, N = 53, Presented without No Response

The reverse is true with respect to the responses to the potential role of various internal factors (see Fig. 2). Over 44% of the participants believe that the relatively poor performance of the

student could be linked with the motivation level. Similarly, almost 40% of the participants believe that it is likely that the pupil shows enjoyment or liking of English classes and about 25% said that they thought it likely that the learner was disciplined. In this particular case, any reference to dispositional characteristics of the pupil – in either positive or negative direction – is misplaced if it is based on a solitary example of language performance. In this sense, it becomes clear that prospective teachers (majority of whom were pre-service foreign language teachers) are unable to escape the trap of committing fundamental attribution error in that they primarily think in terms of dispositions and not situational factors.

Nevertheless: despite the relatively consistent tendency to fall prey to attribution errors, it must be emphasized that about a half of all the respondents (58%) chose the option open/cannot tell when asked to decide whether it was probable that the pupil had a bad day. Compared to other external factors, 'having a bad day' seems like a more plausible explanation that many respondents can accept. This implies that some external factors that are possible causes of performance are more likely to be considered than others Thus, the intensity of the disposition errors varies.

Conclusions

The results of the study demonstrate that despite the dire need and efforts to shape assessment in (foreign language) education in a fair, objective, scientific and inclusive manner, prospective teachers from the German educational context do not manage to completely avoid automatic bias such as fundamental attribution error. Rather, they show a tendency to focus on dispositional factors and overlook potential situational causes that could contribute to the observed language performance of a student. In this sense, the participants in our study seem to assume that single extreme examples of learners' behavior or performance can be interpreted as sufficient signals of disposition (cf. Reeder & Brewer, 1979).

These patterns can be especially problematic in emergency remote teaching, if the time spent with the students is limited and if digital lessons lead to higher levels of stress. In fact, it is expected that if teachers are not provided with sufficient time to reflect on their assessment and evaluation of students or of their work, they may be prone to ignore situational constraints in their judgment of students (cf. Chun et al. 2002; Tetlock, 1985; Weary et al. 2001). In a similar vein, stress or cognitive load can contribute to an increased ignorance of contextual factors (cf. Chun et al. 2002).

Interestingly enough, given the chance to reflect on their choices in the debriefing following the questionnaire, some of the participants report the tendency to minimize unnecessary jumps to dispositional conclusions through self-imposed self-reflection (cf. Weary et al. 2001). The debriefing phase also addressed the importance of fair and inclusive diagnostic processes in (foreign language education) and drew on the direct experience from everyday school life (e.g. through internships) of the participants. In these discussions with the participants, it became clear that the perceived responsibility for the diagnostic judgement does tend to contribute to rethinking their dispositional attribution (cf. Tetlock 1985). Above all, the debriefing also revealed the impact that familiarity between the teacher and the learners can exert on attribution processes reported in previous studies (cf. Idson & Mischel 2001; Wellbourne 2001; Reeder et al. 2004), which underscores the dire need to focus on ways that allow for establishing flourishing student-teacher relationships in emergency remote settings.

Some potential weaknesses of the empirical study need to be addressed: the participants were only presented with one instance of written performance, which in itself was relatively weak. Ideally, similar data should be collected as a response to a contrastive good example of written work in a foreign language, potentially with a variation of the pupils' levels. One could also argue that providing more background information on the author of the text would warrant more familiarity with the person and would mimic authentic classroom conditions in a more accurate way. In addition, while the basic design of the study, including the estimates of the probabilities associated with various possible causes is not uncommon in the field of social psychology and the investigations into fundamental attribution error, it could be argued that the given reasons are suggestive.

Yet, one conclusion that cannot be refuted is the observation that (foreign language) teacher education would surely benefit from a more extensive, open discussion of the potential traps within diagnostic attributional processes that are partially automatic and still need to be avoided in all educational systems, but most of all in the ones that call themselves inclusive and reject the notion of unfair and unnecessary stigmatizing of particular students, especially with regard to the new digital or emergency remote educational reality.

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EasyTalk: A Digital Writer's Workshop for Leichte Sprache (Easy-To-Read German)

Ina Steinmetz, Universität Koblenz-Landau, Koblenz, Germany
Karin Harbusch, Universität Koblenz-Landau, Koblenz, Germany

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Abstract

Leichte Sprache (*LS*; Easy-to-Read German) is a simplified variety of German characterized by simplified syntactic constructions and a small vocabulary. It provides barrier-free information for a wide spectrum of LS readers including individuals with learning difficulties, intellectual disabilities and/or a low level of literacy in the German language. Usually, text in LS is produced by authors proficient in standard German. LS readers audit the ease of understandability. We would like to change this division of roles and empower LS readers to autonomously participate in written discourse. To this end, we present *EasyTalk*, an assistive writing system for LS. In essence, it supports fast and correct sentence formulation based on profound computational linguistic processing. *EasyTalk* aims to support users in writing freely while practicing general linguistic concepts. Users are supported at their personal reading-comprehension level by underpinning the vocabulary with customizable picture symbols, and by read-aloud options for commands and contents. *EasyTalk* takes readership-design aspects into account by reminding the user to add place/time of an event. On the discourse level, it prompts the user to add coherence specifications to express the communicative function of the sentences. In the writer's workshop mode (called *EasyText*), the system aims at teaching when and how to consider audience-design concepts. Accordingly, the users get trained in text production similarly to elementary school children, who also tend to omit audience-design cues. Evaluations demonstrate that *EasyTalk/-Text* supports users in writing text beyond the scope of short message communication by offering intuitive and easy-to-use dialogues.

Keywords: Augmentative and Alternative Communication (AAC), Controlled Languages (CL), Plain Language, Natural Language Generation (NLG), Paraphrase Generation, Writing Workshop/Schreibwerkstatt

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Introduction

Controlled/Simplified natural languages, like Basic English (Ogden, 1930), have long been a topic of great interest (see Kuhn (2014) for a broad survey). *Leichte Sprache* (LS) is a simplified variety of German. It was developed as part of the Plain Language Movement in the 2000s, which aimed to produce easy-to-understand texts for the spectrum of people with intellectual disabilities or learning difficulties (Bredel & Maaß, 2016, p. 60) who often have low literacy skills (Light, McNaughton, & Caron, 2019)—in the following called *LS readers*. In Germany, LS is enshrined in law as the means of choice for providing accessible information in text form (BITV 2.0, 2011). The three main rule books of LS (BITV2.0, 2011; NLS, 2013; IE, 2014) have been the subject of previous scientific investigations (Kuhlmann, 2013; Lieske & Siegel, 2014; Löffler, 2015; Zurstrassen, 2015; Bredel & Maaß, 2016; Bock, 2017/2019; Nüssli, 2019; Pottmann, 2019; Hansen-Schirra & Maaß, 2020). Many LS rules concern the vocabulary (e.g., "Use easy words." or "No abbreviations.") or the avoidance of complex structures (e.g., more than one statement per sentence, complex clauses, subjunctive mood or passive voice). Put in a nutshell, only main clauses are licensed in LS. In main declarative clauses, the canonical word order is Subject-Verb-Object (SVO). All sentences should be phrased in the active voice, indicative mood, and present and present perfect tenses. To date, it has been usual for texts in LS to be produced by authors proficient in standard German and then evaluated for ease of comprehensibility by LS readers (BITV2.0, 2011; NLS, 2013). One factor preventing LS readers from producing texts themselves may be the lack of technical support during the process from message conceptualization in the mind of the speaker/writer to sentence realization in a computer-assisted writing tool that remedies reading/writing deficits.

To the best of our knowledge, there is no easy-to-use writing system for LS readers that offers linguistic support beyond the phrasing of simple, partly personal sentences, let alone a system capable of teaching the concepts of written text production. The writing of coherent, understandable text requires an emphasis on audience-design concepts (Bell, 1984) because the reader cannot seek clarification—unlike the listener in face-to-face communication. In practice, German elementary school children learn written text production by the widely applied method of the *Schreibwerkstatt/Schreibkonferenz* 'writer's workshop' (see, e.g., Reichardt, Kruse, & Lipowsky (2014) for a broad survey).

This leads to two research questions concerning assisted writing: What individual support can help LS readers to write understandable, coherent text? How can an assistive writing system teach the concepts of written text production, like audience/readership design, using intuitive dialogues at the individual LS-reader level?

To support LS readers in text writing, we developed a computational linguistic system, dubbed *EasyTalk*. It actively stimulates the user to add text-understandability and text-coherence elements, at both the constituent-structure and the sentence-combining levels. The system's two principal components support LS readers in formulating grammatically correct and semantically coherent texts: (1) a natural language paraphrase generator supports fast and correct sentence production while taking readership-design aspects into account; and (2) explicit coherence specifications based on *Rhetorical Relation Theory (RST*; Hovy 1988; Mann & Thompson, 1988) serve to express the coherence at the sentence-combining level. For practicing text writing concepts, we added a digital writer's workshop to *EasyTalk*, called *EasyText*. This system controls the choice options in (1) and (2). Mandatory questions

generated by the system aim to teach the user when and how to consider audience-design concepts.

This paper is organized as follows. First, we summarize the state of the art in technical writing support for LS-readers. Then, we introduce *EasyTalk* by a tour through the system followed by a more detailed survey of the two core components. After that, the digital writer's workshop *EasyText* is outlined. In order to illustrate the appropriateness of the user interface of our system, we report recent evaluation results. Finally, we discuss open issues and suggest directions for future work.

1   The State of the Art in LS Writing Support

First, we look at systems from the area of *Augmentative and Alternative Communication (AAC)* (see, e.g., Lancioni, Singh, O'Reilly, & G. Alberti (2019) for a detailed survey, and Light, McNaughton, & Caron (2019) for current research directions) that aid users with complex communication needs to write based on the concatenation of symbols and/or words. For reasons of space, we focus on systems with support through *natural language processing (NLP)* here. According to Higginbotham, Lesher, Moulton, & Roark (2012) or Waller (2018), NLP is increasingly in demand—however, its potential is not yet exploited.

In German, the target language of *EasyTalk,* a rich morphology and relatively free word order complicate the generation of useful and grammatically correct suggestions. The commercial systems *MindExpress 5* (Jabbla, 2021), *Gateway* (Gateway to Language & Learning, 2021) and *Snap Core First* (Tobii Dynavoxx, 2020) offer a representative sample of widely provided features in symbol-based AAC systems. For writing, they provide basic linguistic support such as adaptive word prediction and automatic inflection for simple constituents. Technical AAC solutions are currently evolving rapidly, increasingly available on mainstream devices (e.g., smartphones and tablets; Light & McNaughton, 2012). All popular free apps for German allow users to access large customizable vocabularies of (visual) symbols. However, they focus on direct (face-to-face) communication between conversation partners (cf. *LetMeTalk* (2017) and *SymboTalk* (2019)). None of those products provides well-founded linguistic support for sentence construction.

There is an increasing market for writing support based on *natural language generation (NLG)* (see, e.g., ARRIA (n.d.); cf. Gatt & Krahmer (2018), who illustrate the full range of NLG applications, and G2.com (n.d.), which provides links to NLG systems). However, there are few approaches designed for the needs of AAC users (cf. the pioneering approach by Demasco & McCoy (1992) or the storytelling system by Tintarev, Reiter, Black, Waller, & Reddington, 2016). The target language there is Easy-to-Read English. To our knowledge, there is no recent system for AAC users based on NLG for German.

2   EasyTalk and EasyText

In this section, we first give an intuitive impression how our system supports fast and correct typing. In the following, we go into the details of the computational linguistic mechanisms used to support the writing of a sentence and the production of sentence-coherence elements, respectively. In Section 3.4, we introduce *EasyText*, the writer's workshop mode.

2.1   Tour through EasyTalk

Let us familiarize ourselves with the assisted text-production process of *EasyTalk* through an outline of its five essential steps (cf. the numbers in orange circles in Figure 1; also see Steinmetz and Harbusch (2021) for a demonstration video). The system permanently displays three panels (distinguished by blue bars). Panel 1, at the top, contains the previously written text. Panel 2, in the middle, switches between (A) and (B). Panel 2 (A) accumulates the wordforms of a sentence written so far. Panel 2 (B) stipulates sentence-connector specifications. Panel 3, at the bottom, offers syntactically filtered wordform suggestions for a typed string according to the current context.
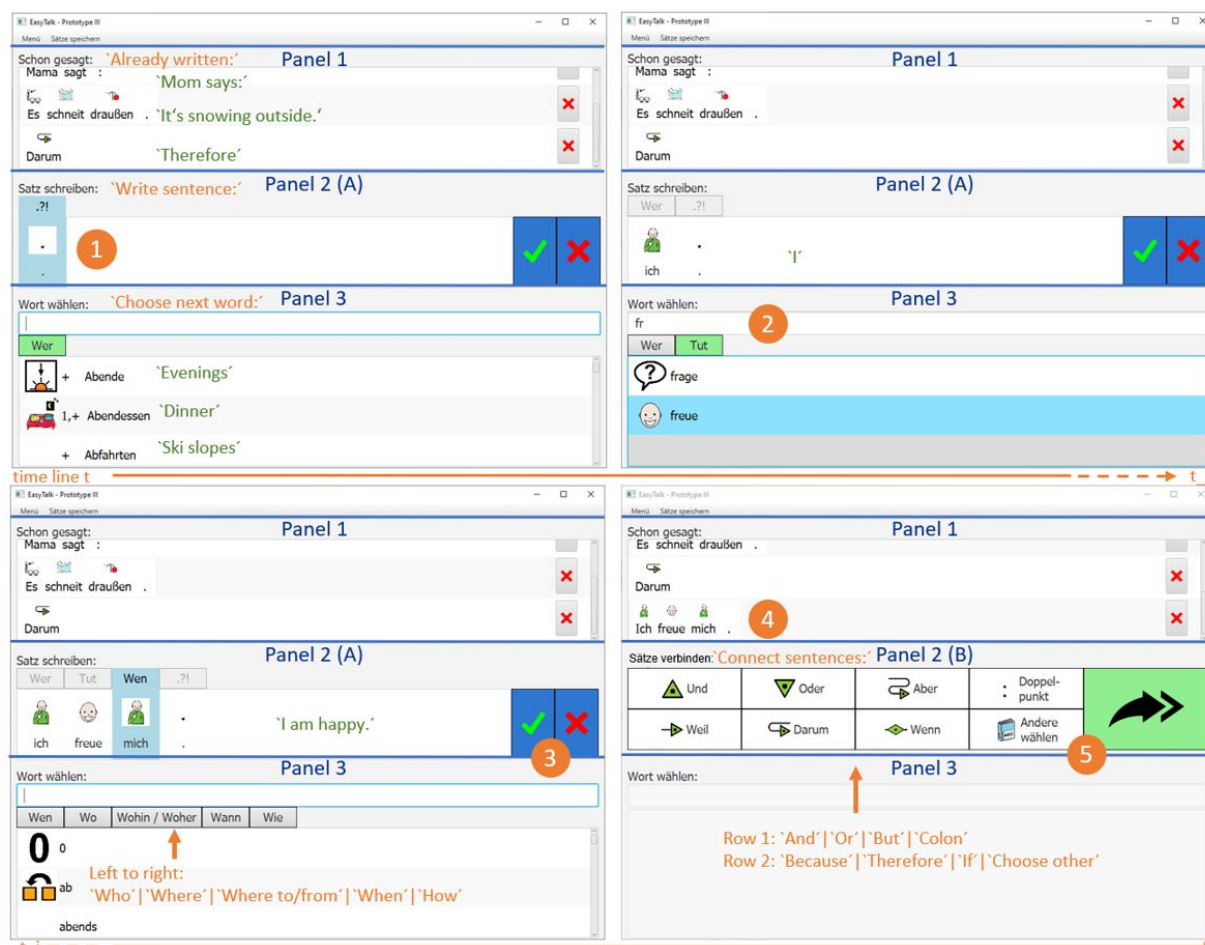
1 In empty Panel 2 (A), clue "./?/" is provided (click button to change; declarative is the default);
2 Add next word to Panel 2 (A) by selecting word by word from the suggestion list offering inflected forms;
3 Choose ✓ to finish the sentence (✗ deletes last word) → Step 3 in parallel to switching Panel 2 to (B) (cf. step 4);
4 The completed sentence moves to Panel 1 (it can be read out loud and/or exported for further use);
5 Select connection of the next sentence → The system switches back to Panel 2 (A) for next sentence.

Figure 1: The Five Essential Steps of the Text Production Process in *Easytalk*.

Figure 1 shows four snapshots from a text production session in *EasyTalk*. So far, the user has produced the following lines of text (where the symbol "//" indicates line breaks): *Mama sagt://Es schneit draußen.//Darum//* 'Mom says://It's snowing outside.//Therefore//'. Complete sentences are displayed in Panel 1. For longer text, the user can scroll through Panel 1 to look back within the flow of thoughts. A read-aloud function serves to remedy reading deficits. To support writers with low literacy skills, AAC symbols (here, we use the ARASSAC symbol set, 2021) supplement each wordform. The produced text can be exported from the

system for further use, with or without symbols. At the beginning of a new sentence, Panel 2 (A) offers the punctuation cue "**.?!**" in order for the sentence type to be selected. By repeatedly clicking the box (marked in blue as active; cf. step 1), the user can change the displayed punction symbol. As a result, the canonical LS word order of the constituents in Panel 3 changes. Here, the user did not change the default setting ".". Accordingly, Panel 3 offers inflected fillers for the subject of a main declarative clause. In order not to overtax the user, the subject is referred to by **Wer** 'who'—comparable to the teaching strategy in German elementary schools to identify grammatical functions. In Panel 3, the user is supposed to type the next word. In step 1, no input is yet provided. Accordingly, *EasyTalk* enumerates an alphabetic list of nouns in nominative case from the lexicon. In step 2, the subject *ich* 'I' with its wh-header **Wer** has already been entered. It is displayed in Panel 2 (A), followed by the selected punction symbol that remains sentence final. Panel 3 displays the header **Tut** 'does' as currently active in green, where the user has typed the string "*fr*". As a result, the suggestion list displays verbforms in First Person, Singular according to the subject-verb agreement-checking in the linguistic core component of *EasyTalk*. The user can select an entry from the list (shown in blue). Consequently, the element moves to Panel 2 (A). According to the valency of the verb, the user has to fill the displayed argument boxes (presented along with a list of facultative adjuncts) before being able to finish the sentence by selecting the green checkmark in Panel 2 (A). In step 3, the user has chosen the latter option for the typed sentence *Ich freue mich*$_{ReflexivePronoun\_DirectObject}$ 'I'm happy'. In response, the completed sentence moves to Panel 1. At the same time, Panel 2 switches to (B). Snapshot 4, in the lower right panel, depicts the new state where Panel 1 is extended (step 4) and Panel 2 (B) offers sentence connectors to make the overall information structure of the text more explicit (cf. the causative adverb *therefore* in our example). The chosen connector is appended to Panel 1, and Panel 2 switches back to (A), i.e., step 1.

In the following two sections, we explain how the computational linguistic support is realized in *EasyTalk*.

2.2   Fast and Correct LS-Sentence Writing in *EasyTalk*

All over a sentence, *EasyTalk* maintains its correctness and completeness. The goal is to present the user with linguistically well-reasoned support without unnecessarily restricting the variability of expression. For this purpose, Panels 2 (A) and 3 refer to the derivation tree of a *natural language paraphrase generator* using a declarative grammar of the LS rules and a restricted lexicon.

In *EasyTalk*, we adapt an approach developed in earlier work for L2 learners of German. In a dialogue with the user, COMPASS (Harbusch, van Breugel, Koch, & Kempen, 2007; Harbusch, Härtel, & Cameran, 2014) helps them to write an arbitrarily complex, syntactically correct German sentence. During the so-called *scaffolded writing* (Harbusch & Kempen, 2011), the user graphically assembles the overall derivation tree with feedback by the system. Such a tree applies lexicalized syntactic rules of the *Performance Grammar* that distinguishes dominance rules from rules for word ordering (Harbusch & Kempen, 2002; Kempen & Harbusch, 2002). COMPASS covers all wordforms in the *German CELEX* (Gulikers, Rattnik, & Piepenbrock, 1995). For a reasonable suggestion list in *EasyTalk*, its lexicon is restricted to *CEFR L2-learner level A1/A2* (Council of Europe, 2020). The system can also be adapted to the user's personal vocabulary (e.g., to include proper names of protagonists) or specific contexts (e.g., for school purposes). The set of declarative rules applied by *EasyTalk* is restricted to the LS rules. For example, the verbforms are restricted to the active voice,

indicative mood, present and present perfect tenses. Moreover, the system suggests non-inversion word order.

For the LS readers, the interface of *EasyTalk* has to be simple and intuitive. Nevertheless, the necessary information for building up the derivation tree has to be collected. In order to avoid linguistic terms, we use the cues in the form of interrogative pronouns, as outlined in Column 1 of Table 1, to communicate with the user about grammatical functions and maintain scaffolded writing. (This technique resembles elementary school exercises for identifying grammatical function fillers in a sentence.) In return, the system is enabled to propose correctly inflected forms. In general, the user is presented with the canonical orders defined in LS. Non-canonical rules for word ordering remain inactive, unless the user actively selects a wh-cue from the list in Panel 3. In such a case, *EasyTalk* automatically orders the sentence in Panel 2 (A).

Table 1 enumerates the constituents of a main declarative sentence (supplemented with the cue words used in the dialogue with the user; cf. the first column) in the order they get presented in the Panels 2 (A) and 3. As soon as the verbform is entered, the lexicalized grammar rules stipulate that all obligatory/facultative arguments are displayed (cf. the second panel). *EasyTalk* does not move any sentence with unfilled obligatory valency slots to Panel 1. In order to prompt the user to add information that the reader cannot infer (audience design), a list of adjuncts/modifiers is additionally provided (cf. the third panel).

Cue	Automatically inflected filler
Wer 'who$_{nom}$'	Elements of the **SUBJ**ect in nominative case
Tut 'does'	**FIN**ite verbform in active voice, present tense, coinciding in person and number with the subject
Wem 'whom$_{dat}$'	Elements of the **I**ndirect **O**bject in dative case
Wen 'whom$_{acc}$'	Elements of the **D**irect **O**bject in accusative case
P$_f$ was 'P$_f$ what'	Elements of the **P**repositional **O**bject in the case **P$_f$**, the instantiated preposition requires
Was tun 'what to do'	**P**ast **P**articiple in case the finite verbform is an auxiliary, or **INF**initive in case the finite form is a modal, or **I**nfinitve_with_**ZU** in case the finite form is a complement-taking verb
Wann 'when'	Elements of **MOD**ifier_time
Wo 'where$_{loc}$'	Elements of **MOD**ifier_location
Woher/-hin 'where$_{dir}$'	Elements of **MOD**ifier_direction from/to
Wie 'with what'	Elements of **MOD**ifier_instrument

Table 1: List of constituents in a main declarative sentence (in the top panel, subject and finite verbform are obligatory; the second panel enumerates all possible arguments/valency-frame fillers of the finite verb; and in the lower panel, adjuncts/modifiers are enumerated). Column 1 provides the cue words to be displayed as headers in Panels 2 (A) and 3.

In the rest of the section, we highlight additional supportive features of *EasyTalk*. The snapshot in Figure 2 sketches a later state of the text-production session from Figure 1: *Und//Ich ziehe gleich meine Jacke an.//Weil//Ich will Ski fahren.* 'And//I immediately put on my jacket.//Because//I want to go skiing'. In the current snapshot, Panels 2 (A) contains the sentence prefix *Ich$_{Wer}$ will$_{Tut}$ fahren$_{Was\_tun}$.* 'I want to go/drive'. In Panel 3, the user has typed "*Ski*". According to the lexicon, one suggestion is displayed.
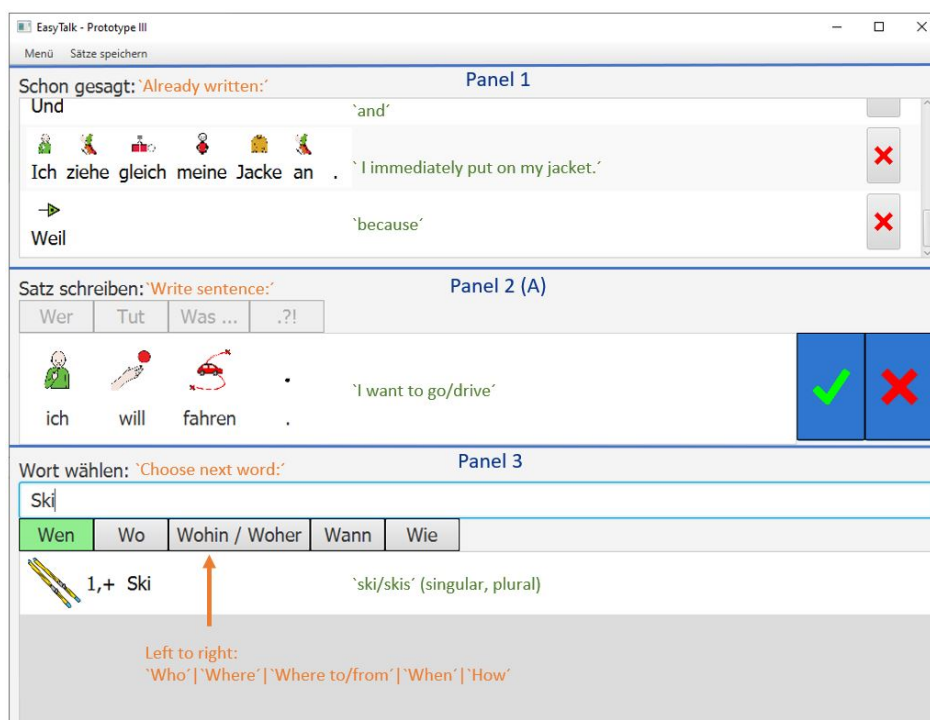
Figure 2: Later state of the text-writing session sketched in Figure 1.

In the choice list for **Tut** 'does', all forms with a separable verb prefix (SVP; cf. *ziehe an* 'to put on' in Panel 1) that the currently selected lexicon covers are presented to the user. In case a verb with SVP is selected, *EasyTalk* maintains the correct word ordering automatically (cf. *Ich ziehe$_{FiniteVerb\_1stP.,Sing.,Ind.Mood,Act.Voice}$ gleich$_{Adverb}$ (meine Jacke)$_{DirectObject}$ an$_{SVP}$.* 'I immediately put on my jacket.'). In case the finite verb is an auxiliary, a modal or complement-taking verb (e.g., *to want to do sth.*) like in Panel 2, the sentence can go on either with a direct object or another verb with its own valency frame to be filled (e.g., *Ich will (ein Eis)$_{DirectObject}$.* 'I want an ice cream.' vs. *Ich will (Ski fahren)$_{to\_do\_sth.}$.* 'I want to go skiing.'). This decision is presented to the user in a simple manner by the choice between the cues **Wen** 'whom$_{Accusative}$' and **Tut was** 'does what', respectively (see Steinmetz and Harbusch (2020) for details of this process). As soon as the verb is entered, the system presents the user with cues according to of the overall valency restrictions/arguments provided in the lexicalized grammar where every wordform is supplemented with the syntactic structure. In the example, the user is about to fill the direct object cued by **Wen** 'whom$_{DirectObject}$' with *Ski* 'ski'. The additionally displayed modifier/adjunct cues should remind the user to supplement the sentences properly with audience-design information like time and place of an event. In Panel 1, the user has filled the cue **Wie** 'how' with the adverb *gleich* 'immediately' that is automatically ordered at an appropriate place in the sentence.

In general, inflected suggestions speed up typing by unifying the two-stage process of selection and manual morphological adaptation. Hence, not only is syntactic correctness ensured, but typographical errors are also avoided, and individual typing speed is supported.

2.3　Discourse-Structure Cue-Specification in *EasyTalk*

Writing support in *EasyTalk* is not restricted to intra-sentential items. Text consisting of a series of simple main clauses with canonical word order lacks flow, and the writer's thoughts are only partially conveyed. In terms of natural language generation, the so-called *text plan*—assembled

in the conceptualization/what-to-say phase—comprises propositions, i.e., the not yet syntactically shaped atomic semantic concepts to be uttered, related by *rhetorical/discourse structure relation*s to express the discourse structure/speaker's intention (e.g., the RST relations CONSEQUENCE(know(speaker, fact: snowing(place: outside, time: now)), happy(speaker, time: now))). In the aggregation phase in NLG, the text plan is mapped onto a linear sentence structure (e.g., snowing(place:outside, time:now)) is a separate sentence not verbalizing that this fact is known by the speaker) before the propositions and RST-elements get verbalized in the formulation phase (e.g., *It snows outside. Therefore I am happy.*)

In *EasyTalk*, intuitive cues referring to RST relations simulate the generation of the overall text plan by stipulating that the user specifies the communicative goal for adding the next sentence. This technique is comparable to sentence-combining exercises in the Anglo-Saxon language area that teach students to integrate sets of short, staccato sentences into longer, more effective ones (see Nordquist (2018) for an online introduction; Ney (1980) for the history, and Saddler & Preschern (2007) for the context in school). Whenever the user finishes a sentence by pressing the green checkmark button (cf. step 2 in Figure 1), Panel 2 switches to menu (B) (cf. step 4 in Figure 1). This menu consists of nine buttons. The green arrow-button on the right side of the menu omits the addition of a connector. In order not to overtax the user, we restrict the choice of connectors to those widely used under LS rules (NLS, 2013). We grouped the elements in the menu according to the conjunction type. In the upper row, the coordinating conjunctions *und* 'and', *oder* 'or' and *aber* 'but', and the colon are provided. We realize that the colon is highly ambiguous in LS texts. However, it is widespread (Bredel & Maaß, 2016, p. 254). We therefore offer this choice to prevent the users from having to search for this option. In the second row, the subordinating conjunctions *weil* 'because' and *wenn* 'if', and the causative adverb *darum* 'therefore' are displayed.

Additionally, the button *Andere wählen* 'Choose other' enables more advanced users to browse through all connectors provided by the lexicon. For the consistency and overall ease of use of the system, Panel 3 provides the list of connector choices with the same selection options as for wordforms during sentence typing. The option selected—either by button or in Panel 3— is appended to Panel 1 (cf. *darum* 'therefore', *und* 'and', *weil* 'because', and the colon in Figures 1 and 2, respectively).

So far, we have illustrated the always active supportive writing features of *EasyTalk*. In the next section, we focus on the teaching of text production concepts by wrapping an active control structure around the key components of *EasyTalk*.

2.4   The Writer's Workshop Mode *EasyText*

As mentioned above, writing coherent, understandable text emphasizes audience design concepts. A writer's workshop aims at teaching students the process of text writing through practical application (cf. Graves & Murray (1980) for the history; Hicks (2009) for the digital application of the concept). When *EasyText* is active, the system functions as a teacher taking over the initiative by asking questions at different stages of the text production. For convenience, this mode can be easily ended or reactivated at any point in time.

```
                          Initial story writing checklist
  1    Liebe Susi!                          Dear Susi!
  2    Denk dir eine Geschichte aus!        Think up a story!
  3    Bist Du fertig?                      Are you ready?
  4    Beantworte zuerst die wichtigen Fragen von   First answer important question with respect
  5    der Geschichte!                      to the story.
  6    Weil:                                Because:
  7    Die Leser*innen wissen viele Dinge nicht.    The readers does not know about many things.
  8    Deshalb:                             Therefore:
  9    Wir schreiben die wichtigen Dinge!   We write the important things.
 10    Wer soll deine Geschichte lesen?     Who is the reader of your story?
 11    Mache ein Kreuz bei den Passenden:   Mark the fitting ones:
 12    •  Mama / Papa                       •  Mum / Dad
 13    •  Petra, meine Freundin             •  Petra, my friend
 14    •  Helen, meine Lehrerin             •  Helen, my teacher
 15    Wer fehlt in der Liste?              Who is missing in the list?
 16    Wir müssen jetzt herausfinden:       We have to find out now:
 17    Was wissen die Leser*innen schon?    What do the readers already know?
 18    • Wann findet die Geschichte statt?  • When does the story take place?
 19    • Wo findet die Geschichte statt?    • Where does the story take place?
 20    • Wer spielt mit?                    • Who takes part?
```

Figure 3: Excert from the Checklist that Can Be Adapted to Specific Text Genres and Situations Presented in the Beginning of an *Easytext* Session.

EasyText's dialogue starts with an introductory text (cf. lines 1–9 in Figure 3; on demand, the read-aloud function supports users with low literacy skills). Lines 10–15 collect background information on the reader in an intuitive manner. As far as possible, the individual questions of the checklist offer a range of alternatives to select from. Where this is not possible, the user types the answer using *EasyTalk*. Based on the currently active user profile (e.g., containing the name of the user (in our case *Susi*), and names of the caregivers, friends, etc.) and the user's previously written texts, the system offers predictions. Lines 16–20 show part of the collection of background information for the text the user would like to write. A sequence of questions is asked to characterize all the protagonists in the list of actors (line 20) so that the reader can identify them clearly. Different options are tested. Does the reader already know the name of the actor(s)? Can they be introduced by name? Can a characterization of the person(s) be added to enable the reader to become familiar with them (e.g., *Petra is my friend, Helen is my teacher*)? Such a session avoids the need for relative clauses (not allowed in LS) to establish new protagonists in the story. Similarly, the background of every sentence is explored through questions referring to the modifier cues in Table 1.

When *EasyText* is active, the system asks the user to note down all changes or details unknown to the reader by asking explicit questions. Instead of simply displaying the modifier cues in *EasyTalk* (cf. Figures 1 and 2), *EasyText* stipulates the filling of modifiers (e.g., when and where the story takes place). *EasyText* provides default fillers in the selection list of Panel 3 (e.g., time="now"/place="user's home address"). For every new sentence, the system asks whether the current fillers have to be changed. Only in the beginning of the overall story, and in case of a change, the fillers are added to the text.

This process has various benefits. Not only is the user trained in adding relevant audience-design aspects, but, in addition, the system can actively support the user during sentence production throughout the story. For instance, suggestions of personal pronouns can be made by the system when referring to protagonists during sentence production (e.g., *sie* 'she' for *Mama)*. Assuming Susi is going to write the story we sketched in Figures 1 and 2 (envisioning that the actor is her female friend *Petra)*, the system would stipulate that the time and place of the event are added to the text—resulting in: "*Es ist 3 Uhr Nachmittag.//Meine Freundin Petra*

sitzt im Wohnzimmer.//Und//Sie liest ein Buch.//Die Mama von Petra ruft aus der Küche.//…
'It is 3PM.//My friend Petra is sitting in the living room.//And//She is reading a book.//The Mom of Petra calls from the kitchen.'.

3   System Evaluation

For our target group, the initial impression is crucial. Many AAC solutions are abandoned due to avoidable interface flaws (see, e.g., Dawe, 2006, Fager, Hux, Beukelman, & Karantounis, 2006, or Waller, 2018). In the following, we report results of testing the adequacy of the user interface (UI) of *EasyTalk* for the heterogenous needs of LS readers with complex communication needs and/or low literacy skills in connection with intellectual/learning disabilities.

We conducted a case study with nine participants with cognitive disabilities and/or autism spectrum disorder at the *Schreibwerkstatt* 'Writing workshop' of a facility for adults with cognitive or multiple disabilities. We employed the method of case studies to freely adapt each session to the abilities and impairments of each test person (see, e.g., Chapter 16 by Lazar, Feng, & Hochheiser, 2017). With respect to accessibility, individual customizations (e.g., individually adapted keyboards or mouses, or the sensitivity of the input recognition), although easily doable, were not provided during the study. All participants used the provided laptop in order to obtain more comparable observations. During the sessions of 30–40 minutes, we recorded the interaction of a participant with the system in the presence of a personal caregiver, or the leader of the *Schreibwerkstatt*. At the beginning of each session, we introduced the system functions to each user. Then, the participants were asked to freely write their own sentences. When needed, we helped in operating the system or assisted with spelling. In the following, we sum up important insights.

In general, all test subjects could independently use *EasyTalk* right from the beginning. The concept of writing a sentence by answering sequences of wh-questions was directly clear to all participants. They related the answering of wh-questions to oral dialogues. Figure 4 depicts three examples illustrating that the users utilized the supportive features of *EasyTalk*. For example, in E1, a temporal modifier is added; in E2, the recursion for entering two verbforms could be operated without explicit teaching; in E3, a verb with a separable verb prefix is used. To our surprise, all participants typed the complete wordforms instead of speeding up typing by selecting the intended wordform from the list of suggestions provided in Panel 3 for the typed prefix. This might change over the time when the users get more familiar with the system. Another explanation refers to a comment by the leader of the *Schreibwerkstatt*: The users get a feeling of security and accomplishment by typing the complete wordform.

We observed problems due to spelling or typing errors (e.g., accidently entering a character several times, or misspelling a word). In return, the suggestion list remains unexpectedly empty. Therefore, we plan to improve the word entering strategy in the next version of *EasyTalk*.
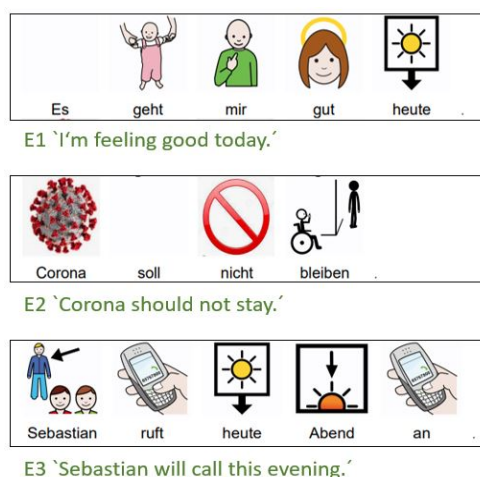
Figure 4: Example Sentences E1-E3 of Text Written with *Easytalk* in Test Sessions.

Panel 2 (B) providing sentence connections was often skipped via the large button with a green arrow. The main reason for choosing this option results from the fact that we did not force our test subjects to think up a story before exploring the system. One participant noted that the options from Panel 2 (B) provide a good solution for writing complex sentences: By writing and connecting individual main clauses, one can write long, coherent sentences without them becoming too long or complicated to write. The leader of the *Schreibwerkstatt,* a caretaker and two social workers, gave us positive feedback on the menu. They judged Panel 2 (B) intuitive to operate. It offers the right support for connecting sentences—thus, creating text coherence for their students. They see great potential for practicing sentence combination in a simple manner.

All test sessions demonstrated that *EasyTalk* meets the requirements of those users who know the alphabetic characters and have basic spelling skills, but difficulties writing whole words or complex sentences and coherent texts. All users appreciated the read-aloud and the export function with symbols. All users, caregivers and experts gave positive feedback on the AAC symbols. The experts and caregivers appreciated that the symbols can easily be exchanged, enabling users to use the symbol sets they are familiar with (e.g., *Boardmaker* or *METACOM*, 2018), and to add personal photos as symbols (e.g., for loved ones).

Without overgeneralizing the results, we were pleased with the largely positive feedback. Currently, we analyze the eye tracking data recorded during the individual sessions.

4   Conclusions and Future Work

We presented *EasyTalk,* an assistive system that supports LS readers in writing correct and complex coherent texts. Additionally, the system offers the writer's workshop *EasyText* that teaches basic concepts of audience design. Crucially, a particular highlight of our system is a user interface that, in addition to low literacy skills, compensates for factors such as working memory deficits or low computer skills.

For the notorious problem of spelling or typing mistakes by people with low literacy skills, we plan to improve the strategy of word selection in Panel 3 to avoid empty suggestion lists. We work on a prototype employing approximate instead of exact string matching. However, we are aware that this feature might be confusing. Many users—irrespective of any specific user group—do not appreciate non-static/deterministic user interfaces (Lee & Yoon, 2004).

Therefore, this mode can be switched off in the settings. Moreover, we plan to add a voice user interface (VUI) for users with functional speech in form of a speech recognition device. For *EasyText*, we work on more sophisticated user profiles for easier customization on shared workspaces (like the computer room in a school or the facility for assisted living). Moreover, we want to offer context-sensitive vocabularies (see, e.g., Demmans Epp, Djordjevic, Wu, Moffatt, & Becker, 2012) fitting different settings (e.g., leisure time or work/school environments) and an easy-to-use interface to design customized text templates and exercises that will result in a so-called *teacher mode* (cf. Harbusch, Franz, & Koch, 2012).

For visually impaired users, we realized that we need to add more options for customization in terms of creating a barrier-free interface—such as special highlighting of the mouse cursor, the font size, and the contrast of the system (e.g., dark mode). How an optimal interface for this user group should look is currently an open problem.

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Contact email: inaschroeder@uni-koblenz.de

Evaluation of Face-to-Face and Online Learning for Enterprise and Entrepreneurship Courses

Kassandra A. Papadopoulou, The University of Manchester, United Kingdom
Robert A. Phillips, The University of Manchester, United Kingdom
Fatemeh Salehi, The University of Manchester, United Kingdom

Abstract

Having moved predominantly online with the UK national lockdown of 2020, a comparison was made of two entrepreneurship courses at The University of Manchester, taught its first online academic year, with the previous year's versions which were face to face. It was found that students generally adapted well to online teaching, feedback and attainment were similar to previous years. However, students felt it was important to have additional access to their lecturers through live sessions, extra assignment help, and need longer time to absorb the material with recorded lectures broken down into smaller videos and activities to aid concentration. They found the live session helpful to meet and work with peers and as part of their studies they want access to both asynchronous and synchronous learning methods. Analysis and recommendations were provided on what the authors consider to be the contributing pedagogic factors of delivering a successful online pedagogic approach in entrepreneurship and make recommendations as to how online learning could be improved.

Keywords: Entrepreneurship and Enterprise Education, Pedagogic Models, Face-to-Face, Online learning, UK

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1.   Introduction

Nine out of ten UK universities include entrepreneurship in their curriculum, with 75% of them offering elective modules in enterprise and 98% providing extra-curricular support for enterprise and entrepreneurship (NCEE, 2020). The University of Manchester (UoM) is one of them and has a dedicated centre for delivering enterprise and entrepreneurship education; the Masood Entrepreneurship Centre (MEC) where the courses considered here originate.

In 2020 universities worldwide ran various models of teaching and learning. In the UK most universities transitioned rapidly to a fully online learning (OL) model in March and an online blended learning (OBL) in September of the same year which includes both face-to-face (F2F) and OL aspects. Traditional F2F education also known as brick-and-mortar, is considered the gold standard, however the benefits of OL approach were first in use with distance learning (DL). DL was created for a niche market with a purpose of adapting to individual's needs and motivations.

OL is considered either a new generation of DL, a departure from DL or a new model for teaching and learning. OL is an internet-based, asynchronous type of DL, providing materials and support to learners involved in flexible learning (Power & Morven-Gloud, 2011). More recently synchronous sessions are integrated in OL. Maeroff (2003) refers to OL as 'a classroom of one'. The spectrum of the pedagogic model combinations in terms of physical and virtual approaches is vast and is conceptualised by the authors in Figure 1.
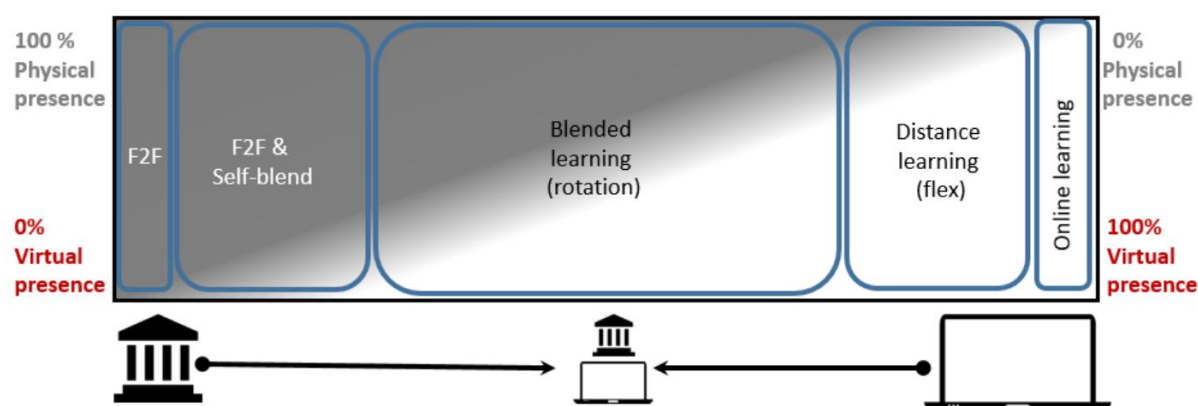

Figure 1: Overall Spectrum of Physical (Brick-and-Mortar) and Virtual (Online) Presence in Higher Education

Higher education institutions have to improve their delivery for a flexible and robust education and pedagogical approach to meet student expectations (Advance Higher Education, 2020a). In UoM, OBL is led and supported by its Faculties and its current teaching model is based on nine principles (The University of Manchester, 2020a), however MEC delivered purely OL courses. Table 1 specifies the models applied to the courses presented in this paper and their main differences. The advantages and disadvantages of each method depend mainly on the need (e.g., level/type of degree) and circumstances of the candidates (usually the geographical location).

MEC offers a number of on and off curricular programmes for undergraduates (Sanchez-Romaguera & Phillips, 2018) and postgraduates (Papadopoulou and Phillips, 2019 & 2020). These, along with many entrepreneurship programmes in general (The University of

Manchester, 2020b) would have elements of practice and teamwork which are not easy to replicate in a virtual environment especially switching to OL at a short notice.

Two courses were considered for this study which ran F2F prior to 2020/21 and switched online for 2020/21 academic year. Advanced Technology Enterprise (ATE) was aimed at 3rd year engineering students with prerecorded lectures of 90 minutes per week, split into 2 x 45 minutes.

Main Characteristic of Learning	Face to Face (F2F)	Online digital/virtual Learning (OL)	Online & Blended Learning (OBL)
Location	Physical classroom (not flexible)	Home / anywhere	Combination of classroom / home, library (flexible)
Learning Methodology	F2F	Online	F2F and online
Learning Time	Fixed timetable (not flexible)	Any time / self-paced (flexible)	Any time / self-paced (flexible)
Technology Usage	Optional use of digital technology (software)	Digital technology is essential (software & hardware)	Digital technology is essential (software & hardware)

Table 1. Comparison of Learning Types (Partially Adapted from Khan *Et Al*, 2012).

There were also 90-minute sessions per week drop-in open Q and A (not recorded). Assignment was given out in week 1 and there was a live 'assignment instructions' session in week 1 (recorded). There was one activity/example or case study each week alongside the lecture material online. Enterprise Strategy and Marketing (ESM) is an open-elective unit offered across the university to 3rd and 4th year students, as such the class has students from many subject areas. OL model for this unit included asynchronous lectures with 2 to 4 pre-recorded videos, readings, and activities for each week. Synchronous lectures were 90-minute weekly interactive sessions focused on discussions and group works. Formative and summative assignments were given out in week 1 and students could ask questions via an online discussion board and during the weekly online drop-in sessions. For both units, many students were present in Manchester, but some were in their home countries around the world where timings of live lectures were an issue. Lecturers had to accommodate material for all students around the world. Both units were offered over 11 weeks, see Table 2.

1.1. Aims

The paper is carrying out a generic and fast-response analysis of two of the MEC's entrepreneurship units to identify the best practice that is applied to enterprise and entrepreneurship education. The description of enterprise and entrepreneurship are described in Advance Higher Education (2020b). Although there was some experience in DL through various UoM programmes, it should be noted that the 'online' aspect of teaching and learning is as of 2020 a university-wide led practice, it is a new approach and experience for the majority of academics, hence the paper will draw with suggestions for improvement of best practice in higher education in enterprise and entrepreneurship.

2.   Methodology

Primary data was used from the university's sources and is split in quantitative and qualitative aspects. The characteristics of the units are depicted in Table 2. Unit Surveys (US) and other feedback lecturers obtained were collected for both units. The US are part of the university's commitment to its strategic vision to obtain feedback from the students, develop the units further and improve student satisfaction. The US ask students to state how much they agree or disagree with a number of statements (quantitative) and free text responses to questions about the unit and the lecturer (qualitative), (The University of Manchester, 2020c). The standard US used in the academic year 2019/20 was adapted for the OL for the academic year 2020/21, which included online-related questions. These were compared with general findings from Alliance Manchester Business School (AMBS) level of OL delivery.

Feature	Enterprise Strategy and Marketing (ESM)	Advanced Technology Enterprise (ATE)
Level / Credits	UG / 10	UG / 15
Student background	Mixed	Engineers
Type of assessment	100% coursework	100% coursework
Cohort size 19/20 & 20/21	53 & 69	55 & 70
Online platform 20/21	Zoom/Adobe Spark	Blackboard Collaborate
Pre-recorded videos length	10-35 min	20-45 min
Live sessions length	60-90 min	90 min

Table 2. Comparison of Features of ESM and ATE Units Studied.

3.   Results and Discussion

A comparison was made for both quantitative survey results and qualitative comments from the students for both units and both years, and a summary of qualitative findings from AMBS, which are presented below.

3.1.   Results – Unit Survey Quantitative Section face-to-face and online

The feedback for the two units for F2F (2019/20) and OL (2020/21) are shown in Table 3.

Unit Survey Quantitative Section - how much students agree (5) or disagree (1) with the statements	2019/20 ATE 10% response rate	2020/21 ATE 22% response rate	2019/20 ESM 32% response rate	2020/21 ESM 24% response rate
I would rate this unit as excellent	4.17	4.00	4.59	4.29
Feedback on my work was helpful	4.50	4.47	4.53	4.12
This unit was well organised	3.83	4.20	4.82	4.53
The lecturer's teaching was excellent	4.50	4.47	4.53	4.53
Online learning was delivered	-	3.08	-	4.24

well				
Online assessment was delivered well	-	4.07	-	4.29
UoM technical support was helpful	-	4.07	-	3.65
(non-US) Average Course Mark	69%	69%	65%	68%

<div align="center">Table 3. Feedback for F2F (2019/20) and Online (2020/21) Teaching.</div>

3.2. Results – Unit Survey Qualitative Section for online cohort

Overall, there was a concern indirectly related to online delivery teaching, deadlines that worked well in previous years, in an online setting students felt they needed more time to absorb the information and write the assignment.

Students appreciated the synchronous question and answer sessions, some preferred asking questions by voice, some preferred to type in the chat box: *"I feel it's a lot easier to have a question seen/heard and answered with the synchronous sessions than in-person and explanation is easy for typing out things that are hard to say as is the case with some technical details and notation"*.

Assignment support was also singled out: *"I found that his online sessions where we could ask questions was especially helpful"*.

"There was a lot of feedback for assignments and being able to send parts of our reports for preliminary feedback was very helpful. There was an abundance of helpful online resources and examples, and the teaching pace was very good. The professor put in a lot of their personal time to helping students even up to the deadline, it makes learning a unit that's a bit left-field a thousand times easier".

However, one student did feel this could be taken even further: *"A more interactive platform would be great because this unit type is unfamiliar for engineering students"*.

Students appreciated having pre-recorded lecture materials and the opportunity for regular interaction with staff and their peers: *"I found the pre-lecture work we needed to do, and then discussing in class most helpful"*.

"Although we had to go over lecture material by ourselves before the corresponding online session, she kept it interesting by incorporating activities to further our knowledge and keep us engaged. In the live sessions, she made sure we understood the week's content and went over the activities with us. I found this a very effective method of learning and really appreciated her classes".

"I enjoyed having the pre-lecture activities to do beforehand, meaning we could have a more interactive session during the live lecture. I enjoyed both staying as one class to discuss and being put into breakout rooms, as long as everyone in the breakout room is prepared".

Having cameras on had a positive impact on the interactivity of the session, but only a small number of students were happy to do so: *"I am quite happy having my camera on during the sessions as it feels more interactive, whereas others seem very reluctant to turn theirs on.*

Maybe a bigger push for people to have their cameras on would improve what was already a very enjoyable course".

Students appreciated the support provided for online assessment: *"There was lots of guidance available and she was always very speedy in responding to emails and discussion board questions".*

3.3.   Results – Alliance Manchester Business School results

The findings of the two units are in line with the general findings from AMBS, which stated likewise that effective online teaching has specific factors which are highlighted here. Courses need to be *well organised with well-structured course materials* that allow students to navigate learning material easily. Lecturers need to provide a clear roadmap that guides students through the content, this can be done in *Blackboard* or *Adobe Spark. Breaking up videos* into shorter chunks helps. *Regular interaction with staff* is important and lecturers can *invite their students to ask questions during taught sessions*. Students find *summative feedback on assignments* important as well as using *polling during online sessions* to pose questions that students can answer to check their understanding. *Drop-in* and well managed *student-to-student interaction in live sessions* via *break out rooms* helps students to get to know and interact with each other (Alliance Manchester Business School, 2021).

4.   Conclusions

The data shows that in terms of marks achieved, students performed as well with OL as previous years F2F. The feedback showed students were contented with the teaching, with similar scores to previous years. Recorded lectures were popular with many students accessing material from different parts of the world. Students in general were not completely new to OL, as in some cases during the F2F course delivery students opted for watching recorded podcasts. Students enjoy the pre-recorded lectures and found them very convenient, but they are not sufficient. Students still want the synchronous interaction as it helps with their learning and meeting their peers. This is in line with studies showing that interacting in a virtual environment and even the mere belief one is interacting with another person leads to superior learning (Okita, Bailenson, & Schwartz, 2007). According to Rice, Moraczewski and Redcay (2016) one component of successful social interaction is the creation of a shared psychological state between partners, which is what students can achieve through synchronous sessions.

However, there were some qualitative comments which can be used to improve the OL offering for future years. Students need more time to absorb material, as the pre-recorded lectures are of a faster pace than F2F. As lecturers pre-record the taught material, run live sessions and provide other support for students (quizzes, additional reading etc.) this can lead to an excess workload for students, lecturers need to balance the course credits with the analogous effort of learning hours and need to match the learning outcomes of courses. Students also preferred simplicity and clarity. Lecturers need to have an early conversation were possible with the students/student-reps to find out what communication channels exists and get a feel for the class, such as their geographical location.

It is important for MEC and UoM to find the right balance to adapt Educational technology (EdTech) and keeping the human element of learning and development of social brain in higher education. Overall the delivery of lectures is being very well managed, however, it is

still difficult to replicate the organic aspect of interaction in classrooms and the facilitation of groups/workshops and spontaneity of thought development, sharing and collaboration.

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Contact email: kassandra.papadopoulou@manchester.ac.uk

From Compassion Fatigue to Compassion Satisfaction: A Research Among Physicians Specialising in Oncology at the University of Padua

Paola Rigoni, University of Padua, Italy
Natascia Bobbo, University of Padua, Italy

The European Conference on Education 2021
Official Conference Proceedings

Abstract
Context: The quality of health workers' professional life includes some expressed or latent metacognition skills related to psycho-emotional stress management, especially in settings where there is constant contact with suffering or dying patients. The purpose of this study was to ascertain the quality and quantity of *self-care* strategies among oncology residents. Method: A professional educator administered the Professional Quality of Life Scale (ProQOL), which measures *compassion fatigue, burnout, and compassion satisfaction*, and an ad hoc questionnaire. The ProQOL is a questionnaire developed and validated explicitly to detect the emotional experience and perceived work quality of professionals engaged in high-exposure settings due to the onset of vicarious disorders. The ad hoc questionnaire proposed simple questions through which to get a picture of everyday life outside of work and to try to understand the self-care strategies that these residents implement. Results**:** Most of the residents involved were at risk of burnout and had low scores on the subscale of the test measuring satisfaction related to the pleasure of helping others. The study on oncology residents, known to be exposed daily to the risk of incurring vicarious disorders (Cheli, et al., 2017; IsHak et al., 2013; Rotenstein et al., 2016; Sinclair et al., 2016), confirmed the trend highlighted by a recent review of the literature (Panagioti et al., 2016).

Keywords: Compassion Fatigue, Oncology, Self-care Strategy

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1. Introduction[1]

The experience of a suffering person affected by an illness can also create suffering among the people who know them, who are close to them or who listen to their story. The term Compassion Fatigue refers to the emotional and psychological state of suffering that results from continuous and prolonged exposure to the pain of others. The most likely and at the same time most visible consequences with which this state of secondary and indirect suffering manifests itself concern dysfunctional behaviors on a cognitive and psychological level with important effects also on professional performance.

Secondary Traumatic Stress is increasingly recognized as a possible occupational consequence of any caring and helping profession (Huggard, Dixon, 2011), and with respect to primary care physicians, surgeons, and oncologists, studies have shown that there are significant challenges with respect to the emotional scope of their work (Balch et.al, 2009; Huggard & Dixon, 2011). In particular, all those who carry out the health profession in the oncological area are exposed to these outcomes (Cheli, et al., 2017; Tartas, 2016).

Another relevant aspect is to be connected to the current health context increasingly characterized by patients with chronic diseases, which implies a profound modification on the part of medical personnel in the approach of the relationship with the disease (Assal, 1999).

In the acute illness model, health care providers learn to suppress their emotions. Inversely in the chronic care setting, long-term care requires practitioner involvement and strong internal motivation within the profession (Assal, 1999, p.105). In addition, the patient today is no longer a passive subject and, furthermore, is not always appreciative of healthcare professionals (Assal, 1999, p. 106), as might have been the case in the past. Patients expect "compassionate" care, and this aspect has become a professional obligation for clinicians (Sinclair et. al., 2016), but very little is known about the state of research on the outcomes of this new identity challenge (ibid.). Equally little is known about the stress associated with the work of physicians, medical school residents, and all professionals who work closely with suffering and/or dying people (Tartas et al., 2016; Figley, 1999; Bobbo, 2015).

In 2016 (Rotenstein et al., 2016) in a review of the scientific literature on the problem of mental distress among medical school students it was found that out of 122,356 students 27.2% suffer from depression or depressive symptoms and that out of 21,002 students 11.1% have suicidal ideation. Depression affects males and females across the board, while depressive symptoms increase by 13.5% as students enter medical school. Only 15.7% of students underwent psychotherapeutic treatment to resolve the problem. From the results of this literature review, we can state that a monitoring of these future physicians' psychic health could be a starting point for educational training interventions that, on the one hand, support the vocational choice of the path to medicine and, on the other hand, implement self-care strategies that lead to Compassion Satisfaction, that is the pleasure of performing one's profession.

As physicians themselves testify in this historical period marked by the covid pandemic - 19: "Health care organizations and society have a responsibility to help address these stresses and challenges." (Shanafelt T, Ripp J, Trockel M., 2020)

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[1] The contribution was written by four hands: Paola Rigoni wrote and edited paragraphs 2, 3 and 4; Natascia Bobbo wrote and edited paragraph 1.

2. Research Designs

2.1 Research Objectives

The primary objective of the study was to describe the state of well-being, as well as to assess the quality and quantity of coping and self-care skills possessed by the residents. As suggested in the literature, an early intervention on awareness of any distress present during training can prepare these future professionals to better manage secondary distress such as Compassion Fatigue or burnout (IsHak et al., 2013). The constant monitoring could allow the prevention of states of suffering that prelude to burn-out and the "maintenance of the caring role". The elaboration of the data of this survey could be a preliminary phase to the structuring of a series of training meetings with the trainees, on the phenomenon of Compassion Fatigue and stress management, with the intent to combine research with intervention (action research).

2.2 Sampling Methodology

The target subjects involved were medical oncology residents practicing at the Istituto Oncologico Veneto (Oncological Institute of Veneto, Padua) enrolled in any of the five years of the course.

The simple random sampling method was used, assigning the same probability of selection, that is, each resident had the same probability of joining the sample. A number of twenty participants out of thirty-four enrolled in the residency was established, believing this number to be adequate for the source population. No value of representativeness is expressed, accepting Marradi's (2007) position that "representativeness", is a concept that assumes innumerable intermediate states between total absence and total presence.

We considered this target group of subjects of particular interest first because they are performing in an environment with a high level of stress and secondary suffering, and second because there is limited research available to date on the emotional state of residents in relation to experiencing such a work environment (Tartas, 2016).

2.3 Data Collection and Analysis Methodology

First of all, the subjects involved self-completed a validated test, the Professional Quality Of Life Scale, ProQOL (Stamm, 2009), version 5. The validated Italian version of the test is provided by the test authors themselves on their online site (www.proquol. org). org); this is followed by an ad hoc questionnaire, consisting of four questions on socio-demographic data, respectively: gender, year of birth, geographical origin, and year of enrolment; ten dichotomous questions that investigate the area of self-care, one with a Likert scale and one with a multiple-choice question that is linked to the perception of the work environment.
Data collected were subjected to analysis using dedicated software (Spss).

3. Results

3.1 Description of the Sample of Subjects Involved and the Data Collected

20 residents participated, of whom 14 were female and 6 males, with an average age of 29 (tab. 2).

Value	Frequency	Percent
27	1	5,00
28	7	35,00
29	6	30,00
30	2	10,00
33	2	10,00
35	1	5,00
37	1	5,00

Table 1: Age

| N	20
Mean	29,75
Std Dev	2,65

Table 2: Average Age

Of these 20, 4 were from the first year of specialization, 5 from the second, 6 from the third, 4 from the fourth and 1 from the fifth (Table 3). Of the participants, 7 were from the Veneto region, 11 from other Italian regions (5 from the center, 4 from the north and 2 from the south), 1 from North Africa and 1 from Eastern Europe.

Value Lable	Frequency	Percent
1	4	20,00
2	5	25,00
3	6	30,00
4	4	20,00
5	1	5,00

Table 3: Year of Specialization

3.2 The Questionnaire Outcomes: Self-care, Working Environment and Protection

In the dimension of self-care, most of those involved stated that they continue to cultivate their interests despite the number of hours they work. In particular (graph 1) all have read at least one book in the last three months, have gone to a museum or an art exhibition, have gone to the cinema, go out with friends in the evening and sleep well at night. The only dimension in which a low percentage of affirmative responses occurs is sports.
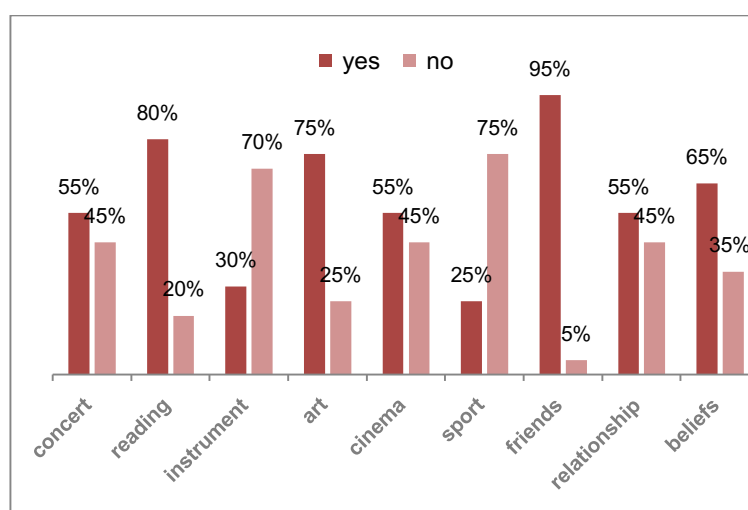

Graph 1: Self Care

No significant correlation was found between item size and year of major or geographic origin. Due to the size of the sample and the unevenness in the gender distribution, it is not possible to compare the gender variable with the other states of the other variables.

Regarding the work environment, it was asked what could be helpful in coping better during particularly tiring periods.

The most interesting data concerns psychological support (graph 2). The psychologist emerged as the only figure recognized for individual protection in the professional sphere, however in the questionnaire less than half felt that psychological support could be helpful. More than half declare that they prefer to have more time to discuss with colleagues even aspects not related to the clinic and the possibility to have more time for themselves as positive environmental factors. The sample considers it less supportive to have information on how to protect themselves from vicarious discomforts such as burn-out, to have more autonomy in the choices that must be made and to have a dedicated environment in the work context where they can take real breaks.
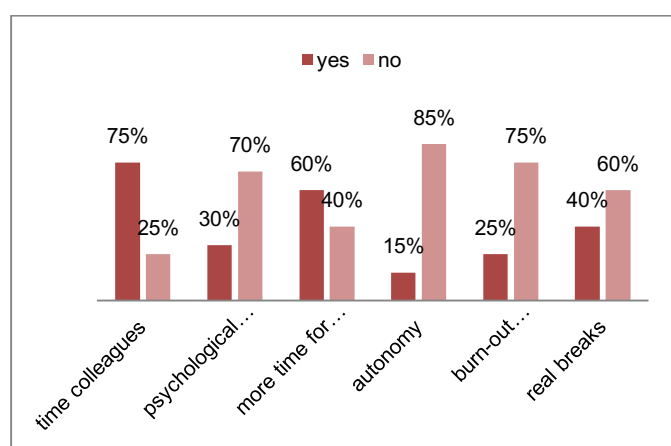

Graph 2: Working Environment

In the dimension of protection, the contrasting figure of the psychologist emerges once again. Less than half of those interviewed believe that, in a moment of personal difficulty, it would be useful to turn to a psychologist (graph 3). More than half declare that they would prefer to talk about their difficulties with a friend (80%), a partner (75%) or a family member (65%).
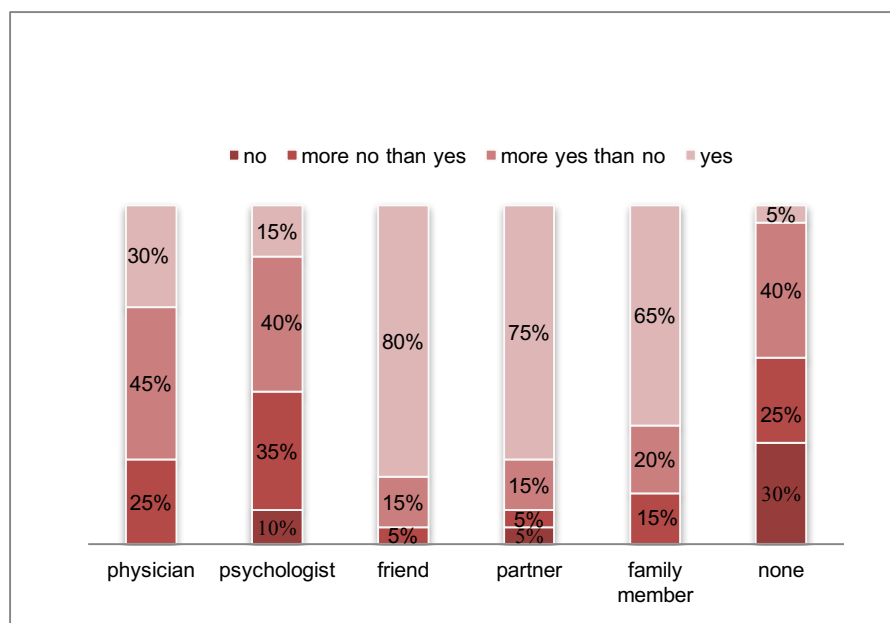
Graph 3: Protection

3.3 The ProQol Test Outcomes

The ProQol test measures three dimensions. Compassion Satisfaction is the pleasure that comes from doing your job well and effectively. This satisfaction may be related to relationships with colleagues, personal ability to propose and implement changes in work protocols or feeling that one's work is worthwhile. High scores on this subscale coincide with higher satisfaction. The calculated average satisfaction score is 37. If the score is less than 32 there may be problems with one's job or there may be areas of concern. The sample presents an average of 34, 5 (graph 4).
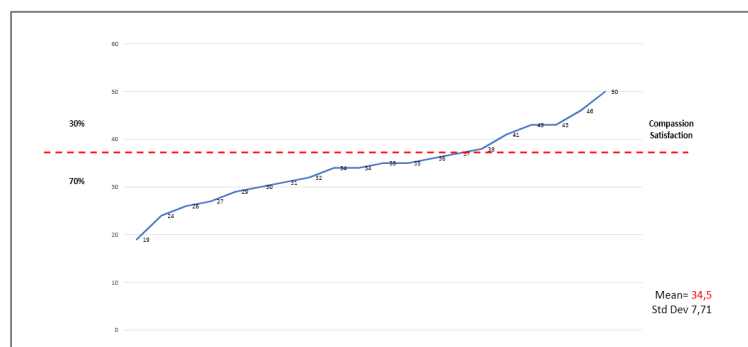

Graph 4: Compassion Satisfaction

The second dimension is burnout. Most people have a rough idea of what burnout is. This syndrome is associated with emotional exhaustion, with depersonalization, manifested by a detached, sometimes openly hostile attitude, and reduced personal accomplishment that is embodied in a wearisome feeling of inadequacy to establish an effective helping relationship with one's patients. The subject feels that his/her efforts are not producing any change or feels that his/her efforts are not recognized in the work environment. These negative feelings have a gradual onset.

The higher the score on this subscale, the higher the risk of burnout. The calculated mean score is 23. The sample has an average of 29 (graph 5).
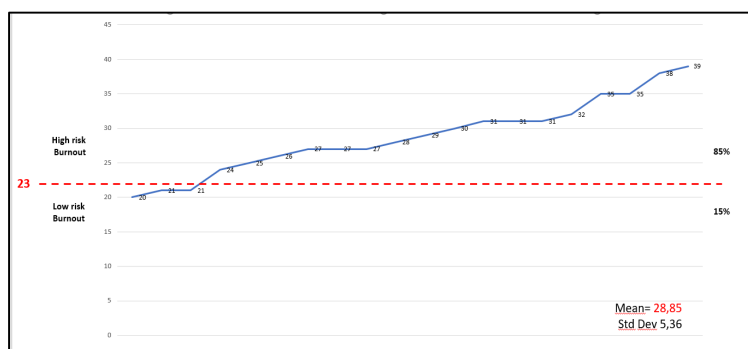
Graph 5: Burnout

The third dimension is Compassion Fatigue. Secondary Trauma (STS), and related work-related vicarious trauma relates to continued exposure to events with a high stress load. Symptoms of STS usually have a rapid course and are associated with particular events. The calculated mean for this subscale is 13. A score of 17 or higher is an indication of the presence of this syndrome. The sample presents a mean of 13 (graph 6).
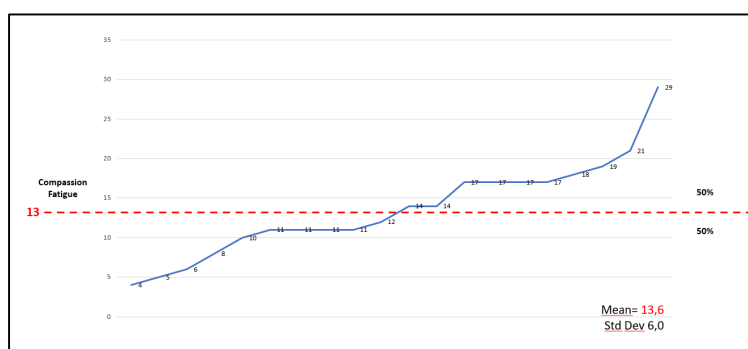
Graph 6: Compassion Fatigue

4. Conclusion

The observational study that surveyed subjects exposed daily to the risk of experiencing vicarious distress (Cheli, et al., 2017; IsHak et al., 2013; Rotenstein et al., 2016; Sinclair et al., 2016), confirmed the trend highlighted by a recent review of the literature (Panagioti et al., 2016). Most of the resident physicians in our study are at risk for burnout and have low scores on the subscale of the test measuring satisfaction related to pleasure in helping others. Such is the inference in statistical terms, but the interpretation of these results is not unambiguous. Stamm and Figley, the authors of the test, point out that the score may be influenced by a particular mood state, having had a "bad day," or experiencing a time when one has little time for oneself and is particularly tired and vulnerable. Only if the high score in Burnout or Secondary Traumatic Stress persists over time might there be cause for concern. Therefore, a single administration of the test does not define the psycho-emotional balance of the subjects, its outcome should be used as a means, a signal to recognize and accept the possible presence of a fatigue. Understanding the meaning of this fatigue/disorder is a practice of self-care that leads to continue to care for others with success and satisfaction.

The role of the educator fits right into this phase, into the subject's difficulty in recognizing these disorders and understanding their meaning in professional life. These disorders come to the attention of the educator because they can produce important effects on the quality of professional performance and the ability to express and act in compassion towards patients.

The educational intent is to guide these subjects towards a positive solution, through a path of knowledge and acquisition of new perspectives capable of implementing or evoking individual and group resources. The patient is a fragile subject who is going through a deep existential crisis due to the path of illness. If the doctor does not welcome the existential experience of the patient or fails to establish a relationship, she/he lacks not only in compassion, but also in communication. The result of this gap is a further experience of suffering of the patient for the lack of acceptance, with consequences that can also affect the dimension of therapeutic adherence. For the physician it is a source of frustration and a negative predisposition (the patient does not want to understand, it is difficult to relate to him, he/she is aggressive). This dysfunction in the relationship therefore presents mirror difficulties, and the physician her/himself becomes a fragile subject from an identity and psychological point of view.

The educator in this context monitors preclinical symptoms. The monitoring has two primary objectives: to precede a training, as this is the specific task of the educator, to prevent states of vicarious distress; to report situations and send to a consultation with a psychotherapist.

The average score on Satisfaction suggests a decline in the intrinsic motivation to the medical profession. Continuous exposure to suffering and workload can lead to complex emotional states that are not always easily recognized by the individual involved. Most professionals do not spend time trying to understand the effect that the work has on their cognitive processes, and how these also affect their emotional state. Educational intervention in this area should be in-formative: a skills course to recognize, interpret and deal with the emotions related to fatigue and burnout. Awareness is the vehicle through which to re-find an inner balance between expectations and reality (Zannini, 2005). This knowledge supports the reinterpretation of one's own motivations on the basis of the experience gained, so as to be able to grasp the elements of fragility in the difficulties on which to work without "consuming" satisfaction.

Physicians must be led to extend their training beyond the specific professional field, open the horizon to Medical Education, know the tools of Narrative Medicine and Medical Humanities, i.e., the area of research in which physicians themselves have questioned a certain didactic-formative paradigm that according to Bert (2006) forms a physician who does not criticize and does not disturb.

The transformation of workplaces into places where the prevention of these vicarious disorders is protected cannot occur if physicians, nurses, and practitioners do not stop to reflect on and understand how it can be created, implemented, and maintained.

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Contact email: paola.rigoni:1@phd.unipd,it
　　　　　　　　natascia.bobbo@unipd.it

Feedback: What It Is and How to Use It Effectively in a Digital World

Pauldy Otermans, Brunel University London, United Kingdom
Sofia Barbosa-Bouças, Brunel University London, United Kingdom

The European Conference on Education 2021
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Abstract

The COVID-19 pandemic presented the challenge of simultaneously moving towards hybrid and blended teaching provision, and designing assessments that, whilst still meeting the learning outcomes, were appropriate for the new learning environment. This allowed for speeding up the process of completely rethinking the purpose and format of assessments as well as the most useful way to deliver good quality feedback. This paper discusses the implementation of a more inclusive form of digital feedback in the Psychology Undergraduate (UG) Program in this new digital teaching and learning environment.

Keywords: Digital Feedback, Feedforward Feedback, Rubrics, Assessment

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Introduction

The purpose and function of feedback is to ensure consistent practice and promote its use as an aid to students' learning in both short- and long-term, encourage the development and use of both academic and transferable skills rather than simply focusing on the assessment content, and to increase students' reflection and awareness of learning processes by allowing for meta-cognition (Gibbs & Simpson, 2005; The Higher Education Academy, 2013). While feedback tends to focus solely on the students' current performance, it is crucial to include a feedforward element which allows a shift in focus from the here-and-now to what is ahead. Feedforward presents constructive guidance on how to improve, promotes future development and enhancement in subsequent assessments, irrespective of type or topic (Hattie, 2009; Hattie & Timperley, 2007).

What do students want from feedback? According to the National Union of Students Charter on Assessment and Feedback (2010), students want feedback to be delivered on time, not be exclusive to particular assessments (e.g. in some Higher Education (HE) institutions feedback is not provided for exams); to be able to have face-to-face, individual discussions on the feedback provided for their assessments; and to be involved in the decision making of how the feedback is delivered.

There are many different forms of feedback, which are not necessarily provided in the traditional way (i.e. linked to an assessment); all of them valid but not always considered by students as 'feedback'. Specific, targeted, feedback from the marker such as written summative comments on an assessment, in-text annotations on an assessment, indication of performance against various criteria on a marking grid (i.e. rubric matrix), written feedback using a feedback template form, oral feedback, etc. Feedback from people other than the marker such as students commenting on each other's work (i.e. peer-feedback), students' own evaluation of their work (i.e. self-feedback), and academic skills advisors from their own HE institution. Informal feedback consisting of 'in-the-corridor' conversations with academics, comments from academics within the Virtual Learning Environment (VLE), reference to assessed work as part of a teaching session. Automated feedback including tests/quizzes within the VLE and self-assessment tasks. Generic feedback, which could be in the form of whole group feedback, answer sheets, or coverage of assessment topics within teaching sessions.

Our Solution

The challenge was to design assessments that would still meet the learning outcomes but were adequate for the new, online learning environment.

In the Psychology UG Program, a rubric template was created for each year that is adaptable to each individual assessment, not too specific and not too general. The goal was to provide good quality feeding-forward feedback. This rubric consists of four sections (Figure 1): (i) A rubric matrix that includes the relevant criteria for that assessment against the different grade descriptors from 'outstanding' (A*/90-100%) to 'unacceptable' (F/below 30%). This allows students to clearly understand where they are in the assessment (i.e. what they have done so far and what they will need to do in order to achieve a higher grade on that specific criterion); (ii) Written feedback with three strengths and three areas for improvement, which need to be sufficiently detailed to allow the student to understand what they did well (so they can do it again), and what requires improvement (including clear guidance on how to achieve that); (iii) A statement that includes the name and contact of the marker and how relevant it is to contact

them (whether it is critical or a 'nice to-do'); and (iv) Further sources of support that are applicable to the students' work (highlighted from a list of available support at the HE institution).

Figure 1: Psychology UG Rubric Template

In addition, the Psychology UG Program includes teaching sessions specifically on the topic of feedback to increase awareness amongst students on what feedback is, what to do with it, and where to go for further guidance and support.

Conclusion

The next steps for 2021/22 include revising the rubric template based on student and staff feedback, as well as any advances in the existing body of knowledge. The teaching sessions on the topic of feedback will continue to be delivered and will now also include a section on the rubric.

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Contact email: pauldy.otermans@brunel.ac.uk

Synoptic and Authentic Assessments: Moving Away from Traditional Assessments to Integrate the Development of Transferable Skills

Sofia Barbosa-Bouças, Brunel University London, United Kingdom
Pauldy Otermans, Brunel University London, United Kingdom

The European Conference on Education 2021
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Abstract
Using traditional forms of assessment (e.g. exams and essays) does not fit with a program that aims to have a broader and richer approach to the subject as well as the development of transferable skills that will upskill students and prepare them for the graduate world. In addition, assessment is not to be used as a form of reassurance to the assessor (i.e. they have done a 'good' job); assessment must allow the student to understand and discover what is fundamental from the topic, at the same time as they learn different, innovative, practical ways to show and disseminate key knowledge and their skills set. This approach is in line with Brunel University London's strategy of using new, innovative ways of teaching and learning, and simultaneously it provides students with continuity, consistency, and clarity in terms of their assessments across the program. The purpose of this paper is to disseminate good practice on the use of innovative assessments, specifically authentic, synoptic and reflective assessments. These assessments ensure a positive correlation with the skills set students must carry into their graduate careers, as well as allowing a shift from 'silo-thinking' to a more interconnected perspective between modules, and improving synthesis and application skills.

Keywords: Synoptic Assessment, Authentic Assessment, Reflective Assessment, Transferable Skills, Innovation in Assessments

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Introduction

Why is transforming assessment important? The purpose of assessment is not to assess students' ability to recall knowledge; instead, it should be about the ability students have to apply the knowledge they have acquired and developed. Therefore, traditional assessments must be transformed to meet the desired purpose as it increases student satisfaction, develops students' aptitude for learning, prompts a more accurate representation of student achievement, and promotes and enhances academic standards (Advance HE, 2019).

A 'good' assessment aligns with and promotes the desired learning outcomes, defines the purpose of the assessment, considers the context in which the assessment takes place (i.e. it is up-to-date with the current environment and societal challenges, and takes into account the characteristics of the students enrolled in the program), and consists of tasks that allow for students' development and engagement with learning (Bearman et al., 2014).

Whilst revising assessments across the Psychology Undergraduate Program, authentic, synoptic and reflective assessments were updated and extended across all years of study as these meet the criteria above. Gulikers, Bastiaens, and Kirschner (2004, p. 69) define authentic assessment as "an assessment requiring students to use the same competencies, or combinations of knowledge, skills, and attitudes that they need to apply in the criterion situation in professional life." In other words, authentic assessments create the environment for students to showcase the knowledge and skills they have learned and apply these to real-life situations they will encounter through their graduate life (i.e. in a graduate workplace setting). Synoptic assessments integrate two or more modules into a one single assessment, thereby enhancing students' understanding of the links between the different components of a specific field of study (e.g. psychology). This type of assessment allows to move away from 'compartmentalized' modules and 'silo' thinking into a holistic approach to teaching and learning (Constantinou, 2020; Gibbs, 2006). Reflective assessments include students in the assessment process by requiring them to reflect individually or in groups on their learning experience. These assessments engage students in self-evaluation and bring an emphasis to meta-cognition and learning, by asking students to think about their own thinking (Thayer, 2018).

Our Solution

Year 1 includes one authentic assessment, two synoptic assessments and two reflective assessments. The authentic assessment consists of a 10-minute 'mock' interview for an actual placement/internship that is available for students to apply for in that particular academic year; this assessment is part of the 'Portfolio for Academic and Employability Skills in Psychology' module. The synoptic assessments are part of the 'Research Methods' and 'Statistics' modules and consist of two lab reports where students combine research methods to conduct an experiment and use the relevant statistical knowledge to analyze and report the data. In the reflective assessments, students are required to reflect on (i) their development of academic and transferable skills throughout Year 1 ('Portfolio for Academic and Employability Skills in Psychology'), and (ii) their experience in taking part in research in psychology ('Portfolio for Research Methods and Statistics').

Year 2 includes four authentic assessments, one synoptic assessment and two reflective assessments. The authentic assessments consist of (i) clinical cases where students have to incorporate their knowledge of 'Biological Psychology' and 'Cognitive Psychology' to come

up with an explanation of what is behind the described symptoms, (ii) analyzing children's behavior in a video in light with the 'Developmental Psychology' theories and concepts, (iii) combining knowledge from 'Social Psychology' and 'Individual Differences' to explain and analyze current societal phenomena, and (iv) a poster where students have to present psychological research as they would in a conference ('Advanced Academic Skills for Psychology'). The synoptic assessment is part of the 'Quantitative Research Methods' and 'Advanced Statistics' modules and consist of a lab report where students combine research methods to conduct an experiment and use the relevant statistical knowledge to analyze and report the data. In the reflective assessments, students are required to reflect on (i) their levels of performance based on marking criteria created by themselves on a particular essay ('Conceptual and Historical Issues in Psychology'), and (ii) their experience in taking part in research in psychology ('Portfolio for Quantitative Research Methods and Advanced Statistics').

In Year 3 there are five authentic assessments and one reflective assessment. Authentic assessments include (i) a portfolio containing exercises involving analysis, presentation and interpretation of neuroimaging data grounded in real-world examples ('Practical Investigations of Mind and Brain'), (ii) writing a report where students work on a 'mock' clinical case and assess risk of violence, or provide a clinical formulation addressing why a patient has offended ('Forensic Psychology'), (iii) evaluating the value of different methodologies to analyze social media-related behavior ('Psychology of Social Media'), (iv) writing a report for a stakeholder organization to fund research for the treatment of a specific disorder ('Disorders of Perceptual and Movement Control'), and (v) design an imaginary small- to mid-scale religion for a small society ('Psychology of Religion'). The reflective assessment involves students' participation and reflection in a six-week mindfulness course ('Mindfulness: Neuroscience and Clinical Applications').

For every year in the program, these assessments coexist with more traditional forms of assessment (i.e. essays and exams).

Conclusion

The assessments were revised based on student and staff feedback, student performance data, student engagement data, and student satisfaction data. These revised assessments are being implemented in the academic year 2021/22 and the success of these will be assessed through year-by-year assessment performance, student satisfaction, and graduate outcomes (i.e. degree/award classification and graduate employment).

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Contact email: sofia.barbosaboucas@brunel.ac.uk

The Impacts of the Anti-COVID Measures Introduced in the Czech Republic and Spain in the Context of Preschool Education

Gabriela Vrbová, Palacký University Olomouc, Czech Republic
Alžběta Vaňková, Palacký University Olomouc, Czech Republic
Alena Vavrdová, Palacký University Olomouc, Czech Republic

Abstract
The text presents a part of a broader research study carried out at the Faculty of Education, Palacký University Olomouc in cooperation with foreign partners. Its aim is to analyse and compare the impacts of the measures against the spread of COVID-19 on preschool education in selected European countries. This paper focuses on an initial comparative study involving the Czech Republic and Spain in order to analyse and compare how the anti-epidemic measures affect preschool education in the context of regional and social peculiarities in both countries. The research method is a qualitative text content analysis followed by open coding, formulation of analytical categories and their comparison according to the principles of comparative pedagogy. The data sources will be international and national documents relating to the research problem. Available data suggest that the impact of the anti-epidemic measures on preschool education differs both countries in the context of geographical locations and social differences. The benefit of this study is the body of data on addressing the impacts of the pandemic on preschool education in the Czech Republic and Spain including their comparison. Another benefit is a set of recommendations for the training of future teachers during the pandemic.

Keywords: Preschool Education, Anti-Epidemic Measures, Reactibility, Regional and Social Aspects

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Introduction

Czech Republic

The Czech Republic is located in Central Europe and borders on four countries. The official language is Czech and the capital is Prague. For the purposes of state administration, the Czech Republic is divided into 14 regions (European Union, 2020; Act on the territorial administrative division of the state and on the amendment of related acts, No. 51/2020 Coll., 2020). As of September 2020, the total population was 10,707,839 inhabitants (Czech Statistical Office, 2020).

The Czech Republic is a parliamentary country with a democratic rule of law and a liberal state regime. It is a democratic parliamentary country; the executive power is in the hands of the President and Government (Filip, 2003).

The Czech Republic has a number of state administration bodies. The state administration bodies are established pursuant to the Constitution and Constitutional Laws. These rules regulate their position and define their powers, territorial competences as well as material competences. As a rule, each body has its own organizational structure and departments.

The most important state administration bodies include the central government institutions with national competences. These bodies include ministries and other authorities as defined by the Act No. 2/1969 Coll. on establishing ministries and other institutions of central government of the Czech Republic (State administration, 2020).

A typical feature in the history of the Czech nation was the dominance of other territories. The Czech territory had always been part of larger historical areas such as Austria-Hungary or the German Empire. As a result, it had always had less power and tried to hold together as a "small-big" nation (Nový, 2005, p. 197).

From this historical context, we can also derive some of the typical features of Czech people such as flexibility, diligence, orientation on people as well as inventiveness. As people, the inhabitants of the Czech Republic are more reserved and rather conservative because they do not like new and unexplored things. However, once they establish a relationship, it is very strong and authentic. They have a great sense of humour, especially sceptical or pessimistic humour. The Czechs tend to be negative or even critical about their country. Similarly, too many new things at once cause great mistrust (Šroněk, 2000, pp. 105–107).

The Czechs are neither strong individuals nor overly sociable. They try to fit into different social groups and once they do, they feel safer. They tend to blame authorities and institutions for all problems instead of assuming their own responsibility (Lingea, 2020, p. 26).

For most people the family is important but they do not cling to it as much as other nations. In old age parents usually move to social care establishments, for example to a retirement home. Intergenerational coexistence is quite uncommon in the Czech Republic (Lingea, 2020, p. 55).

Spain

The Kingdom of Spain (Reino de Espaňa in Spanish) is located in South-West Europe on the Iberian Peninsula. It borders on Portugal in the west, France and Andorra in the north and Gibraltar in the south. Spain includes the Balearic Islands and the Canary Islands. There are 17 autonomous communities and 2 autonomous cities. These areas are further divided into 50 provinces. In 1978, the Spanish Constitution was issued that guarantees their right to autonomy. This autonomy also means their own government which controls life in the area and regions. There are differences in geography, climate and culture. The current population of Spain is 47,100,396 inhabitants (Banco mundial, 2021). The capital of Spain is Madrid with a population of 3.2 million. Spain has been a member of the EU since 1986 and is also a member of NATO, UN, OECD and other international organizations (Hlavičková, Macíková, 2010, p. 98).

Spain is a parliamentary constitutional monarchy. The King represents the Monarchy, has the right to convene and dissolve the parliament and approve and declare laws. The Spanish state apparatus has three parts: legislative, executive and judicial. The legislature is in the hands of the Spanish Parliament, which has two chambers—the Senate (259 members) and the Congress of Deputies (350 members) who are elected every four years. The executive power is in the hands of the Government and State Council (advisory council). The Government consists of the Prime Minister, Vice Prime Minister and other ministers. The current Prime Minister is Pedro Sánchez. Pursuant to the Constitution, the last part is the judicial power which consists of judges (Eurydice, 2021).

Spain has several different cultural features that together form a single Spanish unity. Each autonomous community and region of Spain has slightly different cultural features, traditions and habits. Spain is a country where European and Arabic history crossed (Rusnoková, 2015).

People in Spain are very open, temperamental, communicative and energetic. They are also said to be long-lived. They like to go out for entertainment and culinary experience. Their temperament and communicativeness are manifested not only verbally but also non-verbally. They often use strong gestures, communicate loudly, use mimics and are emotional.

Their temperament and way of life is also reflected in mutual relationships, in the family as well as attitudes to friends and foreigners. They like to pass on their energy to other people and try to make everyone around happy. Their generosity can sometimes be incomprehensible to other people. They appreciate their own families, which are usually large and multi-generational (Beneš, 2002, pp. 59–60).

People in Spain tend to keep their optimistic humour in all situations, even in situations when not everything is all right. They are able to live in the present and look optimistically to the future (Rusnoková, 2015).

Preschool Education in the Czech Republic and Spain

Education in the Czech Republic is governed by the Ministry of Education, Youth and Sports (Structure of organization and Code of organization, MEYS) which is a central state administration body. Education is legally defined by the Education Act No. 561/2004 Coll. Education in Spain is governed by Ministerio de edcacion y formacion profesional = Ministry

of Education and Professional Training (Eurydice, 2021). Education is legally defined by the Royal Decree on Preschool Education No. 1630/2006.

	CZECH REPUBLIC	SPAIN
CHILDREN'S AGE	Older than 2, usually until 6 years of age	Cycle 1: 0–3 Cycle 2: 3–6
MANDATORY PE	Last year of PE	Optional PE
NUMBER OF CHILDREN IN CLASS	24 + 4 (exceptions)	3 years: 16–20 children 4, 5, 6 years: 25 children
ADMISSION OF CHILDREN	by age and catchment area	national and complementary criteria
EATING	in the classroom provided jointly	dining room, classroom, some children individually
CLASSES	heterogeneous and homogeneous	homogeneous
SCHOOL AUTHORITY	state → regions, municipalities, unions	state → autonomous communities
MANAGEMENT OF PE	centralized	decentralized
TEACHER QUALIFICATION	minimum secondary education with graduation certificate	minimum bachelor's degree

Table 1: Ministry of Education, Youth and Sports, 2020a, Act No. 561/2004 Coll., Act No. 563/2004 Coll., FEP PE, p. 6, 2018, Decree No. 107/2005 Coll., Eurydice, 2021, Methodological Portal FEP, 2005, Education Act No. 2/2006, Royal Decree on Preschool Education No. 1630/2006.

COVID-19 in the Czech Republic and Spain

Covid-19 is an infectious viral disease caused by coronavirus also referred to as SARS-CoV-2. Coronaviruses are viruses that first occur in animals and can then infect humans. The first known case appeared in December 2019 in Wuhan, China and probably came from an open market. The virus was believed to come from the bodies of bats but this assumption has not been confirmed so far. Gradually, SARS-CoV-2 spread into the whole world (Government of the Czech Republic, 2020b).

The first signs of Covid-19 in the Czech Republic date back to 1 March 2020. This was followed by the declaration of the state of emergency from 12 March 2020 to 17 May 2020. The next state of emergency was declared on 5 October 2020 and finished on 14 February 2021, lasted 132 days and was the longest state of emergency during the pandemic. The last state of emergency in the Czech Republic was declared on 27 February 2021 and finished at midnight on Sunday 11 April 2021. The Government approved a series of emergency measures outside the state of emergency through which the Ministry of Health introduced anti-epidemic measures pursuant to the Pandemic Act (Covid Portal, 2021). From 23 April 2020 the free movement of persons was restricted, school attendance was prohibited in elementary and secondary schools as well as universities and educational and leisure activities in education were suspended. Nursery schools remained in normal operation during the first and second waves (Government of the Czech Republic, 2020a). From 27 February 2021 the presence of children in nursery schools and other schools was prohibited. Children in the last mandatory year of preschool education were involved in distance education. Full-

time education was first reopened for children in the last year of preschool education and on 26 April for all children. A precondition for reopening was strict compliance with hygiene measures (Ministry of Education, Youth and Sports, 2021a).

In Spain, the first case of infection occurred on 3 March 2020 and the state of emergency was declared. The management of the measures was the responsibility of the autonomous communities. The first wave including high numbers of infected people took place already in March 2020. The second wave took place in September and October 2020 while the third wave lasted from December to January. In the first wave, all educational institutions had been closed until June. After that, nursery schools reopened and remained open the entire school year. However, in order to prevent the spread of the disease, all nursery schools had to observe strict hygiene rules (Autonomous community Madrid, 2021).

Objective of the Research Study

Subject of the research study:
Analysis and comparison of the measures implemented to prevent the spread of COVID-19 and their impacts on preschool education in the selected European countries in the context of time, regional and social specificities.

Main objective:
Analyse and compare the reactibility in the countries selected as well as to analyse and compare the impact of the measures to prevent the spread of COVID-19 on the functioning of preschool education in the context of regional and social specificities.

Partial objectives:
- Identify the reactibility in the selected countries to the measures introduced in preschool education.
- On the basis of a document analysis compare and evaluate the extent to which the specificities of the country's regions affected the impact of the measures on the functioning of preschool education.
- On the basis of a document analysis compare and evaluate the extent to which the common aspects of either country affected the impact of the measures on the functioning of preschool education.

Research problem:
The reactions of the selected European countries to the measures introduced against the spread of Covid-19 in the area of preschool education in the context of regional and social specificities.

Research questions:
- Are the measures introduced in the selected countries in the area of preschools education similar in terms of content and timing?
- Do the measures introduced in the area of preschool education differ by regions?
- Do the measures introduced in the area of preschool education differ by social aspects?

Data sources:
- Anti-epidemic measures;
- Emergency decrees and regulations governing the operation of preschool establishments;
- Legislation and education policy relating to pandemic measures;
- Curricular documents, educational objectives.

Methodology

The data from the content analysis was further compared in accordance with the principles and procedures of comparative pedagogy. Concerning the predetermined criteria, the country selected for comparison was Spain. The country selection method was criterion-based. One of the criteria was regional – location in Europe. Spain is a country in the south of Europe, specifically in South-West Europe. The Czech Republic is located in Central Europe. The other criterion was the governance of the school education system. While Spain is decentralized including its education system, the Czech Republic has a centralized system of education. The final criterion was social – different culture and personality characteristics of the population.

Data analysis method:
Content analysis of texts with a focus on the following aspects:
- Subject: which part of reality became the source for the documents;
- Content of the document: main message, problem;
- Form of text (Miovský, 2006).

Data analysis:
Open coding was used to identify and analyse the specific phenomena. Subsequently, the formulation of analytical categories was performed.

On the basis of the agreed criteria, Spain was selected for comparison with the Czech Republic. The countries are on the European continent and both are members of the EU. Since March 2020, both countries were confronted with the covid pandemic and tried to respond accordingly. COVID-19 also affected educational institutions. Preschool education had to adjust its conditions in order to respond to the spreading pandemic. In both countries, nursery schools were closed. The analysis and comparison were based on up-to-date information provided by the government and state administration, information from the ministries of education and health in both countries as well as applicable legal documents.

The categories for comparison were defined on the basis of a possible effect on preschool education. They were open and at the same time took into account the specifics of both countries. The categories were as follows:
- Response to COVID-19;
- Regional aspects and their impact on the measures introduced;
- Social aspects and their impact on the measures introduced.

Results

Both countries were affected by three waves during which the numbers of infected people increased dramatically. In both countries the waves came at different times. While the Czech Republic fought the first wave in October and November, it was the second wave for Spain.

At the beginning of the pandemic, the Czech Republic did not have as many infected people as Spain. In Spain, the numbers of infected people grew much faster. This may have been caused by the different characteristics of the inhabitants of Spain who are more temperamental and extrovert, like to hug and are very sociable. Intergenerational families are a priority for people in Spain. This may have caused greater spread of coronavirus in this country. The third wave in Spain coincided with the second wave in the Czech Republic at the end of December and in January. The Czech Republic faced the third wave in March 2021. In both countries, the worst outbreak of the pandemic came in January. The measures in both countries were similar but differed in intensity. The restrictions responded to the numbers of people infected. During the first wave, both countries completely shut down all services and educational institutions, except nursery schools in the Czech Republic. During the following school year, nursery schools in both countries were open under strict hygiene rules. In Spain, nursery schools were open throughout the whole school year, while in the Czech Republic they were closed from February to April. However, preschool children in the last mandatory year continued to be educated.

As far as regional specifics are concerned, the Czech Republic is divided into regions, cities and municipalities. All of the measures were controlled by the state in cooperation with the Ministry of Education. During the pandemic, nursery schools were regulated centrally by the state administration. Spain is decentralized and is divided into autonomous communities with their own competences. The state of emergency and some restrictions were governed centrally by the state but many competences were in the hands of the autonomous communities. They regulated their educational institutions according to the actual situation and the number of people infected. For this reason, all nursery schools in the Czech Republic were closed although in some regions the situation was not so bad. In Spain, the autonomous communities were able to react more flexibly to the situation and regulate the closure of educational institutions.

The social aspects did not have a major effect on the impact of COVID-19 on preschool education. Despite the fact that people in the Czech Republic are very cautious, during the first wave all educational institutions were closed except nursery schools. The reason was the diligence of the Czech population thus allowing the parents of preschool children to work. The closure of nursery schools in the following school year was due to the third wave of coronavirus which was very strong and hospitals were full. The spread of the disease had to be stopped immediately. For this reason, all services closed down. In Spain, nursery schools were closed only during the first wave at the beginning of the epidemic. The reason was the new disease and the effort to prevent it from spreading. After the first wave had subsided, all educational institutions reopened at the end of June. The social aspects had a little effect on the functioning of preschool education. The major indicator was the number of people infected, hospitalized and the basic reproduction number in both countries.

Conclusion

The research study revealed that both countries had responded very flexibly to the actual pandemic situation. Both the Czech Republic and Spain faced three waves of COVID-19 during which the disease spread quickly across the population. The state of emergency was declared in both countries and restrictions were imposed. At the beginning of the pandemic in Spain, all educational institutions were closed. The same applied in the Czech Republic except nursery schools which remained open. In the following school year, preschool education was in full operation except two months in the Czech Republic when nursery

schools were completely closed. As far as compulsory preschool education is concerned, children had to be taught by means of distance education. After two months, nursery schools reopened and remained open until the end of the school year. The difference between the two countries is in the governance of the restrictions. In Spain, the autonomous communities are fully competent and decide on the restrictions according to the current situation in the region. The Czech Republic is governed centrally and the measures apply to the whole country irrespective of the situation in the different regions.

A benefit of this comparison could be the information about the reactibility of either country which should be used to get the best of the previous steps and measures in order to be able to respond flexibly in the following months with a positive back evaluation of the action taken. We should still achieve the objectives of preschool education and develop children within the entire scope of their personalities despite the difficult conditions caused by the new pandemic. We can learn from the previous measures and try to update preschool education so that the achievement of the objectives is affected by the restrictions as little as possible. A benefit for future teachers could be the ability to better respond to the measures implemented and the actual events. Similarly, the training of future teachers should focus more on other forms of education that may be used.

Acknowledgements

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Contact email: gabriela.vrbova01@upol.cz
alzbeta.vankova@upol.cz
alena.vavrdova@upol.cz

Do You Trust Me?
A Systematic Literature Review on Student-teacher Trust and School Identification

Isabel Brito, University of Beira Interior, Portugal
Ema Patrícia Oliveira, University of Beira Interior, Portugal
Ludovina Ramos, University of Beira Interior, Portugal

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Abstract

Trust between a student and a teacher and school identification are described in scientific research as focal points of learning, personal development and satisfaction, and a basis for a positive school culture that can impact the whole community. Yet, both constructs are still challenging scientists as to their components, incidence and links. Additionally, empirical studies have mainly explored the relationships between either student-teacher trust or school identification with proximal constructs, and their impact in other aspects of school life, and few address the two constructs simultaneously. The accuracy of their definition and the grasping of their mutual connections seems an important step to take, to further research and enhance school environments. This study consists of a systematic literature review, which seeks to contribute for the understanding of the latest findings about trust between students and their teachers, and about school identification, in basic education, attempting to clarify their definitions and relations, distinguishing them from other proximal constructs, namely school belonging. The PRISMA Statement (Moher et al., 2009; Page et al., 2018) is adopted as methodological procedure for data collection and analysis. The research protocol includes articles presenting empirical studies, published in peer-reviewed academic journals, between January 2000 and March 2021, accessed in Web of Science and B-On. Results will be presented according to the PICOS approach. Key variables and findings related to both constructs will be discussed. Finally, strengths, limitations, important implications and suggestions for future research on the subject will be briefly addressed.

Keywords: Student-teacher Trust, School Identification, Students' Belongingness to School

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Introduction

In this study we try to retrieve what recent scientific research has identified as the relevancy and the elements of trust between students and their teachers, in basic schools, and the correlations between those and the relevancy and elements of school identification.

Trust is a latent construct with multi-level significance both in a general social view, as within an educational perspective (Niedlich et al., 2020). Defined in the context of student-teacher relationships as student-teacher trust, it comprises vulnerability, benevolence, honesty, openness, reliability and competence (Bankole, Mitchell, & Tschannen-Moran, 2013).

School identification is an affective construct considered correlated to personal development, academic performance, school improvement and trust among stakeholders, including sense of belonging and valuing (Mitchell, Kensler, & Tschannen-Moran, 2016; Voelkl, 2012).

Trust between a student and a teacher has been identified in scientific literature as a crucial factor of personal development and of the quality of schools as learning communities, enhancing the general social environment, both while the person is growing and when the student has become an adult. Research underlines that trust involves a risk, more acute in contexts of crisis.

Students' trust in their teachers is a specification of the multiple and complex trust relationships that occur in a healthy school community. We adopt the definition by Bankole, Mitchell and Tschannen-Moran (2013), already the result of a research depuration and based on the five-facet model proposed by Hoy and Tschannen-Moran (1999): the student's trust in his/her teacher implies a "willingness to be vulnerable" based on confidence that the teacher will relate and act with benevolence, honesty, openness, reliability, and competency. The "positive" elements of trust (e.g., benevolence) seem well established in scientific literature. On the contrary, the fact that students and teachers are willing to assume and expose vulnerability seems to us one of the most important points to investigate: that a student is objectively vulnerable to the teacher seems obvious (Bankole, Mitchell, & Tschannen-Moran, 2013); that the teacher is also objectively vulnerable to the students, even if because of different factors, mainly affective, but also professional and institutional, may also be evident (research on teachers' burnout is clear confirming this; on the other hand, teaching and learning are mutually linked). But the willingness to recognize and act positively upon this vulnerability, and upon its reciprocal aspect, seems a point lacking investigation. May it be that this accepted vulnerability constitutes the point of intersection of the two constructs of student-teacher trust and school identification?

School identification springs from two essential human needs, belonging and valuing, possibly thus including a positive expression of personal vulnerability that becomes fulfilled in a communal and institutional reality as a school.

The construct of school identification is most thoroughly considered in recent research by Kristin Voelkl, namely in her chapter in the Handbook of Student Engagement (Voelkl, 2012), in which she reviews the most relevant research on the matter and proposes the following definition: school identification is "an intrinsic form of achievement motivation that encourages students to engage in appropriate learning behaviors (…), that is, an internal desire to achieve, develop competencies, and take pleasure in academic success" (p.194). Its components are identified by Finn (1989) as *belonging* and *valuing*: both rooted in the

psychological theories of human needs (Maslow, 1968), the first comprehends the need to experience a sense of community — "a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (Chavis & McMillan, 1986, p.9); the second expresses the individuals' "need to feel their actions are worthwhile and to have a sense of competence and positive self-regard" (Voelkl, 2012, p. 195). The "arena" where the person experiments this competency is valued, either as causing itself a sense of fulfillment or as a factor of another goal attainment. Voelkl does not establish an explicit relation between school identification and student-teacher trust, but the author's section on teachers' relationships with students identifies *teachers' encouragement* as clearly impacting school identification. The elements of teachers' encouragement are showing care (which may correspond to benevolence and reliability, elements of trust), providing clear norms and expectations (which may be included in honesty and openness) and encouraging students' autonomy (which may connect with competence). Cooperative learning — which largely depends on the student-teacher interaction — is presented as an important means to foster identification.

A correspondence between the elements of trust and the elements of school identification may show a useful correlation to foster both dynamics, enhancing the quality of the relations between individuals, and clarifying the characteristics of a positive school environment. The two constructs together may be vital to a healthy school environment.

These conclusions taken from both paths of research — on student-teacher trust and on school identification — make us attempt a future research question: is the fact of experiencing vulnerability both by the student and by the teacher a positive trigger to risking a relationship of reciprocal student-teacher trust which, in turn, finds its institutional dimension in school identification? Experiencing vulnerability corresponds to a relational need of objective attitudes and behaviours (reciprocal benevolence, honesty, openness, reliability, and competency) enacted by individuals — the student and the teacher — but also by a community, the school, to which both individuals feel they belong and which they value as a place where they are accepted and are helped to develop, and where their vulnerabilities are welcome and worked upon.

Scientific research is attempting to keep pace with changes, so as to further reflection and decision making through an adequate analysis of data. It is not an easy task. Systematic reviews of literature contribute to having a broader look over facts and theory and to enhancing the dialogue among the scientific community and between scientists and educators and educational decision makers. The present study aims at being a contribute to this collection of knowledge of facts and theories, and to the dialogue between scientists, thinkers and school stakeholders. There appears to be no recent literature review associating studies on student-teacher trust and studies on school identification. This study intents to fulfil that gap.

Method: Systematic Literature Review

We analyzed empirical papers published between January 2000 and March 2021. This time span shows the data and conclusions of the scientific community affected by recent trends and circumstances and allows a manageable number of materials to work with. All of these papers build on previous studies; therefore, the time limit does not necessarily signify a knowledge reduction, for references to previous works assure the continuity of the scientific approach.

We had in consideration peer reviewed articles written in English, Portuguese and Spanish, in an effort to cover the majority of the published material on this subject. Even so, there is the danger of not considering relevant data and reflection, due to time and language limitations.

The search was conducted following the PRISMA statement (Moher et al., 2009). The selection of articles for analysis was made from the Web of Science and B-On data-bases.

The search criteria used the following cues: student*-teacher* trust, school identification, student* belong* to school*, combined to allow a thorough coverage of the multiple possible links between the constructs of student-teacher trust and school identification and its proximal area of students' sense of belongingness to school.

As criteria for inclusion in the present study we considered:
a)   Peer reviewed articles;
b)   Published in English, Portuguese or Spanish, from January 2000 to April 2021;
c)   Addressing the trust relationship between students and their teachers, in basic schools, AND/OR the students' identification with school, even if theorized recurring to the proximal construct of "students' sense of belongingness to school", considering positive psychology issues that involve the students' relationship with their teachers.
d)   Works using quantitative or mixed approaches, with the exception of one theoretical article (Voelkl, 2012), included because of its importance for the establishing of the construct of school identification.

As criteria of exclusion, we considered:
a)   Literature reviews, with the mentioned exception;
b)   Non-scientific articles, even if on the subject of study;
c)   Scientific articles that address trust or school identification of other school stakeholders, not the students;
d)   Scientific articles that address under-graduate or graduate students trust in teachers or school identification;
e)   Scientific articles about the relationships between student-teacher trust or school identification and other school issues such as racism, violence, educational policies, multiculturalism, leadership, organizational structure;
f)   Scientific articles that address, as principal object, psychological issues of children and adolescents related to mental health risks, gender questions, inclusion, minorities, peer-relationships;
g)   Scientific articles that address trust or school identification but aiming mainly at studying academic performance and impact of social-economic status.

A total of 279 papers were found, using web of science and b-on data-bases. After the screening of the respective abstracts, 50 were selected as relevant to answer our question and the other excluded. Within these 50 articles, 23 were selected according to the previous criteria, after examining the abstracts and conclusions looking for quantitative or mixed scientific articles that address teacher-student trust, school identification and aspects of school belongingness which relate to one or to both constructs. From these, after extensive reading, 17 were considered included in our research criteria.

Findings

a)   Studies that measure and relate student-teacher-trust and school identification

1. Bankole, Mitchell and Tschannen-Moran (2012) applied a single survey form based on the Student Trust in Teachers Scale (Adams & Forsyth, 2009), and on an adaptation of the original Identification with School Questionnaire (ISQ) developed by Voelkl (1996), measuring student achievement with data from the Virginia Standards of Learning (SOL) assessments in English and Mathematics. Paper versions of the survey were administered by teachers to students of third to 12th grade classrooms, randomly chosen in the 49 schools of a mid-Atlantic district in the United States and a confirmatory factor analysis was used as measurement model. They confirmed the three hypothesis they had started with: a. that student trust in teachers, student academic press and student identification with school are positively correlated with each other; b. that the three variables would come together to form a latent variable the authors call student academic optimism; c. that all three variables are also strongly correlated with student achievement, over and above the effects of the social and economic status and student demographic characteristics. Based on these results, the authors encourage educators to cultivate student-teacher trust, celebrate academics and enhance student identification with school.

2. Mitchell, Kensler and Tschannen-Moran (2016) investigated the effects of students' trust in teachers and of students' perception of safety on school identification. The authors confirmed the two hypotheses of departure, namely that student trust, safety and identification with school covary positively; and that the levels of student trust in teachers and students' perception of safety are school properties that explain different levels of students' identification among different schools. The authors applied a student climate survey composed of three scales — Student Identification with School, Student Trust in Teacher and Student Perception of Safety in an east coast district in the U.S.A. 5441 surveys were analysed, 59.8% of elementary students, 22.6% of middle school students and 17.6% of high school students. School level, minority status and percent free and reduced lunch (as a proxy to SES) were included as covariates. The authors emphasize the importance of including the students' voice in further studies and conclude that student-teacher relationships are the essential factor of cognitive and affective identification of students with school, confirming earlier findings about the link between student-teacher trust and school identification (Adams, 2014; Mitchell et al., 2008).

b)   Studies that measure student-teacher trust and its impact

These studies differ as to the orientation of trust, either students' trust in their teachers or teachers' trust in their students or trust considered as a social dimension, namely collective trust.

3. Lee (2007) investigated the effects of students' trust in teachers on school adjustment, academic motivation and academic performance. The study was applied to 318 7th graders in Seoul Middle Schools. The author used the short version of the Students' Trust in Teachers Scale (Lee & Han, 2004) that includes two subscales: cognitive trust and affective trust, combined to reach a total trust relationship score; the School Adjustment Scale (Yoo, 1982), to assess students' perception of school climate and personal adjustment; the Academic Motivation Scale (Yoon, 2003), to verify students' perceived academic motivation; and the end-of-year cumulative grade point average, in Korean, English and mathematics, as the index

of academic performance. The author concluded that students' sense of trust positively influences their school adjustment, academic motivation and, thus, performance.

4. Van Houtte and Van Maele (2012) explored the impact of teachers' trust in students both in academic and vocational tracks. They used data of the Flemish Educational Assessment, ending up with a sample of 3,376 students attending 9th and 11th grades (U.S.A. equivalence), and 461 teachers in 22 academic secondary schools in Flanders, and 3,475 students and 754 teachers of 28 vocational schools, during the school year of 2004-2005. Belonging at school was assessed using a translation of the Psychological Sense of School Membership scale (Goodenow, 1993). With an exploratory factor analysis, the authors identified perceived teacher support as a factor within sense of belonging and decided to treat the other factors as one scale including peer acceptance, rejection items, and general belonging items. School type was the main independent variable, distinguishing academic from technical-vocational schools. The results indicated that while in general, school belonging was lower in vocational schools, when the variable faculty trust was introduced the difference between school types ceased to be relevant as to school belonging. Teachers trust in students at school level and parental support at student level were the main determinants of students' sense of belonging. The researchers underline a new result: that faculty's trust in students assessed by the teachers themselves and students' perception of teachers' support are different concepts, related but not interchangeable.

5. Adams (2014) conducted a study to verify if collective student trust is a positive factor for urban elementary students and confirmed that a culture of collective student trust enhanced identification with school, internal control over learning tasks, and math and reading achievement. The author traced the empirical and conceptual frame of the construct of collective trust embedded in the individual psychologic needs that emerge as a social factor, which constitutes not the sum of the individual beliefs, but an intangible common resource that is offered to newcomers as a group norm and common asset. The study was conducted in an urban school district in a southwestern state of U.S.A. 1.646 surveys were analysed. Surveys included an adaptation of Voelkl's (1997) Identification with School Questionnaire; the Self-Efficacy for Self-Regulated Learning Scale (Bandura, 2006; Zimmerman & Schunk, 2008); the Student Trust in Teachers Scale (Adams & Forsyth, 2009); and scale scores from the state-mandated math and reading achievement tests. The first stage of the study was to verify if student trust in teachers, school identification and self-regulated learning qualified as collective properties, using Intraclass Correlation Coefficients, ICC-1 and 2 (Van Houtte & Van Maele, 2011). Then a model-building process in HLM 6.08 tested the links between collective student trust and school identification, self-regulated learning and math and reading achievements. The author concludes that the relational environment built by collective student trust enhances students' academic excellence.

6. Ahmadi, Hassani and Ahmadi (2020) explored student-level and school-level variables linked to sense of belonging to school. Emphasising the importance of belonging to school during the risky years of adolescence, the authors verified the factors that increase that essential link to school which enhances personal and academic development. The target population was all high school students in the West Azarbaijan province of Urmia, in 2018/19; 11th graders were chosen as a cluster and a total of 1200 students were chosen randomly, resulting in 1003 usable student questionnaires. The study used the Student Sense of Belonging Scale, present in the PISA (2000) student survey. Among other factors such as socio-economic status, parental involvement, sense of fairness, academic self-efficacy and peer support, a trust relationship between the students and their teachers was verified as positively relevant for the students' sense of school belonging.

c)　　　Studies that address school identification

7. Antonio, Carvalho, Martins and Santos (2020) studied the relation between teachers' feedback and school identification; and the role of school identification as mediator between teachers' feedback and students' behavioral engagement. The authors also aimed at verifying the changes in these constructs as students become older and progress at school; and between academic courses and professional ones. 2,534 students of public and private Portuguese schools, in 6th, 7th, 9th, 10th and 12th grades, participated in the study, 69.3% attending academic courses and 30.7%, professional courses. The Questionnaire Feedback, Identification and School Trajectories (Carvalho et al., 2005) was used, combined with the Teachers Feedback Scale (Carvalho, 2014); the School Identification Scale (Conboy et al., 2015) and a nine-item scale (Carvalho et al., 2016) to assess students' behavioral engagement. The authors conclude that there was a significant positive relation between students' perception of effective teachers' feedback and school identification; that school identification mediated students' engagement with school activities, enhanced by effective teachers' feedback; that there was not less dependence of older students on teachers' feedback; though students in 6th and 7th grades reported more effective teachers' feedback than in the 9th, 10th and 12th years. School identification was found to be less in the highest years. Students in the professional track show higher levels of identification with school.

8. Simonsen and Rundmo (2020) developed a study that tried to compare the impacts of school identification and self-efficacy on school satisfaction of Norwegian high-school students. Framing their study on the importance of social identification as a response to the fundamental need of belonging, they point at social identity leadership (Haslam et al., 2011) as an essential feature of teachers' mission. The authors applied a survey to 794 first year high-school students, from both general studies and vocational education, two months after the beginning of the school year. Questionnaires were used including items to account for School Satisfaction, Cognitive and Affective Identification, Social Identification, Social Identification with the Teachers and with the Classmates – Group Identification Questionnaire, the Identity Leadership Inventory Survey, Multiple Group Membership, General Self-Efficacy and Academic Self-efficacy Scale. The authors found that students' affective identification with school was the most relevant factor of school satisfaction and showed a strong association with self-efficacy, indicating the social feature of self-efficacy. The study also pointed at a relevant link between teachers' social identity and students' identification with the teachers. Finally, the authors account for a strong relation between identification with classmates and school identification, stressing the importance of educators' management of the students' identification process, to avoid alienation dynamics. In conclusion, the authors point out that the role of self-efficacy in enhancing school satisfaction seems minor to that of school identification, and that self-efficacy itself beneficiates from school identification. The authors proposed to contribute to a "new psychology of classroom management", as a social identity leadership process, uniting teachers and students in a common quest.

9. Bromhead, Lee, Reynolds, Subasic and Turner (2017) conducted a study with 340 grade 7th and 9th Australian students, in which a) school climate and school identification were identified as positively correlated with numeracy and writing and b) school identification was revealed as mediator between school climate and achievement. The authors recommended attention to the importance of the group and of social identification for learning.

d)   Studies that identify school belonging

Along our research, we found several studies that refer to school belonging. This construct is one of the elements of school identification, according to Voelkl (2012) and tends to absorb also the other element of school identification, valuing, for these constructs are both latent in scientific literature and tend to be proximal. We bring here the studies where "school belonging" or "sense of school belonging" seem to mean the same as "school identification".

10. Hogberg, Johansson, Peterson and Strandh (2021) accounted for a declining of school belonging over the last two decades and try to understand its causes. The authors focus on 15-16 years old students and use individual-level survey data from the Swedish version of the Programme for International Student Assessment (PISA), in which Swedish students reported the highest scores of School Belonging in the years between 2000 and 2003, declining after that, being thus exemplificative of a general trend observed in the other countries participating in the programme. The first objective of the study was to research the characteristics of the Swedish trend: the authors found a polarized tendency, where there is a general decline, but accentuated in students from low-income and migration backgrounds; there is also a declining trend of school belonging for students with low-achievement, especially after 2012, which seems disproportionate with the average. The second objective of the study was to find the causes of this declining. But, with the exception of mathematics anxiety between 2003 and 2012, the other variables, namely, school disciplinary climate and student-teacher relationships did not explain it. Although only as a theoretical hypothesis, the authors suggest that, since the declining in Sweden coincided with a performance-oriented shift in educational policies, that shift can explain the data, alienating from school the most fragile students. The authors appeal to the necessity of more research on the field.

11. Konishi, Parent and Wong (2019) explored the relevance of Student-Teacher Relationships (STRs) and Sense of School Belonging (SSB) for future orientation of adolescents, which includes expectation, aspirations, planning, anticipation of future consequences and time perspective (Lindstrom-Johnson et al., 2014). Underlining the social variables of future orientation, the authors proposed to answer two questions: do STRs and SSB predict educational and career expectations? And do SSB and educational expectations interfere in the impact that school climate variables have on career expectations? The study included 3,238 students aged 15 years, who participated in the Hong-Kong 2003 Program for International Student Assessment (PISA) and answered the optional questionnaire Educational Career and Information Communication Technology. Results seemed to point at students having higher expectations when they experience positive relationships with their teachers and sense that they belong to school. Interestingly, while STRs seem to influence mostly the individual sense of school belonging and educational expectations, it is school belonging that in turn seems to impact directly on career expectations.

12. Allen, Kern, Hattie, Vella-Brodick and Waters (2018) presented a meta-analysis of results found in 51 quantitative studies, published between 1993 and 2013 involving 67.378 students aged 12 to 18, in schools in Australia, New Zealand and the U.S.A. The authors tried to identify which of the ten themes linked to school belonging are actually significant as causal or associated with school belonging. Individual and meso level factors were analyzed as relevant; to our present review, the most significant results were the ones obtained looking at the micro-level factors, specially at student-teacher relationships. At this level teacher support was found as the most relevant to school belonging, to the point of permitting correction of negative

family and peer interactions. Teachers support, combined with the help of parents in a whole-school approach to students was found as the most relevant factor.

13. Gizir and Uslu (2017) studied the role of student-teacher relationships, peer relationships and family involvement in adolescent school belonging. They applied a survey to 815 seventh and eighth grade students of state schools in four central districts of the Mersin province in Turkey. The authors used the Sense of Belonging sub-scale of the Perceived Cohesion Scale (Bollen & Hoyle, 1990); the Student-Teacher Relationships and Student Interpersonal Relationships, sub-scales of The School Climate Survey (Haynes, Emmons, & Comer, 1993); and the Parent Involvement, sub-scale of the Show Me Character Student Survey (Marshall & Caldwell, 2006), divided into Parent Involvement at Home and Parent Involvement at School. All the variables were shown to impact positively on school belonging, and teacher-student relationship was by far the most significant and associated with the other personal, peer and parent related factors.

14. Chhuon and Wallace (2012) proposed an interesting construct, namely, "being known", as describing the adolescents' perceptions of development tasks, psychological perceptions and effective teaching through which teachers influence students school belonging. The researchers used a sample of 77 high school students, in Los Angeles (California), Pittsburgh (Pennsylvania) and Saint Paul (Minnesota) aged14 to 20, recruited in development programs and different schools, and conducted focus groups with an average of 5, 6 participants, and a subsequent analysis of the raw data through a conceptualization process. Findings underlined the accuracy of students perceptions and the importance that students give to three items: teachers' devotion to teaching and their competence and effectiveness in doing so, meeting the real student and adapting methods and developing a caring relationship with each; the instrumental support that teachers are capable of mobilizing to actually facilitate and foster students' academic goals, viewed as a professional responsibility that should always be present; the "benefit of the doubt" attitude, that allows for respect, tolerance and acceptance of the turmoil naturally present in a process of gradual independent decision making on part of the students, essential to their growth, opposite to negative prejudices and generalizations about students. The authors conclude that the student-teacher relationship is the most relevant relationship for students, for it is within this relationship that the essential questions of adolescence — who am I? who can I be? — are looked at and cared for.

15. Johnson (2009) verified, through a mixed methods study, several factors that foster student belonging to school and enhance learning and personal development. The author compared students' perceptions in two north-western High Schools in U.S.A., one that presents a traditional structure and one that is described as non-traditional. Belongingness is measured both through a Psychological Sense of School Membership Scale (PSSM) and through a one-time questionnaire about teacher support perception during a week of Experience Sampling Method (ESM; Csikzsentmihalyi, 1994), to a self-selected group of students in both schools. In conclusion, the author points at teacher support and adolescents' sense of school membership as important factors of learning and motivation.

e)   Studies that address student-teacher relationships that seem to correspond to trust

16. Hughes (2011) conducted the first longitudinal study about elementary students' perceptions of teachers' support, and their effect on academically outcomes. The author distinguished students' perceptions from teachers' perceptions and used a sample of 784 academically at-risk third graders, that she tested with a Teacher-Student Relationships

Questionnaire, looking at school outcomes in the following year. The study suggested that research should take into account both the child's and the teacher's perspectives and that a positive and warm relationship on part of the adult is capable of mitigating conflict and significantly influence the child's sense of belonging and academic engagement, fostering outcomes.

17. Vaz et al. (2015) studied the personal and contextual contributors to school belongingness among primary school students in Australia, through survey questionnaires applied to 395 6th and 7th grades students, and data treated by linear regression models. Demographic variables account for 2.5% of SB; student personal factors account for 49.5 %; school factors, among which, teacher-student relationships, account for 13.9%; family factors for 3%. Authors propose that a democratic school environment will influence higher levels of school belongingness through enhancing the personal and school relevant variables.

Discussion and Conclusion

This systematic literature review may infirm of methodological limitations, for it may ignore important contributions that do not fulfill the formal criteria of inclusion. Further research on the subject, both empirical and theoretical, will be useful. Even so, this seems enough material to show that research about student-teacher trust and school identification are still scarce, taken into account the importance of both constructs for students, teachers and schools all over the world.

The elements of both constructs seem clearly identified in some research, but not yet generally acknowledged as a common theoretical body, that could help understand reality and enhance positive school communities. School identification seems a "stronger" construct than mere "school belonging" or "school sense of belonging", for its dual components of belonging and valuing demand a critical approach on top of an affective one. On the other hand, the construct of "belonging", in the studies above, seems to comprehend "valuing" on part of the student, even if not so explicitly assumed.

The risk of vulnerability, explicitly taken when it comes to trust, and the conscience of a need, present within "belonging" and "valuing", both seem fragilities which may turn into possibilities and advantages, because they can cause positive reciprocal dynamics and interactions, that, if composed and experienced together, may avoid abuse and enhance opportunities for protagonists, both individuals and communities. Advantages and positive impacts of both constructs in students' development and school environments seem well established and verified by empirical research.

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A Critical Review of Environmental Education for Sustainable Development Goals, the United Nations Convention on the Rights of the Child and Child-Friendly Schools

Gulsah Dost, University of Durham, United Kingdom

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Abstract
Global warming and other acts of environmental destruction have had significant consequences on our lives in recent years that will most likely continue in the future. Therefore, it is very important for children to have access to information about environmental education and the ability to apply this knowledge practically. Environmental education builds awareness, creates the skills and knowledge essential to express complex environmental problems, helps students understand how their choices and actions influence the environment and promotes ways to keep the environment sustainable and healthy for the future. Environmental education should be considered and not limited to schooling but added to Sustainable Development Goals (SDGs), The United Nations Convention on the Rights of the Child (UNCRC) and Child Friendly Schools (CFS). For this reason, this study will examine the role of environmental education within the scope of SDGs, UNCRC and CFS, and will critically evaluate the relationship between environmental education and each concept.

Keywords: Environmental Education, United Nations Convention on the Rights of the Child, Sustainable Development Goals, Child Friendly Schools

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Introduction

Environmental damage has significant impact on the lives of children today and future generations as the severity of the damage increases in the absence of preventative action. According to the latest Intergovernmental Panel on Climate Change Report (IPCC, 2021), scientists are observing changes in the Earth's climate in every region of the world and in the entire climate system. Their findings show that there are new estimates of global warming exceeding 1.5°C in the coming decades and up to 2°C if necessary measures are not taken. Thus, increasing the number of environmentally literate individuals is important for the protection of the environment and the sustainability of environmental resources (UNESCO, 1978; Wheaton, Kannan, & Ardoin, 2018), and for this purpose, environmental education can serve as a critical tool in tackling environmental problems (e.g., Potter, 2009; Palmer, 1999). Environmental protection is seen as an important goal at all stages of environmental education. Michelsen and Fischer (2017) stated that environmental education should be seen as an indispensable necessity if we want to successfully promote sustainable development. Therefore, nature-based environmental education, which provides discovery through learning by doing, aims to develop students' emotional relationship with nature, their attention to ecological issues and social relations, and encourages them in this field (e.g., Ballantyne & Packer, 2002).

Children's rights violations caused by environmental damage can have lifelong, irreversible, and even intergenerational consequences. Therefore, the UNCRC provides a strong normative framework for the realization of children's rights through a healthy environment. Children, parents and adults working with children should be familiar with the international framework of children's rights and should be encouraged to receive an education that respects the natural environment and raises their awareness (Blanchet-Cohen & Elliot 2011). Here, rights based, child friendly education systems and schools come into play; these schools are characterized as a child-friendly schools, inclusive, healthy and protective for all children, impactful, emotionally safe, and relevant to families, communities and children and are covered in the UNICEF Framework. Therefore, this study explores in-depth and broadly links and synergies between environmental education, the SDGs, the UNCRC and the CFS from a critical perspective.

Outcome of Environmental Education

Environmental education comprises ecological and environmental learning, nature awareness, forest pedagogics and other terms (O'Flaherty & Liddy, 2018; Rauch, 2000; Weiss & Rametsteiner, 2005). Environmental education is a significant educational mission and field for every institution at every stage of education. Based on environmental education, it is understood that human life includes the biological life in the world and that individuals are in harmony with this biological life and nature, and by raising understanding of this from early childhood, protecting the environment will facilitate the life of future generations (Kharrazi, Kudo & Allasiw, 2018; Sinakou, Boeve-de Pauw, & Van Petegem, 2019). This education aims to increase self-confidence and responsibility in individuals, increases environmental awareness and individuals' conscious of the environment (Liu & Guo, 2018; Erhabor, 2018). Environmental education includes a number of components such as awareness, knowledge and attitudes towards environmental threats, the skills to identify them and the ability to find solutions to environmental problems, as well as participation in activities that lead to their resolution (Ramadhan, Sukma & Indriyani, 2019; Law, Hills & Hau, 2017). Additionally, this education improves their problem-solving and decision-making skills by providing individuals

with the ability to look at a subject from different perspectives through critical thinking (EPA, 2007).

Environmental education has had many positive effects, from improving academic performance to personal growth and the development of critical life skills such as confidence, leadership and autonomy (Chen, 2018; Browning & Rigolon, 2019; Ramadhan, Sukma & Indriyani, 2019). Bodzin et al. (2010) state that being in a relationship with the environment and exposure to environmental education, individuals can improve their academic development by strengthening scientific inquiry, arithmetic and developing language arts through writing and speaking. There are studies showing that environmental education increases civic participation and positive environmental behaviours. For example, Powell et al. (2011) assessed a middle school-focused residential outdoor program that emphasized character development and environmental education. The study discusses the links between environmental education and positive youth development in light of the findings on character development, environmental responsibility and leadership. Stevenson et al. (2013) also discuss how environmental education goes beyond mere understanding and conceptualization. They state how it goes to develop learner agency, including a problem-solving orientation. Through focus groups and surveys with environmental education participants and practitioners, West (2015) identified numerous and varied outcomes for both groups, with an emphasis on knowledge as well as social outcomes among participants. Researchers who have closely examined some environmental education programs have found that environmental programs involve providing individuals with environmental awareness, attitudes, skills, intentions, enjoyment, and behaviours that include citizen participation (Ardoin et al., 2020; Stern et al., 2014; Ladwig, 2010). Environmental education, which provides individuals with attitudes, values, knowledge and skills to take environmentally friendly actions, encourages individuals to improve the sustainability of human-nature interactions over time (Mastŕangelo et al., 2019; UNESCO, 1978).

Environmental Education for Sustainable Development

The ideologies of environmental education contained in the Tbilisi Declaration include the basic values of sustainable development: adopting perspectives both at the local and global level; promotion of international solidarity; considering the social aspects of the environment and the close links between economy, environment and development (UNESCO, 1978). Sustainable development is the overarching framework of the United Nations and this framework has four dimensions, which are society, environment, culture and economy (WHO, 2016). These dimensions are not separate from each other but are intertwined. Sustainability is a paradigm in which social, environmental and economic issues are balanced in search of a better quality of life that includes future goals (Schaltegger & Wagner, 2017; Epstein, Elkington & Herman, 2018). For example, a prosperous society provides food and resources and relies on a healthy environment, aiming to provide its citizens with safe drinking water and clean air.

The 2030 Agenda consists of seventeen Sustainable Development Goals (SDGs) and 169 targets that will guide policy and finance for the next nine years (United Nations, 2015a). This Agenda includes acting in collaborative partnership with all countries and stakeholders, from ending poverty, reducing inequality, to building more peaceful, wealthy societies by 2030. These targets and objectives are "global in nature and universally applicable, taking into account different national realities, capacities and levels of development and respecting national policies and priorities" (Matte et al., 2015, p.6). The UN 2030 Sustainable

Development Agenda envisions inclusive equality, justice and well-being within the environmental framework and places a significant emphasis on education as set out in Goal 4. Education is recognized as an aim for education in Goal 4.7 with sustainability as a means to accomplish the remaining 16 Goals.

Target 4.7 "*By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development*" (UNESCO, 2019, p.68).

Education and environmental sustainability are not only closely related to each other, but also strongly linked by a cause-effect relationship; therefore, what is typically caused by the former naturally affects the latter (Howe, 2009; Walid & Luetz, 2018). In this categorisation, education assists as a tool to achieve environmental sustainability goals. Although in theory this seems like a reasonable and logical conclusion, in practice it turns out to be a much more unstable relationship network. After exploring the broader historical relationships between environmental education and Environmental Sustainability and Sustainable Development, the SDGs show the story of a worsening relationship between education and the environment. Within the SDGs, education is included in Goal 4: "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (United Nations, 2021, p.11). While this goal deals with development from a social and economic point of view in its main statement, it does not make any special reference to the environment. In other words, sustainable development (SD) seeks to grasp and explain the relationship between society and economy to promote the transition to sustainability. However, environment was not mentioned in this SDG statement on education. The complexity of sustainability as a concept makes it challenging and ambiguous making it difficult to relate SDGs to educational learning outcomes with what Education for Sustainable Development (ESD) endeavours to achieve. While the multiple targets detail individual targets, SDG Goal 4 does not address environmental sustainability and does not make a single explicit reference. This raises several important questions and the most important is; if environmental sustainability is not even a target, can education be expected to deliver results in environmental sustainability? In other words, can education achieve its real purpose related to the environment without including sustainability?

Sustainable Development Goals cannot be fulfilled without addressing children's rights (United Nations, 2015a, 2021). It covers and applies to children, even if not explicitly stated in all goals and targets of the 2030 Agenda. Therefore, it is essential that the implementation of the 2030 Agenda promote, strengthen, protect, and fulfil the realization of children's rights by integrating a children's rights-based approach that respects and promotes children's rights (Arts, 2019). Using both main structures in synergy will strengthen their mutual practices and ensure that children's rights are realized in a meaningful way. All world leaders strive to fulfil their 2030 commitment, striving to secure healthy and quality education, a clean world and more for children all over the world (United Nations, 2021). More than 100 Member States have reconsidered their promises to children's rights to ensure the implementation of the SDGs (United Nations, 2021). UNICEF collaborates with governments, other UN agencies and partners to help countries guarantee that the SDGs deliver equal results for and with every child, for present and future generations. On a national basis, some countries have explicitly embraced the right of the child to participate in their constitutions and domestic laws (Parkes, 2015). In many court decisions, UNCRC and regional documents, the child's right to participation is clearly cited and discussed (Geary, 2012). Considering the processes and

conditions that directly affect children and young people, it is necessary to expand this further to include children's families, communities, professionals working with them, policy makers and ultimately the entire regulatory regime (Gal, 2017).

UNCRC as Environment-Related Children's Rights and Environmental Education

The UNCRC is one of the few human rights papers that clearly calls for the world's countries to take action to preserve the environment and to leave a cleaner and liveable nature to future generations. UNCRC has now been signed by 196 countries, and since the General Assembly adopted the Convention in 1989, it has speedily become the most approved international human rights agreement in history (UNICEF, 2009b). This Convention consists of 54 articles and has articles that stipulate that all children of the world should automatically enjoy these rights, addressing both the rights of children and the responsibilities of governments to ensure and protect these rights (UNCRC, 1989). The UNCRC imposes obligations on governments to protect the rights of countries regarding children's rights and to ensure that every child enjoys these rights equally. This means that national governments have a legal responsibility to act on climate change to protect children's rights and prevent violations on this issue. Child rights-oriented policies reduce children's vulnerability to the harms caused by climate change have important co-benefits for children such as allowing them to develop, survive, protect, participate, have a voice and enjoy their fundamental rights (Pegram & Colon, 2019). Governments taking climate action from a UNCRC perspective not only enable them to fulfil their UNCRC mandated obligations but also to contribute to climate action. Furthermore, Article 24 and General Comment 5 impose obligations on developed nations to play a role and take action in the promotion and protection of children's rights in developing countries and these obligations include; developed countries need to provide financial resources and take political action to ensure that children in developing countries enjoy their rights. When this article is evaluated in the context of climate change, minimizing the negative effects of climate change on vulnerable communities and helping them to activate the resources they need and to achieve emission reductions by developed countries can minimize the effects of climate change that negatively affect children in developing countries.

Children's environmental rights are not summarized in a single specific UNCRC article; they are covered in numerous articles. Article 3, Article 6, Article 12 Article19, Article 24, Article 27, Articles 28, 29 and 31 all relate in several aspects to ecological rights (see Table1). For example, children's rights to health, survival and development are enshrined in the UNCRC Articles 6 and 24, while green and healthy spaces are an important part of children's right to play (UNCRC Article 31) and children have the right to participate in all matters that affect them (UNCRC Article 12).

Table1. Articles of the UNCRC That Apply to Children's Environmental Rights

Provision	Content	Relevant legal text
Article 3	Best interest of the child	Article 3 '*In all actions concerning children, whether undertaken by public or private social welfare institutions, courts of law, administrative authorities or legislative bodies, the best interests of the child shall be a primary consideration*'.

Articles 24	Health and health services	Article 24 (2) on the right of the child to the enjoyment of the highest attainable standard of health provides that: *"States Parties shall pursue full implementation of this right and, in particular, shall take appropriate measures: [...] to combat disease and malnutrition [...] taking into consideration the dangers and risks of environmental pollution"*
Article 29	Goals of education	Article 29 (1) on the aims of education provides that: *"States Parties agree that the education of the child shall be directed to: [...] the development of respect for the natural environment".*
Article 6	Life, survival and development	
Article 19	Protection against, among others, neglect	
Article 27	Adequate standard of living	
Article 28	Right to education	
Article 31	Play, leisure and culture	

The UNCRC committee makes a responsibility to put the child's best interests first when making decisions that can have a major impact on a child. Where a child is mature enough to express his or her views, these views should be given due weight according to the age and maturity of the child, and it should be ensured that children who are able to form their own opinions have the right to participate in any actions that affect them (Article 12). Looking at the UNCRC articles, there are also two articles that specifically mention about the environment, these are articles 24 and 29. Article 24 of the UNCRC states that children have the right to enjoy the highest attainable health and environmental standard/conditions. Article 24 of the Convention also expresses that States require considering the risk of contaminated water and food as well as pollution when individuals enjoy their right to health (UNCRC, 1989). The environmental health condition of children is also closely related to other rights of UNCRC. These contain the right to survival and development, the right to life as well as the right to food, water and sanitation, education, adequate housing, freedom from economic exploitation, information and an adequate standard of living. The right to non-discrimination and equality also means that children over the world should have access to a healthy and safe environment.

While the UNCRC contains provisions that explicitly refer to the environment, such as Articles 24 and 29, many other children's rights, mainly socioeconomic rights, have robust environmental dimensions or can be reinterpreted from an environmental perspective. Therefore, the UNCRC already comprises the critical grounds of a legal framework for the protection of children's rights with respect to the environment and aims to protect children's

environmental rights as a legal instrument, because it is impossible to realize critical rights such as rights to life, health, play, or an adequate standard of living for current children or indeed future generations without an ecologically healthy environment. For countries to fulfil their duties and obligations to realize this right, an effective legal and political framework is established that protects children from environmental threats and degradation that would endanger their survival and development (Walker, 2017). However, there are some barriers preventing children from benefiting from environmental education as a right. Education curricula of some countries are not related to existing problems in a local context (Conde & Sánchez, 2010). The environment in which children live is dirty, excessively degraded making it difficult for children to realize their potential which deprives them of basic awareness of environmental risks (Lawson, 2018). The decrease in quality time in nature or nature spaces for children fails to meet the needs of children and is a major threat to the realization of Article 29(1) (e) of the UNCRC. There is limited room for resolving problems, engaging in skills development and possible solutions, and challenges which concerns all children. Furthermore, Article 29(1) (e) does not have a solid explanation of what exactly states/countries should do in their efforts to promote environmental education. In contrast, multilateral environmental agreements, like the Paris Climate Agreement, indicate educational measures but do not make particular reference to the rights of children (United Nations, 2015b). The Paris Climate Agreement (2015) emphasized that the protection of the natural world and the development of respect begins with children's enjoying of nature, spending time in nature and experiencing nature. Understanding and recognizing the environment by establishing a bond with the environment is a prerequisite for children to take actions to protect and preserve nature.

UNCRC is ignored in the determination and implementation of environmental policies and standards, laws, policies and actions related to children's rights are not considered, revealing a gap in legislation and policies, as well as neglecting children's rights related to environmental factors (UNICEF, 2009b). Environmental policy decisions and laws taken at the national level are not considered within the scope of children's rights (European Commission, 2019). For example, there seems to be a gap in the treatment of standards and policies regarding biodiversity, ecosystems and natural resources from a child rights point of view. On the other hand, policies designed to assess children's rights do not adequately consider environmental issues (CRAE, 2017). While international agreements on the environment such as the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, and the Paris Agreement in climate change practices rely on cooperation, more robust guidance is needed to identify the elements of a child rights-based stance on climate change and environmental issues.

Child-friendly Schools and Environmental Education

Child-Friendly School (CFS) framework was put forward by UNICEF in 1999, as a result of the global requirement to increase and improve the quality of education, based on the philosophy of children's rights, adopting the fundamental position of education as supporting the development of children at the highest level (Osher et al., 2009). The CFS are a versatile framework and meet the basic needs of the child as a student. The CFS framework also aims to guarantee the full participation of all actors who can influence children's full engagement of the right to quality education (Chabbott, 2004). These schools avoid building new schools and ensure that existing schools are for children, while ensuring that the school fulfils and protects children's rights, since schools becomes their second home. In a CFS, there is a healthy, hygienic and safe learning environment, adequate water and sanitation facilities are provided to children. In addition, these schools provide health policies and practices such as a school

free of drugs and harassment, and health services like nutritional supplementation (Clair, Miske & Patel, 2016). A child-friendly school can essentially be considered as a miniature of a society because it includes ethno-linguistic tensions from countries and communities where social, economic, political and cultural dynamics cooperate and are based on rights-based approaches (Orkodashvili, 2013; Clair, Miske & Patel, 2016). Horelli (2007) defined a child-friendly environment as multidimensional, complex and multi-level. This refers to an environmental framework that supports the individual child and related groups that are significant to the child. From this point of view, a wide-ranging model in the learning curriculum in schools is required to enable children to realize their full potential and to reduce negative experiences.

Child Friendly Schools are schools with three basic pillars: emotional, physical and psychological, which include all children, consider the best interests of children and enable them to be emotionally secure, physically safe and psychologically enabling (UNICEF, 2012). The child-friendly school also puts a great deal of effort into promoting sustainable educational development by leading the designing of a clean environment for children and give significance to the well-being of children at school (UNICEF, 2000, 2012). UNESCO (2015) express that one of the goals of sustainable development is to provide and sustain a healthy life, and with this it aims to ensure the well-being of all. The CFS framework encompasses and promotes gender-sensitive, child-centred, protective, community-related, comprehensive, ecologically friendly, and healthy attitudes around the world. This has established the basic method to promote proper education for all children, directly in natural life or in the event of an emergency.

The CFS are areas that can help minimize the various negative effects of a potential crisis on children, but these schools are not the solution to problems of all children. The CFS activities are built around improving children's problem-solving skills and coping skills, and children are proactively involved in the selection of activities to ensure that the activities are relevant to them (UNICEF, 2009a). The CFS creates a child-oriented and child-friendly environment that supports children's cognitive development, as well as providing them with learning opportunities at various levels (Djoehaeni et al., 2020). They can help minimize disruption to the development opportunities and learning that education provides, particularly in the developing world. Child Friendly Schools support children's positive self-control and self-regulation skills and enable them to take responsibilities appropriate to their age (Ningsih, 2020). Thus, they can help children develop self-esteem and sense of security.

The UNCRC (1989) expresses that member States are obliged to provide a safe, protective and healthy environment that is free from injury, violence, abuse and neglect. In this context, it is important to recognise environmental risk factors based on children's rights, by considering the basic needs, vulnerabilities and marginalization of children, and to create a framework for protecting the environment and minimizing potential risks within the scope of children's rights. Therefore, environmental education and CFS play a critical role as these are defined as an effort to increase environmental awareness and aim to form environmentally friendly behaviours in individuals. Since the creation of a healthy environment is a requirement for the full realization of children's rights, more attention is needed to the environmental aspects of children's rights to activate and strengthen the frameworks covering children's rights in the management of environmental quality (Schubert, 2012). UNCRC cannot clearly guarantee the right of children to a healthy and quality environment in an ecological context which is a fundamental right of children. In addition, UNCRC cannot fully guarantee that all children will enjoy such a right at the highest and fairest level, as it is depending on external factors such as how countries make regulations for children's rights. Both the monitoring and interpretative functions of the

UNCRC committee give the opportunity to better define the relationship between a good quality and healthy environment and UNCRC principles in an ecological context. The Committee as an interpreter and monitor has the chance to provide information on how developing children's right to a healthy environment should be.

Conclusion

Individuals need to be aware and informed about the environment in order to cope with environmental problems, to take action and to help improve the environment. Providing environmental education to individuals is an important instrument for teaching them to have a sustainable vision, sustainable life, environmental literacy and environmental responsibility. In a context where social relations and solidarity among individuals dominate, education focused on the environment that ensures sustainability for present and future generations by preserving traditions and customs that encourage responsibility among its members is very important. The cross cutting approach of environmental education enables us to address all the challenges posed by environmental degradation in one place, with the measures that we need to take in order to understand existing inequalities and protect the environment. The SDGs, UNCRC and CFS have a fundamental basis in strengthening environmental education and these are interlinked. If we want a sustainable world including equality, sustainable development and a clean environment, these three agreements should fulfil their duties and the countries should effectively fulfil the decisions taken by these elements. If we want a sustainable world that includes equality, sustainable development and a clean environment, these three agreements should guide the countries by detailing the articles/goals/targets related to environmental education.

Children's futures and rights are threatened by inadequate government action to address the climate crisis, the destruction of natural resources, widespread pollution of air, water and soil, and exposure to toxic substances. These negative impacts affect children disproportionately and countries fail to ensure that every child receives an equal quality education and lives in a sustainable environment, which violates the principle of non-discrimination. A safe and healthy environment is closely related to children rights and despite the many connections between them, the lack of awareness among individuals and the inability of countries to develop an effective enforcement mechanism by establishing this connection hinders the effective implementation and protection of children's rights for all children. The UNCRC provides a normative framework for the realization of children's rights through a healthy environment and environmental education and awareness of children's rights, but these are largely absent from environmental or climate-related laws, policies and actions. Thus, Member States need to ensure that they have taken action to integrate the SDGs into their governments' policies, actions and strategies and detailed the documents and practices related to the environment within the scope of children's rights. In addition, Member States should take into account the best interests of children in their concrete environmental actions/plans/policies/reports/laws from the decision-making stage to the implementation and evaluation stage.

Although climate change will eventually affect every child, children living in high-risk areas seem to need the most urgent support given their vulnerable situation. The negative effects of climate change, natural disasters, poverty and urbanization not only affect children negatively but also lay the groundwork for the violation of children's rights. The CFS model has the ideology of providing a safe and protected school, trained teachers, appropriate resources and a learning environment for students in all these adverse situations. Protecting children's rights is one of the most important components of this model. For this reason, it is very important to

increase the number of the CFS model in countries, to realize children's rights by considering international documents, and to ensure that children take environmental education in schools to become environmentally literate. Children depend entirely on a natural environment in order to live in a healthy and sustainable environment, have adequate and clean air, safe water and adequate sanitation, and have access to non-toxic environments and playgrounds. The right to a healthy environment needs to be adopted, protected and implemented by all countries of the world, whether they are UNCRC members or not. Taking such a step is important for children and future generations who are disproportionately affected by environmental damage.

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Contact email: gulsah.dost@gmail.com

Levelling the Playing Field: A Case Study on the Benefits of Integrating Student Feedback Through Fluid Course Development

Kate Luxion, University College London, United Kingdom

Abstract

A challenge in teaching and course planning is striking the balance between the skills and knowledge students need to learn and the timeliness of the information available to explore and learn from. In visual arts, students who are hoping to pursue professional practice need legal knowledge, communication skills, and technical skills alongside reflective thinking and time management. But various mediums and disciplines complicate and constrain the process of course development. This presentation explores a case study of documenting fluid course development through integrated feedback to address these complications and teaching in interdisciplinary space. The course to be discussed is a Visual Arts Business Procedures as I taught it at a technical college in a semi-rural area of South Carolina, with teaching methods covering digital and face-to-face praxis. Successful approaches to be discussed include ways of centering student voices, use of engagement to improve depth of learning, knowledge co-production as a learning process, and creating community across semesters. The discussions and provisional conclusions include how to implement these approaches in low resource settings, while ensuring they met accreditation and assessment standards.

Keywords: Equity, Course Development, Student Engagement

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Introduction

This case study discusses a course that I redeveloped and taught at Greenville Technical College in the United States over several semesters, starting in Summer 2019 until Fall 2020. As part of the Visual Arts programme, the Visual Arts Business Procedures course prepares students for professional careers as artists.

Over the length of the semester, students start by learning legal knowledge related to business, including the basics of copyright law, contract law, and various business structures before moving into developing and branding their own business. Research blog posts help to explore the information in these earlier assignments to help guide students through the materials, while being able to learn from what information their peers share, to form the habit of working on projects in stages.

Alongside these units, weekly discussion boards provide hypothetical situations requiring students to consider ethical questions that will shape the structure and mission of their businesses. Approximately halfway through the semester, the discussion boards transitioned into reflective journal entries. The topics of the journal provide private spaces to contemplate the relevance of the information learned with the ability for feedback and questions to be left for the instructor to answer as they arise.

Asynchronous lectures paired with synchronous activities help to make sure that the online components of the course make the best use of the allotted contact hours. Attendance for the course is based on the departmental requirement of 90% attendance to maintain enrolment, gauged through a minimum of 75% of assignments completed on time to allow for many of the students having to support families and jobs while completing their degrees at Greenville Technical College.

Shorter assessments, along with the discussion boards, blog posts, and journals across the term, receive feedback and recommendations, with the final assessment being an amalgamation of the earlier assignments with further depth and the marking feedback incorporated.

Pedagogy and Positionality

Starting with positionality and pedagogical approach, the decisions discussed here were led by an intersectional, feminist approach that recognises that educational policies and static teaching plans can often disadvantage students. In order to address these institutional barriers, it is important to strike a balance that improves access while supporting student-led and student-centred capacity building in higher education. While pragmatic, there is some contextualising of the choices made within the literature to support a wider implementation of the approaches taken.

The Problems

In redeveloping the course, there were several concerns that arose. As one of the two courses where students from multiple disciplines come together, its redevelopment presents a unique number of challenges in order to support each diverse cohort. The main issue was the only space for students to make recommendations was at the end of the semester. An additional point was flagged when the programme was made aware that there were concerns about the

post-graduation employment rate. Through the redevelopment process, the changes to the course benefitting students could also help to address this issue as an extended means of supporting students in their careers.

Student Evaluations

Challenge 1—Implementation Delay

Typical procedure in evaluating courses have students check in at the end of the semester. While these evaluations provide valuable data, clarifying whether students feel like the instructor is present and familiar with the information that is being taught. While these are valuable traits to have as an instructor, the evaluations fall short in asking students what more they would want from the course. What results is student voices being heard at a stage that makes it too late for them to influence the course that they are enrolled in. Students only being able to voice their opinions at the end of a semester makes the feedback that they offer beneficial only to the next cohort, which will have a set of unique individuals whose needs might not be met in the why they need to be because of the delayed implementation of feedback.

Challenge 2—Benefit to Student

In order to ensure that students can benefit from their input in course development, there needs to space for students to communicate their needs through the semester rather than at the end of the term. While this might be common sense in some pedagogical approaches, it not always that case that teaching staff is aware of the value that student communications can bring to course development and implementation. What is necessary is a way to ensure that students can directly benefit from the feedback that they provide to ensure that they are learning materials that apply to the course while being relevant to their long-term career goals.

Challenge 3—Engagement

While teaching earlier iterations of this course and others, there are certain elements that are necessary to improve student engagement. Often, a course can seem like a mound of information that is being presented, causing anxiety around being able to access and internalise enough information as a student within the short timeframe of an academic term. Theoretically, the adjustments to improve the student feedback loop in a way that enables students to benefit from their feedback should improve the connection to the course materials and thus improve student engagement.

Student Evaluation Solutions

Primary changes to the course that resolved the stated challenges include a trio of activities that take place across the course. A discussion boards and journal activities supplemented by an extra credit question at the end of the final exam, the latter providing the data necessary for the start of the next term.

The original course assigned readings included short essays from artists who reflected on their careers. While informative, these essays did not provide the details necessary for students to build their own career plans. Rather than read through the reflections of other

artists, the assignment was adjusted for the students to reflect on their own experiences and how they would implement them for their own careers.

Questions serve as prompts for the journals, guiding the students through what was and was not relevant to them (Moss & Murray, 2005), help to personalise the learning experience. Personalisation is created through establishing a dialogue with the students through the journal. This partnered approach to learning is beneficial to both students and teacher (Netcoh, 2017). These reflections and personalisation help to bridge the student and the materials in a way that facilitates better engagement by the students, particularly with the welcome session that will be discussed shortly.

Another element of the conversation extends from the final journal assignment into the final exam. Through these assessments, students are asked to answer two questions. The first question being, "what would change about the course?" and the second question asking "what advice would you give students just starting the course?". With both these questions, it is possible to understand more about the student's experiences, while also providing data to use with the next cohort.

Larger charges are usually requested by students at the end of the term, while advice for future students ties each of the semesters together. At the start of each term, with the course being given primarily online, a welcome session is hosted to give students an overview of the course materials. During this live session, the information shared at the end of the previous term is shared with incoming students to help them understand what other students felt to be valuable knowledge when just starting.

Hearing from other students during the welcome sessions provides a foundation for the importance of maintaining communication with peers through the discussion boards and research blogs. Thus, these improvements that also centred student voices helped to lay the groundwork for improved student engagement, which mirrors what educational research has found (Yair, 2000).

Skills, Resources, & Relevance

Challenge 1 - Multidisciplinary Cohort

Because of the range of disciplines within the visual arts programme, the materials in the course have to cater to any of these disciplines. While there are some elements that can be generalised, each discipline represents a niche with its own terminology and professional nuance. The programme includes concentrations in Photography, Graphic Design, and Fine Arts. Under these concentrations are specialisations in typography, animation, sculpture, painting, printmaking, among others.

Challenge 2 - Unique Goals

With these specialisations, each student comes to the visual arts business procedures course with a set of unique goals. Those goals play out in the course assessments, which is a complete business plan for either a personal visual arts studio or a company that is centred around their visual arts discipline. Because of this uniqueness, it makes it difficult to take a traditional student/teacher approach. Particularly since these creative disciplines have a long history of following the apprenticeship model in order to develop a vocation.

Challenge 3 - Career Longevity

The expense of textbooks can be extremely limiting, with students often having a delayed start on assignments because of the delay caused by a lack of financial aid. Materials and skills in the classroom in fast moving industries can mean that students are up-to-date in the course and already out-of-date by the time they graduate if nothing else is done.

As first-generation students, as well as being the "artist of the family", there are also concerns about being able to network for a successful career. This also means that many of the basic skills necessary to run a business need to be taught as part of the course as well. These skills overlap with valuable academic skills, such as timeliness, research, public speaking, communications, and project management and organisation.

Beyond the material on legal and ethical knowledge, there are few limitations to what comprises a successful final assessment. The unique goals and interests of the student shape the way they complete each stage of the assignment. Which is the interaction of the three challenges, relating back to students needing to learn and employ autonomy and confidence over the length of the course. With the importance of learning those skills being part of forming lifelong habits, making them a key element of the course that must be implemented to ensure student success.

Skills, Resources, & Relevance Solutions

Through the redevelopment of the course, stepping back and integrating the student-led approach laid out by Biggs and Tang (2011). Their framework uses a four-step method that encourages students to share their knowledge and experience within a judgement free space. This approach also enables acknowledging students through both the assessments and through individual support (i.e., mentor-mentee relationship dynamics). The discussion boards, research blogs, and other assignments shared in "public" spaces within the course allows for students to shape the course content. By centring the topics that interest themselves, students shared with their peers the most up-to-date information about course topics while they are discovering what they need to know to run a successful professional practice.

Structuring assignments and assessments in this way enables a more individualised access to resources both across and within the disciplines in each cohort. As well as providing an additional layer of critical assessment of materials, as student have to read through more general knowledge about their disciplines in order to compose answers to prompts about what applies to them in their own art discipline. Allowing for a more engaged interaction with the materials by providing summaries and sign-posting peers, while comments and responses acknowledge the value of the resources that their classmates have found. It allows for a creation of community spaces outside of the context of group projects, which can be riddled with problematic communication and workload distribution. Enabling creativity beyond the visual arts mediums that they are used to by developing critical thinking skills through resource curation.

Earlier iterations of the course tried to use group projects to teach the skills of working as a team, but found these were the most often ignored projects as students either were unsure of where to start or assumed non-involvement would allow for points without effort. Communications and connections improved with the discussion boards and research,

improving the depth of engagement for the main/final assessments of the course. Where the group projects were providing the same knowledge, the conversations as smaller groups actually reduces the connectedness that was felt amongst the cohorts. By listening to the stress and concerns felt by the students, the course was able to adapt to a model that was better suited to capacity building to meet students' short- and long-term career goals. This approach also better facilitated a mentor-mentee dynamic, allowing for the structure of the course and teaching to more closely resemble the dynamic that will be present in the visual arts work force.

Meeting Programme Goals

Challenge 1 - Contextualised Learning

While some of the engagement issues were addressed, part of the gap in materials from the transition of the course was a lack of students' work examples. What students needed were tangible examples of student successes, both in the course's context and the need for better connections with tangible examples of visual arts business successes in the real world. As an extension of the personalised learning approach, this component highlights the value of linking student feedback and learning to active resources that would affirm the value of the course materials. In part, this concern is addressed by the knowledge on professional organisation, but there were additional needs to ground the knowledge better in the course.

Challenge 2 – Accreditation

What is required of the course is tied into the accreditation as much as it is tied to student feedback and personalisation. Through the final assessment and skills necessary by the end of the semester, the basic framework of the course provided a foundation while also giving parameters to what could and could not be radically changed.

Challenge 3 - Making Connections

Part of the connections to the working world include how the course materials links with other courses in the overall programme. There was an issue of keeping in touch with students to better support career success. This links back to the accreditation as well, since students need to evidence successful employment as visual artists for the programme to maintain support from the state-level accreditation board.

Meeting Programme Goals Solutions

Using materials and assets that were made available through professional organisations helped to bridge the gap between student and information. Keeping in mind that these outlets would be the most likely to update resources as the job market and various visual arts disciplines shift to meet the needs of society and commercial markets. Resources that are available for these outlets included resume templates, examples of branding guides, marketing materials, and other materials that echoed the assignments that they were asked to complete, showing an understanding of course materials. Mirroring the ability to individualise the learning process discussed earlier, as students could tailor the materials and resources to meet their goals within the course and their longer-term professional goals.

Alongside these publicly available resources, students were also provided examples of successful student projects, as well as assets that had been created for the professional businesses and organisations that I have developed throughout my career. Having tangible examples, and behind-the-scenes information, helps to show that the skills and activities of the course directly relate to starting and running a business. Valuing the time of the student through practical exercises that are beneficial to their careers, while helping them better contextualise the value of those skills at the same time. Moving away from a model of teaching that separates academic activities and practical skills on how to use that knowledge outside of the classroom. In kind, and as many of the students at the school face economic hardship, the course reading materials were curated from Open-Source textbooks made available through university repositories.

Positioning students to think beyond the classroom, allowing students to co-develop information sharing and cultivate peer relationships that can benefit and jumpstart careers. Encouraging professional connections to remain through LinkedIn and their final Exit Portfolio course, which provides a means of connecting with other faculty that is supporting the students throughout their time at Greenville Technical College. Vogler et al. speak to the importance of navigating professional relationships in this way being beneficial to the learning experience (2018). By being able to work with an instructor as client/supervisor/mentor helps to strengthen knowledge in vocational setting, but arguably is valuable in other academic contexts as well.

Limitations

Some limitations present during the redevelopment included the scope of the changes that were requested by students. This included whether the change was possible within the semester. When the final reflections of the semester included additional topics, such as grant writing, it was necessary to wait until the next term.

An unforeseen issue was resistance from the support offered by the tutoring support staff. Despite access to the course materials, the tutors made recommendations without referencing the newly implemented course structure. The confusion and difficulties for the students that resulted found some resolution through some changes discussed within this presentation. However, it is important to note that this might be an issue that other face even with clear and open communication with supporting staff.

Future Directions

More direct integration of student voices may streamline some decisions would be beneficial. While there have been some instances to try out similar approaches in leading seminars while pursuing a PhD, there are restrictions on how flexible the module is as there is the anticipation of gathering feedback at the end of the term to implement it in a future semester. This assessment of generalisability will help to see what value this case study can serve in other courses and disciplines.

Summary/Provisional Conclusions

With the journals providing an ongoing source of student feedback, many of the concerns voiced by students mirror the concern that students expressed through Ballantyne et al.'s review of the topics that need to be covered in official student evaluations (2000). With the

more robust information being provided by the qualitative data provided through the journal entries and final assessment feedback questions.

What students needed were open spaces for communication to be provided through the assessments and additional live sessions. These conversations helped to improve the course by centring the students' needs, highlighting the importance of the materials beyond a simplified restatement of aims and objectives; also allowing for additional lessons around timeliness, communication, professionalism, and how to balance these with being approachable and human.

It is the variations within these conversations that shifted with each group of students that highlight the importance of being flexible in how courses are implemented. For the ease of sharing the adjustments within this case study, the timeline for changes can read as smooth and working on first instance. These are the final iterations that worked across cohorts, with the resources established that allowed for taking a flexible approach.

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Contact email: stnvkll@ucl.ac.uk

Nepalese EFL Teachers' Perception and Practices of Differentiated Instruction

Samikshya Bidari, Soka University, Japan

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Abstract

Differentiated Instruction (DI) is a pedagogical premise that provides benefits, such as meeting diverse learner needs, accommodating students with varying learning abilities (De Jesus, 2012). DI is not just for special education; it addresses every student's needs without turning classrooms into cram schools or private tutoring lessons. Therefore, in light of recent progress in Nepal's education sector, ignoring the importance of DI in the EFL classroom is extremely difficult. Previous research has paid little attention to the complexities of DI implementation in Nepal. There has been little discussion of EFL teachers' perceptions of DI in Nepal, in particular. The aim of this study was to investigate Nepalese EFL teachers' perceptions and the factors supporting and hindering the implementation of DI in their classrooms. This research provides valuable insights into the pedagogical effects of incorporating DI in a desirable manner. A qualitative case study was employed as a research design of the study. Fifteen EFL secondary level teachers teaching at private schools in Kathmandu Valley were selected for this study. The teacher participants were chosen via a systematic random sampling procedure. The data were analyzed and interpreted using a thematic approach, employing survey questionnaires, teachers' interviews, book analysis, and classroom observation as data collection instruments. The findings of this study reported differentiated Instruction was not even close to the initial stage of implementation due to large class size, syllabus constraint, time constraint, lack of teacher professional development events, and digital incompetency during the COVID-19 pandemic.

Keywords: Differentiated Instruction, COVID-19, Learners' Diversity

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Introduction

Moving towards progressive education, teachers have felt the urgency to deal with diversity and the needs of every individual learner (Oliver, 2016). We accept the world where each individual is different (Kurt et al., 2013; Tomlinson, 2014). Although a growing body of literature recognizes the importance of teaching strategies, Differentiated Instruction (DI) has yet to attract a considerable number of dedicated educators. Generally, teachers show themselves as novices when they meet their new set of students at the beginning of each academic year; they certainly do not carry all the answers regarding how to meet the needs of their learners. Nevertheless, they bring excitement, optimism, and determination to conduct the most effective lessons. Educators globally have expressed admiration towards the culture of Differentiated Instruction (DI) as it aims to increase learners' engagement and interaction by aligning tasks and support by providing pedagogical strategies tailored to specific needs of their learners (Tieso, 2003; Houtveen et al., 2001). To conceptualize the process of DI, teachers' understanding of each individual and how they impact the proposed knowledge in their English classroom seems crucial. This article intends to explore teachers' perspectives and practices on promoting an inclusive learning environment in the secondary EFL classroom of Nepal, addressing the learners' learning differences and how teachers address those differences. This article includes the literature review, research methodology, findings, discussions, and educational implementation.

Literature Review

Differentiated Instruction (DI) is an instructional strategy that embraces each individual's learning map and dismisses traditional instructions as insufficient since it is constructed around a "one size fits all" curriculum (Loeser, 2015). Hence, the prime objective of DI is to assist teachers in unlocking the full potential of their students by designing learning opp ortunities that are tailored to their specific needs and interests (Santangelo et.al., 2012).

Additionally, differentiated Instruction provides teachers with various options for accomplishing their instructional goals, allowing students to reach their full potential (Tomlinson, 2005). Teacher-student relationships are formed through practical communication skills. It has to meet diverse learners' needs in terms of learning capacity, economic and social circumstances, and language diversity. To address learning differences in an EFL classroom, a teacher needs to plan lessons based on a pre-assessment. While preparing for the study, as Tomlinson (2009) strongly argued, the teacher needs to consider the variations in response to students' needs. This variation implies modification in content, process, and product (Heacox, 2002 & Tomlinson, 2006).

Content

Content is an important part of the curriculum to help learners improve significant and relevant content knowledge and abilities. According to Tomilson and Imbeau (2010), content can also refer to a student's manner of accessing important content. Content diversification refers to various duties, such as supplying diverse materials concerning language skills, such as brochures, multimedia, audiotaped DVDs, and other genres, and giving students options. However, when the ministry of education has specified the textbook curriculum, changing the content is difficult; instead, changing the technique is critical. According to Tomlinson (2001), though learners learn in various learning styles, the basic skills and content they comprehend stay constant.

Process

The process is another domain of differentiation in which a teacher uses different teaching methods and various learning experiences to accommodate the learners' diverse learning needs. As discussed in Tomlinson (1999), all students have the cognitive ability, learning style, and learning pace. Therefore, teachers often select appropriate teaching methods, proper tasks, and essential learning experiences by considering such individual uniqueness. While choosing the right instructional strategies, personal needs, learners' unique learning styles, modalities, and intelligence are considered. Expectations are defined by criteria and accessed through designed strategies and negotiations tailored for the student. Generally, teachers differentiate the process by adding complex or abstract tasks, ensuring their engagement in critical and creative thinking, and offering various learning methods suited to the student's needs, aspirations, and abilities. Tomlinson (1999) identified the process as teaching style, group tasks, and group discussion. In the process, students can take different roads to the same destination. Tomlinson, Brimijoin, and Narvaez (2008) discussed the features of differentiated Instruction that includes understanding students' learning styles, interests, cognitive capacities, and then instructing them in groups or pairs, or as a whole class. How students show, their understanding is the key principle of DI. Tomilson and Imbeau (2010) used the term "sense-making activities" to enhance learning; such activities can be tiered tasks, project work, group work, individual work, and whole-class work according to the level of students. As Tomlinson and Allan (2000) suggested, such activities call for students to use critical thinking skills to understand essential ideas and are focused on learning goals. However, involving students in the same work on a regular pattern may not prove long-term beneficial.

Product

The third component of differentiated Instruction is differentiation in the product. Tomlinson (1999) defined the product as final assessments that give learners a different way for self-expression, activities and tasks with varying levels, and custom-designed evaluation method. Product refers to the result of the whole teaching and a learning process, which mainly depends on the program's input and process. A product may be tangible, like a report, brochure, or model; it may be verbal, dialogue, speech, or debate; or it may involve action, like a dance. In the educational process, product refers to the knowledge, behaviors, values, and skills known from curriculum and Instruction. Different types of products may have occurred from the same educational process. Some students learn the syllabus's language, but some students do not learn the delivered content as per expectation. After participation in an educational program, students learn so many things such as how to be prepared on curricular content, how to ask questions to the teachers, how to answer the asked questions in the examination, how to write the answer on the answer-sheet, how to behave with others, how to communicate with others, how to get help from other, and so on. However, all learners attending the same class and studying the same curricula cannot learn the same content to a similar extent. Such differences are especially visible in an inclusive classroom were diverse learners' study together. It means; children with a fast pace learn content, behaviors, values, and skills compared to the children with a slow learning pace within a particular time bound. The product comprises the way students show what they learn and what they can do with that learning. In other words, demonstrating what students learn and what they can do after understanding can be called a product.

Socio-Cultural Theory

According to Vygotsky (1978), a teacher's job is to identify students' current level of achievement and provide them with treatment to help them learn more effectively. The doctrines of Vygotsky constitute one of the main elements in assembling the theoretical framework of this research. Vygotsky (1978) identified an important concept of the Socio-Cultural theory of human education, emphasizing knowledge as a social process. The primary theme of the socio-cultural theoretical framework is that learners create meaning and understanding. Vygotsky (1978) discovered that social and cognitive development is an inseparable aspect of human development, and learners can absorb new concepts through the ears and interact with the peers or The Knowledgeable Other (TKO). These interactions help students understand a new concept or skill by involving them in group, pair, individual, and collaborative work (Mooney, 2000). In a similar vein, Brown et al., (2015) stated that as students demonstrate progress in their learning, they continue gaining communicative competence in the target language.

Policy

It is stated by the British Council (2019) that we live in challenging times with diverse societies, where their commitment to equality, diversity, and inclusion (EDI) is put to the test in a day-to-day setting. The inclusion of EDI in education is the aspect that receives the most attention. Around the world, there is a common commitment to achieving the Sustainable Development Goals, as set out by the United Nations General Assembly by 2030. In order to "ensure inclusive and equitable quality education for all and promote life learning opportunities for all," Goal 4 is highly committed to reaching out to the unreached children and being the voice for the voiceless, while also ensuring justice for children with disabilities and children from marginalized communities. Inclusion of students from a variety of backgrounds can help to create a welcoming environment for all, regardless of their age, gender, ethnicity, socio-economic background, cognitive ability, health or language needs (Douglas, 2019). It is about demonstrating the skills and awareness as an educator of how to identify and respond to the students' diverse learning differences and styles in an EFL classroom (Thiederman, 2003).

The Government of Nepal (2017) has officially declared that Nepal is a diverse country in many ways. Schools in Nepal are full of students from different social, cultural, economic and linguistic backgrounds. Hence, teaching is very challenging in such a diversified classroom and with all the political instability and policy changes that have occurred, new complications and challenges are unavoidably emerging. Teachers should always be mindful of the fact that learners from all cultures should be afforded the same opportunities as others. The School Sector Development Plan, SSDP, envisions Nepal achieving the goals of Education for All (EFA) and the Millennium Development Goals by 2016-2022.

Problem Statement

While differentiation is widely acknowledged as a compelling and effective way to restructure the traditional classroom to include students with a wide range of abilities, needs, interests, and learning profiles, the philosophy lacks empirical evidence, notably in Nepal (Joshi, 2018; Bidari, 2021).

Purpose of the study

To explore English language teachers' perceptions and classroom practices
Analyze the impacts on DI implementation. The purpose is also to gain understanding of existing, appropriate differentiation techniques and to learn how teachers can improve their own practice by meeting children where they are, rather than where the textbook says they should be.

Research Questions

1.   What are the different perceptions of teachers regarding instructional differentiation in Nepalese EFL classroom?
2.   How do teachers practice differentiated Instruction in Nepalese secondary English classrooms?

Research Methodology

This research explores EFL teachers' perception, practice and understanding about differentiated instructional strategies. This research also intended to examine the possible factors that supported or challenged the teachers to promote an inclusive environment in their classroom to accommodate students with learning differences.

This qualitative study adopted the phenomenological approach because it holds the notion that participants' perspectives led to multiple realities (Ary et al., 2010, p. 50)

Research Participants

Based on diversity, fifteen English teachers were selected who represented different cultural ethnic groups, language, and geographical region of the country. Systematic random selection: All the teachers preparing students for their tenth-grade national level board exam SEE (Secondary Education Examination) under the Ministry of Education. The reason behind the systematic random selection is to create a wide structure for a specific phenomenon based on the schoolteachers with different features (Yildirim et al., 2005).

Research Site

Fifteen B graded private schools in Nepal were selected for this research. B-Grade school symbolizes the schools for lower socio-economic community who strive to send their children to private schools for the better education. The reason behind the selection of B-grade schools is to create a wider view for a specific phenomenon (Yildirim, 2005).

Instruments

In order to provide comprehensive data from the participants of the study, three instruments were employed to provide details and complete data collection from various participants. The first tool was online survey questionnaire, this questionnaire intended to filter the participant's and only interview those participants who showed interest to talk about DI and share their ideas. The second instrument in-depth interview, where teachers were approached and reapproached to collect better data. The third instrument used to triangulate the data was classroom observation. All the selected instruments have their specific purpose that were

intertwined to extract wider possibilities to understand the interpretation of the repeated patterns and themes. Online questionnaires and semi-structured In-depth interviews were the primary data sources completed from August to October 2020. Because the participants were teaching English in English medium instruction condition, the Questionnaire was delivered in English.

Data Collection

All those participants expressing their desire to participate voluntarily were noted via survey questionnaire section. The participants were then asked to set an interview schedule with the researcher. The interview questions were framed as one of the valid tools to explore the theme and understanding of the phenomenal pattern of differentiated Instruction. The data from the interview were collected through virtual/online interviews using the zoom to make it convenient for the participant due to COVID-19, some participants preferred to send answers in a written form as the bandwidth service was not strong for video or even a call, it was not effective and also very costly. The researcher was also searching for participants who had been practicing the concept of differentiated Instruction to some extent. Semi-structured interviews provided better room for participants to open up express their perceptions and materialize their actions and feelings. Interviews are more flexible, which allows the participants to add on new possible issues that researchers may not have perceived yet during their study. The classroom observation was conducted online due to the COVID-19 global pandemic-2 zoom online sessions from one of the schools and three messenger group classrooms from other schools were observed in detail.

Data Analysis

Data analysis is a crucial step in research. First of all, the analyzing process started by digitally transcribing interviews. The researcher then organized the data, and coded teachers name as T1, etc. After organizing, the researcher located redundant data and dismissed them as unnecessary to reach the core meaning out of the remaining data. The process relied on content analysis by repeatedly reading through all of the data in order to generate a general relevant theme or sense of information, according to the common characteristics (Cohen et al., 2007). The content analysis in this research was developed through the deductive approach. The use of the deductive approach was used to harmonize with the concept of the study and its relevancy to research objectives (Saldana, 2013). In this research, the theme building process was followed by four phases of the thematic analysis process as described in Braun et al., (2006). In the first phase, the researcher became familiarized themselves with the data by reading it several times. While reading, everything relevant and important was being noted down and also, whatever ideas or thoughts that emerge after reading was noted down. In the second phase, data were carefully coded by identifying meaningful chunks. All that looked relevant was coded.In the third phase, several categories were created and then merged together with open codes. In the fourth or the final phase, categories were merged into the construction of themes to induce what the theme meant to the participants. To elicit the intended hands- on data, researcher had established a good rapport with the selected teachers' participants.

Result

RQ 1. What are the different perceptions of teachers regarding instructional differentiation in Nepalese EFL classroom?

Several themes emerged from the data collected from survey questionnaire and the in-depthinterview, the most common issue raised in response to the first question about teachers' perceptions of DI was surprising. Twelve teachers reported they were aware of differentiated Instruction, one replied partially, and the other three said they were not aware of it. From the teachers' interview, the answer was interesting regarding the Nepalese EFL teachers' perception on DI, the recurring confusion was apparent amongst the Nepalese EFL teachers of the term differentiated Instruction. The teachers who have had completed their university graduation with education background were aware about the term, but all had their own interpretation about DI. For instance, when requested to describe differentiated Instruction to the best of their knowledge, they quickly began to clarify the question. Some teachers felt it was more used in special needs education only, while others explained it was used only for the classroom with disadvantageous learners. The differentiation variables of choice and interest were used interchangeably throughout the lessons observed and interview responses.

RQ.2. How do teachers practice differentiated Instruction in Nepalese secondary English classrooms?

This question was answered using questionnaire survey and interviews with teachers. Everyone had a chance to speak during the interview, including the fifteen teachers. Due to COVID, some respondents chose to recall physical classrooms while ignoring online classrooms. They preferred to talk about their recent online sessions and differentiated instruction experiences. To bring in new ideas from the internet and attending various webinar series, T7 and T13 were excited to use ICT in their EFL classrooms. Adding games, a digital white board, grading via excel, and more were suggested. T9 complained that educational technology squandered class time. He claimed it was impossible to differentiate Instruction while students were using the same software at the same time. 12 more teachers shared their teaching memories. They mentioned teaching content, assignments, and assessments.

However, not every teacher participant said they do differentiated Instruction every day. T1 replied that he divides students into groups, trying to understand their multiple intelligences, learning pace, motivation, and rapport. Timing, rapport, needs, and motivation are all important to T2, but time constraints prevent him from addressing them all. Learner's learning style by knowing their background, family, culture, and customs, T3 responded. A group of students with similar learning styles aided T4. He also divides students by proficiency and interests, according to T5. Also, T6 mentioned responding to students' learning styles by talking to them and knowing their learning needs. In addition to their family and cultural background, previous learning strategies, and goals and objectives are checked. These assessments helped him respond to students with various learning styles. T7 said he made groups with similar norms and learning interests. T8 said she tried to approach students as they expected them. As a researcher, T9 expressed his desire to see his students use collaborative and cooperative learning strategies. T13 suggested introducing the subject and grouping students based on learning styles to make learning enjoyable. T14 said the students' results couldn't be equal because they had different learning strengths. They didn't use any special planning or techniques. It was T14 who said he was aware of the differences but chose to ignore them. Their strategy choices were also influenced by the content's task and demand. It varies from lecture-style to project-based learning. T4 said his strategy was based on task-based learning, content-based learning, and project-based learning, as well as the lesson's nature. T5 said he used the lesson to choose his strategy. Grammar exemplification, literature comprehension. It depends on the situation and how students learn,

said T6. T7 chose their strategy based on the chapter's content and the students' needs and interests. Instead, they checked students' facial expressions and performance during classwork and homework assignments, then let them write as much as they needed, according to their learning paces and requirements. Selective teaching was mentioned by teachers. Theoretically, T3 and T8 agree that while selective teaching may help students meet assessment criteria, it cannot improve real-world outcomes. For each month, T11 reported that they had to report on their classmates' issues. The teacher could then adjust their lesson based on the reports from each of the leaders. T12 reported analyzing needs by reading their faces. T12 smiled and said he sometimes felt more like a psychiatrist than their English professor. Lack of time and student numbers were the main issues reported by T14. Time, class size, and syllabus all contributed to T15's inability to analyze their students' needs.

However, in the classroom using Messenger, there were too few participants for any grouping to be observed. As a result of COVID-19, the teacher claimed they could no longer use cooperative learning strategies. Less than the traditional Teacher Fronted Approach, it appears that teachers are already using the Student Talk Approach (STA) to address students' needs and interests (TFA). In addition, teachers paid close attention to students' needs and learning styles by observing their facial expressions and behavior in class and homework assignments. Some teachers mentioned selective teaching. Third, while selective teaching can help students meet assessment criteria, it does not guarantee better results in real-life situations.

Findings

The fifteen teachers selected for the interview for this study had a unique perspective on DI. To protect participants' privacy, they were referred to as T1, T2, T3, etc. The participants responded to interview questions about their perspectives and classroom practices with differentiated Instruction. The data analysis revealed common themes in the participants' statements. The primary two themes, cooperative language learning and good teacher-student rapport, were classified as supporting DI. Developing language learning skills and differentiated Instruction in a classroom are perceived by teachers as important factors in overall teaching and learning performance. Five other significant themes or issues were discovered as impediments to DI's process. As revealed in the interviews, the COVID-19 era is hindered by large class sizes, a lack of in-service professional development programs, and technological challenges in remote teaching.

Factors Supporting DI

11 out of 13 teachers believed DI helped them cater to their students' needs and interests. As T1 stated, *"I try to group students based on their learning pace, intelligence, and interests. From there, I try to ensure that the stronger ones help the weaker ones and that the students are free to approach me at any time if they have not understood my lesson or if I am too fast or too slow"*.

Following Vygotsky's (1978) socio-cultural learning theory, students should learn from The Knowledgeable Other (TKO). The lines also confirm Cooperative Learning's worldwide and cross-curricular success (Johnson et al., 2009).

"To make learning fun, I divide the students into groups of similar learning styles.

According to Wertsch (1985), the emphasis on human interaction is restructured to create a cooperative learning environment where learners are engaged in group, pair, and individual task-based learning activities. Examples of project work include group, peer, and individual. This study emphasizes grouping and pairing students."

Likewise, T14 mentioned*, "I encourage equal participation from all students."*

In this setting, Vygotsky (1978) advised teachers to form collaborative learning communities. Ahmed (2017) discusses how to best apply Vygotskyan's theory through group work. In this type of group work, students can work individually or in pairs. All participants used these techniques to differentiate when teaching language skills.

Students today have a wide range of academic abilities, learning styles, and intelligences. Teachers face a huge challenge teaching in such a diverse environment. Motivation must be used to assess their level of interest. Teachers are expected to reach all learners, slow to fast, in order to successfully complete teaching and learning activities.

T12 also had unique motivational experiences*. "I think giving good grades and marks serves as a tool to motivate my students. Some of my students could write well while others couldn't. Those who were good wrote well and got good grades. My students' grades improved dramatically when they produced strange sentence structures with lots of other errors. So, I gave them high marks even though their writing skills differed. When slow learners saw good grades, they became more motivated to learn. Their faces were beaming."*

According to T12, slow and fast learners are intrinsically motivated, contrary to Lei (2010). While T14 had a unique approach to motivating students. He said he always gave students personal attention. Slow or fast learners, they need personal attention to feel cared for and supported. They felt safe in learning because the teacher is the center for them.

T14's statement opposes traditional teaching methods that focused less on individual learners. T14, however, focused on individual students, implying that individual attention is required for balanced differentiated Instruction. And, as Tillemaand (2002) puts it, such practice is the model of desirable pedagogical behavior. Most of the teachers reported their understanding about inclusive education was to integrate factors such as gender, ethnicity, academic ability as well as personality. Teachers reported that students were busy forming their own groups even before teacher took their time to study about the needs of their learners. T1 replied that he tried to create a conducive environment by creating a fun-filled environment by being funny using jokes, creating drama or role-plays, making stories, and explaining slowly and giving group work.

Factors Supporting Differentiated Instruction

Rapport between Teacher and Students

Rapport building were classified as supporting factors in this study on DI for the learners' benefits. The teachers' belief about students' ability to achieve created the positive impact as stated in Bidari (2021). In the same line perception regarding developing language learning skills and the effectiveness of differentiated Instruction in a classroom and their reasons for having played roles in overall teaching and learning performance. Similarly, five other significant themes or issues were discovered, classified as factors hindering DI's process.

Factors Hindering the Implementation of Differentiated Instruction (DI)

Differentiated Instruction assumes that all students, regardless of their differences, should be addressed. However, DI was found to be impractical. Many studies, both qualitative and quantitative, show that teachers' knowledge of DI (Chien, 2015; Lunsford, 2017; Mariyam Shareefa, 2019) and teaching and learning methodology is lacking (Suprayogi; 2017, Merawi; 2018). This study found several barriers to implementing DI in the classroom.

Time Constraints

Teachers find it difficult or impossible to implement DI because lesson planning and preparation takes time. T6: Enforcing DI and finishing the annual plan at the same time is impossible. Most of the time, high achievers get bored or low achievers can't keep up. According to Tomlinson (1999), not all Instruction is differentiated, and it is impossible to teach each student a unique lesson. Instead, it focuses on content that is relevant to each learner's pace and needs. In this context, T12 stated that there is no set method to follow because it depends on the lesson and the students' interest and desire to learn. Moreover, one method or technique does not address all needs.

Large Class Size

The class size determines the success or failure of teaching. It's difficult for teachers to address a large class. T1 responded, "My class has 40-50 students, so it's difficult to address different types of students in the time allotted." Similarly, 11 out of 15 respondents agreed to the same. The responses suggest that secondary EFL teachers in Kathmandu Valley have been unable to implement DI due to class size. T12 added, "I enjoy teaching students with diverse interests and needs." I strive to reach every student. T14 also claimed that time is a barrier in the teaching process, as well as the number of students in my classroom; their arguments are in line with the small class size, which is genuinely conducive to teach as expected. From the above examples, large classes hinder DI implementation. As a result, students should be divided into small groups of no more than 30. The size of the class determines the success and failure of teaching. When it comes to a large class, it is very challenging for the teachers to address all the students.

Technological Challenges in Remote Teaching During Covid-19

From teacher T7's response, it seems evident that there has been a digital divide between and among students and the teachers. It is very challenging for the teachers to teach the students to resolve their technical difficulties. Also, teachers themselves have technological challenges as they are not digitally supported either by the government or school administration.

Insufficient Preservice Training on Differentiated Instruction

The teachers are the actual practitioners of differentiated Instruction in the classroom. Nepalese English teachers are not practicing much DI in their classrooms. (Khanal, Nadif & Bidari, 2021) reported the similar instance as the demotivating factor of teachers' motivation in teaching; in this study, a similar case was prevalent; implementing it in the real classroom setting seemed to be an obstacle.

Digital Divide

The research examined that there has been a digital divide between and among students and the teachers due to which it is very challenging for the teachers to teach the students resolving their technical difficulties and teachers themselves do have technological challenges as they are not digitally supported neither by the government nor by the school administration as mentioned in (Bidari, 2021) Moreover, it was found that most Nepalese English teachers were utterly unknown about differentiated Instruction.

Conclusion

The results indicated that the perceptions and the practice of differentiated Instruction did now match in Nepal. The complexities of DI implementation in Nepal have received scant research. Particularly in Nepal, nothing has been said about EFL teachers' views on DI. To find out how Nepalese EFL teachers perceive DI and what elements help or impede its adoption in their classrooms. This study focused on the beneficial pedagogical effects of adopting DI. The study used a qualitative case study research design. This survey included 15 EFL secondary teachers from Kathmandu Valley private schools. The teacher participants were picked at random. The data were collected via survey surveys, teacher interviews, book analysis, and classroom observation. Because of class size, syllabus, time, lack of teacher professional development, and digital incompetence, this study indicated differentiated Instruction was not even close to being implemented.

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Contact email: samikshya_phele21@kusoed.edu.np