

The IAFOR Conference for  
Higher Education Research – Hong Kong

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# CHER

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***Preparing Globally Work Ready Allied Health Care Graduates: Technology as a Useful Teaching Tool for Allied Health Educators***

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**Abstract**

Global education requires collaborative, standardized and flexible teaching pedagogies which are fit for purpose to each local community and diverse range of changing student population across institutions. Educational initiatives and use of technology are essential to train self-directed lifelong learners with transferrable skills preparing graduates for technical, professional, entrepreneurial and multinational leadership roles in future. The emerging economies are based on knowledge as a key factor of production, and industries demand highly trained employees in the fast changing health industry. To address diverse needs of students, mixed mode innovative strategies need to be used to train globally work ready allied health care graduates with modern day employability attributes including good soft and human skills by incorporating flexible learning tools and technology. Our teaching strategies, resulting in very high employment rate before graduation with global employers and low attrition rate, include work integrated learning, problem based learning, inter professional learning, team work with group discussions leading to peer review, reflective practice, self-directed learning and various means of formative and summative assessment items. This is incorporated within horizontal and vertical scaffolding of teaching material across courses and subjects to prepare interdisciplinary graduates for very liquid workplace of the world today. This article will introduce some of the above mentioned strategies employed and successfully achieved by our degree programs across allied health. However, our challenges remain in evaluation of effectiveness and incorporation of entrepreneurship for increasing healthcare students aspiring to be self-employed innovators in the international healthcare industry.

Keywords: Higher education, globalization, innovative mixed mode curriculum, work ready graduates, allied health care students, learning and teaching strategies, teaching pedagogy, graduate employability skills, work integrated learning, problem based learning, multidisciplinary inter professional learning

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## **Introduction**

It is important for academics and teaching team in higher education to understand their students' background and diversity in order to provide them with tools and support that will allow them to positively engage with learning that matches their individual needs and to reach the best possible outcome of becoming high achieving graduates. The students and graduates need to be equipped with skills that make them lifelong learners without focusing mainly on the exams and grades. Understanding the students' needs and capacity as well as appreciating their diverse backgrounds, teachers can accommodate the diversity of students and provide an avenue for better ways of belonging in their institution (Thomas, 2012). This has been shown that student's success at university may be reliant on their feeling of belonging at the university. Often institutions expect students to adapt to their teaching environment however it improves student learning and is becoming a common theme in higher education sector to provide students flexibility and teaching team work together with student body in collaborative manner in the teaching and learning pedagogy.

Purpose built different types of summative and formative assessments must be included to promote deeper understanding of concepts as part of various approaches to learning (Postareff *et al.*, 2007).

Considering the diversity and needs of students, standardization of disciplinary higher education globally and preparing work ready graduates for emerging economic global market is the aim of higher education institutions, this article will introduce some of the strategies employed and successfully achieved by our degree programs across allied health.

Training future allied healthcare workforce is a collaborative responsibility of both the higher education institutions and the health care industry. Universities role is to develop an innovative, student centered learning and teaching culture by establishing the strategies recognizing the ways how technology can improve students experience both inside and outside the classrooms. It is vital for institutions to better engage with industry (end product user) to ensure they get the workforce which requires minimal on job training and besides having academic up-to-date knowledge and technical skills, our graduates also have soft human skills to succeed in the future world of workforce. It is imperative that higher education prepares graduates for the global automated industry of future (Talley, 2017) by maintaining open communication and involvement with industry, policy makers and decision makers as well as regularly including technology in teaching.

## **Technology in Teaching**

With fast changing health care system there has also been a steady rise in the use of technology for learning and teaching over last three decades as an approach to educating allied health students. Multiple newer platforms and software have made the delivery of learning resources more cost effective and productive.

Today university students come from a diverse range of backgrounds with varying capacity for learning. They all need to be supported to succeed equitably and to maintain a high retention rate (Thomas, 2002).

Minicomputer and personal digital assistants (PDA) have been commonly used in health care setting for few years now however only recently have they been incorporated in tertiary teaching institutes particularly in allied health care teaching class. The PDA's provide a fast reference to material useful in educational or clinical situations (Long *et al.*, 2016). They have also been used as tools for clinical education by helping calculate clinical prediction rules or providing information related to adverse effects of drugs (Day-Black & Merrill, 2015). However with widespread use of smartphones and ever increasing applications being developed for these devices (Chen, Lieffers, Bauman, Hanning, & Allman-Farinelli, 2017), many of the PDAs for the delivery of educational and clinical applications have become outdated. The mobile computing through smart phones has opened another avenue of teaching accessibility regardless of where students and teachers are located around the world or what device they are using. This has been achieved through the creation of browser-based software that is device-independent.

There are multiple types of mobile devices that students can use to access the internet. Mobile computing, and the use of the network-capable devices, such as RPi, is being established and used by students on many high school campuses. As it is a relatively new technology being introduced in university teaching some challenges still remain, specifically with notions of privacy, control of access, cheating on assessment items and copying of information. However, the ever expanding array of applications and software, the use of technology for educational purposes is only limited by our inventiveness.

### **Work Integrated Learning (WIL)**

Industry experience in form of clinical placements has been core part of learning in allied health tertiary education. However, limited time exposure and financial burden on the tertiary teaching institutions sometimes limits full benefit that can be attained by industry placement. One of the means of engaging students in their own learning is to take the class room to the students (Montreux, *et al.*, 2015) to enhance flexible learning using work integrated learning and technology. One of the applications of the use of technology in diagnostic health care is reviewing blood and tissue stained films to understand and report on the morphology of the cells and tissue in making clinical diagnostic decision. It is very time intensive skill that requires more hours of practice than is usually possible in the classroom microscopy. Our students use a free downloadable program called Aperio, which makes microscopic images of all blood cells and body tissue sections reviewed under microscope in classroom available to be examined on a home laptop or even a smartphone at any time. We also supplement the samples with annotation information as a means aiding continuing learning.

Since the implementation of this highly popular program, student grades and satisfaction have improved significantly. We use WIL to integrate the acquisition of disciplinary heavy content and skills with their application in workplaces. I motivate my students by relating the theoretical knowledge from interactive lectures with corresponding laboratory exercises within the same week, simulating actual activities that they will undertake in their daily work life.

We also use virtual reality (VR), an interactive 3 dimensional (3D) computer-generated teaching tool that uses computer graphics merging several display and

interface devices to provide the effect of student engagement (Pan, Cheok, Yang, Zhu, & Shi, 2006). Virtual reality includes real world elements into a simulated environment. The 3D environment has been used to animate motion data for biomechanics teaching (Dixon, Loh, Michaud-Paquette, & Pearsall, 2017). This technology allows students' access to real world laboratories and activities not normally accessible due to safety issues or financial feasibility in a teaching class.

### **Problem Based Learning (PBL)**

The evolving global health industry requires a multi-skilled workforce capable of applying and translating their knowledge and competencies such as communication skills, leadership, and empathy as well as team work (Beck & Laudicina, 1999) in multiple contexts and working across multiple disciplines. A PBL approach has been shown to lead to the development of self-directed learning skills and enhance student-centered learning outcomes beyond knowledge acquisition (Setia, 2010).

In this approach, we provide real scenarios from local hospital laboratories and from our professional experiences, to stimulate the problem solving and troubleshooting, and to support students to solve problems commonly encountered, but that are not typically found within the textbook. We engage students in these patient case studies and PBL activities over several weeks in the laboratory, linking various topics. These are simulation of real life cases where students apply knowledge across the semesters and within a semester across the weeks and across the disciplines within the same semester. Students need to apply the cross disciplinary knowledge to reach the final diagnosis. We link the interactive lectures with the corresponding PBL exercises within the same week.

### **Interprofessional Learning (IPL)**

Allied healthcare professionals are an integral part of multidisciplinary healthcare teams requiring highly skilled and competent members from every health discipline. Health Professionals work in teams to manage patients, for this collaboration, facilities are required for meeting either face to face or using technology. In the university students are provided IPL experience in form of an opportunity to work with and from other medical or allied health fields to discuss cases and solutions to medical problems as a result developing the communication skills essential for their employability.

Video-conferencing has been in use since the 1980s. However, development of web conferencing experiences for learning is gaining popularity as online forums for collaborations. Our university similar to many others uses the browser-based web conferencing package Blackboard Collaborate that allows simultaneous collaboration no matter where the students or staff is located. Social media also covers a wide range of platforms under university control being used in higher education sector, including blogs, wikis, YouTube videos, Twitter, Skype and closed Facebook pages (Orr, Baram-Tsabari, & Landsman, 2016; Zitzelsberger, Campbell, Service, & Sanchez, 2015). These applications have made IPL easily accessible across borders permitting the exchange of user-generated content to share, distribute and discuss the knowledge gained in virtual communities and networks.

## **E-portfolios and Reflective Practice**

Industrial automation has had a global impact on clinical laboratories and biopharmaceutical Science. Total laboratory automation (TLA) and innovative information software has changed the working environment for scientists as well as the way students are being trained and educated (Sédille-Mostafaie, Engler, Lutz, & Korte, 2013). The Radloff and Coates (2009) Student Engagement Questionnaire (SEQ) highlighted five new items to measure the areas, in which students were considered as career ready, one of these items included whether students have an up-to-date resume (Radloff & Coates, 2009). The electronic based portfolio is a recording of various skills and techniques that a student has accumulated not only during his time in the university but also after graduation. E-portfolio has developed as an effective alternative that may soon replace the traditional paper based resume.

E-portfolios controlled by students for sharing certain folders with the academic supervisors and the industry supervisors. This will allow us to see in real time the progress of the students and we can provide them with real time feedback and guidance instead of waiting till the end and giving them final grades only. This will also be a platform for 3 way communication across the university, industry and students to monitor student progress with ongoing support during the program. These portfolios can be carried by student across all years of their study and they can use them to compile all their work in various courses in different disciplines completed during their university studies. Instead of carrying multiple folders with them to the clinical placement and job interviews, they can have all the material in one e-portfolio for future reference as well as an evidence of their competencies endorsed by academics and industry supervisors when they are ready to apply for jobs in workforce. With e-portfolio, students have the access that they control and can share files/folders with their academic supervisors as well as industry supervisors when on clinical placement.

This allows students to have all their study material across the courses in one single portfolio and allows the supervisors to monitor their progress in real time to provide timely comments and feedback particularly in various courses where they have to keep weekly reflective journal as part of their main assessment of the courses. Any work done by students in the classroom or reflections involving critical learning and peer reviewing can be saved on their e-portfolio directly or through their USB. It is very useful to have a user friendly system where students can save their reports and tissue/blood slides features to take with them to clinical placement and job interviews upon graduation, with their supervisors comments/feedback and endorsement of having met competencies.

Reese and Levy (2009) regard the implementation of e-portfolios to be advantageous in documenting real world learning experiences where each student is accountable for their own education. We get the students to use Pebble Pad to record their assessments and self-reflections in their individualized e-portfolios. Pebble pad is a personalized learning and assessment system used in many tertiary institutional courses to enhance student-learning experiences providing a lifelong holistic learning experience. Application of Pebble Pad allows the student to present a timeline showcasing self-reflections, accumulation of resources and competent training skills, which helps the students to create a resume which can be updated in real-time

throughout their student life. Furthermore, Pebble Pad acts an effective medium to allow individuals from the industry, usually future employers, to be able to access the training modules completed by the student, and in turn positively influence the employability of a student.

Integration of e-learning technologies within the programs associated with Health Science. However, these technologies are still in their early stages of development and require significant contributions from the industry and academic staff for further development.

### **Assessments**

Besides various teaching strategies, different modes of ongoing formative and summative assessments (Harlen, 1997) are also used to help students improve their learning through constant feedback provided both in class and online individually. Our program has a high number of students from some of the groups that Universities generally deem to need greater support including mature age students, those from lower socio-economic backgrounds, first-in-family to go to University, and a range of multicultural non-English speaking background, indigenous and disability groups. To meet the wide range of needs presented by this diverse student population, we ensure that our courses offer a range of assessment techniques to encompass students with varying learning capacity and styles (Thoams R Gusky, 2003). All our course conveners plan assessments in consultation with the whole team and develop templates, as well as marking rubrics, which are scaffolded across courses. Each mid-trimester and final exam include multiple choice questions, short answer, essay questions as well as a case study for patient diagnosis based on the results obtained by the student during a practical exam. Students are also required to interpret more complex test results provided from a case study in a theory exam.

### **Conclusions**

Health care workers and therefore educators are under pressure to increase output with in limited resources. There is a need Need to optimise the effectiveness and efficiency of the way students develop their professional skills within limited resources. Innovations in Technology are opening gates for its use as and where possible. The rise of Health Care Technologies in practice means changing face of education from basic theoretical and competency skills to work ready biotech competent allied health practitioners. Technology tools support communication and decision-making. Information systems connect allied health carers to physicians and sometimes patients directly. There is a big need and move to incorporate technology in classrooms for teaching and learning.

Digital technologies are integral component of the allied health care curricula. Education is undergoing a significant shift, moving away from teacher led classroom to student centred approaches (Ramsden, 2003). Current students have been technically savvy from young age that has influenced their learning styles. They require educational resources that engage them in the learning process (Prensky, 2009), and expect technology integrated into their learning experiences (Berman, Fall, Maloney, & Devine, 2008).

While e-learning tool are attractive, sometimes they can have limited educational benefit when designed with no focus on teaching and learning pedagogy. Pedagogical knowledge combines cognitive, social and developmental theories of learning and how they are applied to students in the classroom (Harris, Mishra, & Koehler, 2009). An understanding as to how students learn and transform information into knowledge is important. Students learn most effectively when they can see, hear and interact with the teaching tools.

The technology adoption should be “grounded in the reality that technology alone cannot cultivate education transformation; better pedagogies and more inclusive education models are vital solutions, while digital tools and platforms are enablers and accelerators.” (Adams Becker et al., 2017, p. 6). One of the major challenges is to keep updated in the curriculum, the fast changing technology in competitive market. In conclusion, it is fair to say educational technology has been around for decades. However, integrating it into curriculum of allied health care education is a recent fragmented attempt by various organizations globally. It seems essential to use educational technology but with care to ensure it is fit for your purpose and has long term adaptability at minimal ongoing cost.

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***Listening Comprehension Difficulties of College Students: Basis  
for Remediation Strategies in the Classroom***

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**Abstract**

This descriptive research determined the listening comprehension difficulties experienced by college students when listening to aurally- presented text/s. Difficulties were categorized based on the factors causing them. The findings were used as basis for the proposed classroom remediation strategies. The main tool used to gather the essential data was survey questionnaire with rating scale. Results revealed that the students *often* experienced difficulties in listening due to physical setting that was noisy and listening aids/materials/equipment that had problems with the volume quality. They *sometimes* had problems with the: 1) listening comprehension process; 2) texts' linguistic features; 3) concentration; 4) psychological characteristics pertaining to their interest, attitude towards the text, and their confidence; 5) listener; 6) speaker/reader; and 7) content of the text. Thus, appropriate strategies were proposed to remediate the difficulties experienced by the students.

Key Words: listening comprehension difficulties, remediation strategies, listening comprehension process, linguistic features, psychological characteristics, physical setting, content, speaker

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## Introduction

Most English language learners claim that listening is the communication skill that is easiest to learn. They may be right for listening is a receptive skill, not a production one. Listening is frequently used as a communication skill in the classroom that can facilitate the emergence of the other skills. Educators, communication and business experts agree that listening is an important skill that requires hard work. Supporting this observation, Adler and Elmhorst (2002) stressed that listening involved far more than sitting passively and absorbing other's words. In his best-selling book, Stephen Covey identifies it as one of the "seven habits of highly effective people." Cited by Adler and Elmhorst (2002), Tom Peters, business consultant and co-author of *In Search of Excellence* and *A Passion for Excellence*, emphasizes that one key to effective leadership is listening. A more recent study focused on listening in business setting and in different work contexts. Personnel at all levels – including top-, middle-, and lower level managers, workers with no managerial responsibilities, and university students – were asked to note the time they spent engaged in various types of communication during a typical week. The results were impressive: Listening 32.7%, Speaking 25.8%, Writing 22.6%, and Reading 18.8%.

Adler and Towne (2001) lamented that despite the importance of understanding others, the quality of listening is generally poor in most organizations. In classroom settings alone, communication between the teachers and the students typically achieve no more than 25 to 50 percent accuracy in interpreting each other's remarks. After 24 – 48 hours, the recall level drops to 25 percent.

In the field of education, Thomlison (1984) remarked that listening comprehension (LC) is considered as indispensable part of literacy development, as it is the bridge between spoken and written language. Factors affecting listening comprehension have to be investigated to determine which ones serve as interference or contributory to effective communication between and among the communicators. If students struggle with listening comprehension they will struggle to learn academically, especially in situations where aurally – presented materials are used for instruction purposes.

Research results revealed that students' problems in listening comprehension were caused by speech rate, vocabulary, and pronunciation. In terms of speaker factor, it was revealed that 'clarity' was the main cause of EFL listening difficulties. As to listener factor, 'lack of interest' 'the demand for full and complete answers to listening comprehension questions' were the two main difficulties encountered by EFL students. Hamouda (2013), on the one hand, attributes the difficulty of listening comprehension to varied sources: students' listening comprehension process, linguistic features, failure to concentrate, learner's psychological characteristics, the listener, the speaker, the physical setting, and the content of the text. In Rubin's study (1994), it was found out that most listening comprehension difficulties experienced by students were due to four major factors: the speaker, the listener, the environment, and the text itself.

The research results examining how certain factors or conditions affect L2 listening comprehension is considered very limited. The literature contains inconsistencies in how factors of interest within these aspects are described. More empirical studies are

needed to explore learners' own perceptions of their listening experience since listening cannot be observed directly and described precisely. Learners' perceptions may offer clues to the sources of comprehension breakdowns. Albeit, much of the research reports reveal weak or inconclusive results, leaving many factors still unresolved.

Driven by the researcher's concern with their students' listening performance in the classroom, this study was conducted. Specifically, it aimed to identify the comprehension difficulties frequently experienced by the college students when listening to aurally-read texts in English, determine the factors that may have caused their difficulties, and propose remediation strategies that may be applied in the classroom to improve students' listening comprehension. It is hoped that this study will raise teachers' awareness of the students' difficulties in listening comprehension, awareness that may be instrumental in helping them conceptualize and apply appropriate treatment measures.

Two hundred eighty (280) students who had taken English 3 and/or were taking English 3 during the time that the research was being conducted participated in the research in the 1<sup>st</sup> semester of the academic year 2015-2016. One hundred forty (140) students came from the BEEd department, similarly, 140 came from the BSEd department: 70 second year and 70 third year students from the BEEd classes, also, 70 second year and 70 third year students from the BSEd classes.

Survey questionnaire was used to get information about the difficulties the students faced in EFL listening while taking English course/subjects at the College of Education, Tarlac State University. The questionnaire was designed after a review of the literature (Underwood, 1989; Rubin, 1994; Dunkel, 1991; Lotfi, 2012; Hamouda 2013) about factors that influence listening comprehension.

The questionnaire consisted of two parts. Part 1 contained 2 questions to collect participants' names as well as course and section. Part 2 included eight (8) factors that influence listening comprehension of the students, namely: A. *Difficulties Related to Students' Listening Comprehension Process* (12 items); B. *Listening Difficulties Related to Linguistic Features* ( 16 items); C. *Difficulties Caused by Failure to Concentrate* ( 6 item); D. *Listening Difficulties Related to Psychological Characteristics* (5 items); E. *Listening Difficulties Related to the Listener* (7 items); F. *Listening Difficulties Related to the Speaker* ( 7 items); G. *Listening Difficulties Related to the Physical Setting* (3 items); H. *Listening Difficulties Related to the Content of the Text* (9 items). A total of 75 descriptions of listening comprehension difficulties were identified and described. The answers were recorded on 4-point Likert Scale (Never, Sometimes, Often, And Always).

## Discussion

### 1. Difficulties Most and Least Frequently Experienced by the College Students When Listening to Aurally-Presented Texts in English.

#### 1.1. Difficulties Related to Students' Listening Comprehension Process

Listening comprehension is an active process in which a person concentrates on selected aspects of aural input, form meaning from a passage read, and associate what he/she hears with existing knowledge. It encompasses the multiple processes involved in understanding and making sense of spoken language.

Table 1 shows the statistical results on the difficulties the students experienced most and least frequently in terms of listening comprehension process.

Difficulties	M	D
1. I find it difficult to make a mental summary of information gained through listening.	2.17	S
2. During listening, I have difficulty checking whether I correctly understand the meaning of the whole chunks of the listening text.	2.10	S
3. While listening, I find it difficult to guess the meaning of unknown words by linking them to known words.	2.03	S
4. I find it difficult to use the context to guess those parts of a listening text that I cannot hear clearly.	1.94	S
5. While listening, I have problems making meaningful personal associations with the new information.	1.89	S
6. When I listen to texts in English, I experience difficulty with listening for the main idea of the text.	1.85	S
7. I find it challenging to focus on the text when I have trouble understanding.	1.81	S
8. Before listening, it is difficult for me to predict from the visuals what I will hear.	1.96	S
9. It is difficult for me to relate what I hear with something from an earlier part of the listening text.	1.77	S
10. I have difficulty finding out what the main purpose of the listening task I am going to do.	1.72	S
11. After listening, I find it difficult to evaluate the overall accuracy of my comprehension.	1.72	S
12. While listening, I have difficulty checking my understanding of the text based on what I already know about the topic	1.60	S
Grand Mean	1.88	S

Table 1. Difficulties related to students' listening comprehension process

It could be seen from Table 1 that the first 5 ranking difficulties that many of the respondents sometimes experienced were: 1) Difficulty in making a mental summary of information they gained through listening (2.17); 2) Difficulty checking whether the correctly understood the meaning of the whole chunks of the listening text (2.17); 3) Difficulty in guessing the meaning of unknown words by linking them to known words (2.03); 4) Difficulty in using the context to guess those parts of a listening text that they could not hear clearly while listening (1.94); and 5) Having problems making meaningful personal associations with the new information (1.89). However,

the grand mean suggests that majority sometimes (1.88) experienced difficulties in listening due to the comprehension process involved.

The above findings concurred with those of Boyle (1984), Chiang and Dunkel (1992) Rubin (1994), and Lynch's (1997) studies. Having such similar findings, the researchers concluded that the students have difficulty interpreting inputs in terms of what they know and what they don't know. Current views of listening comprehension propose that listeners must know how to actively process language input. This implies that the reading teacher needs to assist students enhance their strategies in listening to fully understand what they hear or listen to.

## **1.2. Listening Difficulties Related to Linguistic Features**

Challenges in listening result from the language itself. Lack of English proficiency and their professors' use of English in class make studying of the target language not easy. Research shows that some difficulties in understanding and remembering information from speakers may be due to their inadequacy in the use of English.

Table 2 presents numerical data representing the frequency of listening difficulties the students experienced on linguistic features.

Difficulties	M	D
1. I find it difficult to infer the meaning of an unknown word while listening	2.74	O
2. I use my experience and background knowledge of the topic to understand the spoken text.	2.64	O
3. I find it difficult to understand listening texts in which there are too many unfamiliar words including jargon and idioms.	2.42	S
4. Complex grammatical structures interfered with my listening comprehension.	2.35	S
5. I find it difficult to recognize the signals which indicate that the speaker is moving from one point to another.	2.34	S
6. I find it surprising and difficult to deal with colloquial language and slang.	2.25	S
7. When encountering an unknown word, I stop listening and think about the meaning of the word.	2.25	S
8. I find the listening passage difficult to understand.	2.16	S
9. I feel fatigue and distracted when I listen to a long spoken text.	2.15	S
10. I find it difficult to follow the sequence of the spoken text when the sentences are too long and complex.	2.12	S
11. I find it difficult to interpret the meaning of a long spoken text.	2.11	S
12. I find the pronunciation familiar but cannot recognize the words.	2.10	S
13. Long spoken text interfered with my listening comprehension	2.03	S
14. I do not often pay attention to intonation of the speaker.	1.92	S
15. I find it difficult to understand every single word of incoming speech.	1.88	S
16. I find it difficult to understand listening texts when the topic is unfamiliar.	1.77	S
Grand Mean	2.2	S

Table 2. Listening difficulties related to linguistic features

Table 2 shows that majority of the respondents often found it difficult to infer the meaning of an unknown word while listening (2.74) and they often used their experience and background knowledge of the topic to understand the spoken text (2.64). The rest of the difficulties listed in the table were sometimes experienced by the students as implied by the mean scores they obtained. The overall mean (2.2) reveals that majority of the students sometimes had difficulties in comprehending aurally-presented texts due to linguistic features.

The data gathered agreed with Underwood's findings (1989) who observed that when encountering an unknown word, many students stopped listening and started thinking about the meaning of the word. This practice may interrupt the flow of speech, thus the students may miss some essential information. This tendency of seizing to listen and concentrating on the language word by word to work out on its structure, and then decide on its meaning interferes with comprehension (Underwood, 1989).

### 1.3. Difficulties Caused by the Failure to Concentrate

Another factor which affects listening comprehension is concentration. Failure to concentrate will result in the students missing some of the lecture content, which will eventually affect their understanding of the whole lecture. Hamouda (2013) said that poor concentration may be caused by visual or auditory distractions, physical discomfort, poor volume, lack of interest in the subject matter, stress, or personal bias. Regardless of the cause, when a listener is not paying attention to a speaker's dialogue, effective communication is significantly reduced.

Table 3 presents the statistical data on the frequency of listening difficulties caused by failure to concentrate.

Difficulties	M	D
1. I lose my concentration when I think of another question..	2.65	O
2. I lose my concentration if the reading/recording is of poor quality.	2.62	O
3. I am unable to concentrate because I search for the answers, and I listen to the text/passage at the same time.	2.40	S
4. I lose my concentration when the text is too long.	2.29	S
5. I lose focus of the talk when I got an expected answer in my mind.	2.27	S
6. I lose my concentration when I think about the meaning of new words .	2.19	S
Grand Mean	2.4	S

Table 3. Difficulties caused by failure to concentrate

Table 3 reveals that many students often lose their concentration when thought of another question (2.65), while some lose their concentration if the reading/ recording was of poor quality (2.62). Many were sometimes unable to concentrate because they searched for the answers, and listened for the text/passage at the same time (2.40), lost their concentration when the text was long (2.29), lost their focus when they got an expected answer in their mind (2.27), and lost their concentration when they thought about the meaning of new words they heard (2.19). It is indicated in the table that as a whole, majority of the students sometimes (2.4) consider concentration as a cause to the poor listening performance that they had in the classroom.

The data gathered go with the findings of Gilakjani and Ahmadi (2011) who found that text length was one of the major problems for listeners since they tended to lose focus after concentrating too long on the listening. Their students stated that when the text is lengthy, they have difficulty remaining focused. According to Gilakjani and Ahmadi (2011) if the exercise is too long it would be more suitable to break it up into shorter parts by pausing or a change of the speaker. Listeners can also lose their concentration if the recording is in a poor quality or they are disturbed by outside noises.

### 1.4. Listening Difficulties Related to Psychological Characteristics

The listening comprehension process is a relatively complex psychological process. When a person feels nervous or anxious he or she may not be able to concentrate on the activity that has to be accomplished. When one feels uncomfortable, the ability to understand an aurally- presented text is reduced. Boredom and frustration are other

barriers to listening comprehension. This occurs as a result of lack of interest in the topic, poor motivation, and less stimulating or monotonous lecture presentation by the teacher.

Table 4 shows the statistical results on the frequency of psychological characteristics as contributory to listening difficulties met by the students.

Difficulties	M	D
1. If I don't arrive at a total comprehension of an oral text, I feel disappointed.	2.43	S
2. I feel nervous and worried when I don't understand the spoken text.	2.41	S
3. I find it difficult to understand the spoken text which is not of interest to me.	2.21	S
4. I stop listening when I have problems in understanding a listening text.	2.11	S
5. Before doing listening comprehension tasks, I fear that I cannot understand what I will hear.	1.88	S
Grand Mean	2.21	S

Table 4. Learners' perception of listening difficulties related to psychological characteristics

Table 4 shows that if the students did not arrive at a total comprehension of an oral text, sometimes they felt disappointed (2.43). They sometimes felt nervous and worried when they did not understand the spoken text (2.41), sometimes found it difficult to understand the spoken text which was not of interest to them (2.21); sometimes stopped listening when they had problems in understanding a listening text (2.11); before the listening comprehension tasks, sometimes they feared that could not understand what they would hear (1.88). The overall mean 2.21 means that most of the students sometimes experienced problems in listening due to some psychological concerns.

In the study of Hamouda (2013), he found that a very high percentages of students (41.7%) reached an agreement that they always felt nervous and worried when they did not understand the spoken text. Only 6.6% in his study claimed they never experienced panic when they failed to understand the spoken text. These figures also pointed out that psychological factor creates psychological problems for learners. Such study of Hamouda strengthened the findings of the current study. Harmer's research (2001) is also in concurrence with the above findings. According to him, many students stopped listening when they had problems in understanding a listening text. He also reported that some of his students lose interest in listening and some even gave up. The results seem to imply that it is the teacher's job to arouse the students' interest, help them gain confidence in themselves and make sure that they can achieve success in listening with the limited amount of English.

### 1.5. Listening Difficulties Related to the Listener

It has been observed in many classrooms that a student with a low level of intelligence will have a harder time comprehending and understanding a text that is being read by someone else. On the other hand, a person that has a high level of

intelligence will better understand the message intended by the speaker. There could be other factors that may have caused listening difficulty.

Table 5 shows the findings on the frequency of listening difficulty due to some other factors that concerned the listeners themselves.

Difficulties	M	D
1. At the time of listening, I find it difficult to predict what would come next.	2.16	S
2. I find it difficult to recognize the words I know because of the way they are pronounced.	2.09	S
3. I find it difficult to quickly remember words or phrases I have just read.	2.04	S
4. There are words that I would normally understand in writing, but when I hear them in a stream of speech, I find it difficult to tell where one word finishes and another begins.	2.04	S
6. I find it difficult to listen to English without transcripts.	2.03	S
7. I find it difficult to get a general understanding of the spoken text from the first listening.	1.91	S
8. I find it difficult to answer questions which require other than a short answer (e.g., why or how questions).	1.90	S
Grand Mean	2.03	S

Table 5. Listening difficulties related to the listener

Table 5 shows that majority of the students sometimes experienced the following difficulties/problems in listening: 1) Difficulty in predicting what would come next at the time of listening (2.16); 2) recognizing the words they knew because of the way they were pronounced (2.09); 3) quickly remembering words or phrases they had just read (2.04); 4) telling where one word finished and another began when hearing them in a stream of speech (2.04); and listening to English without transcripts (2.03). In general, majority of the students sometimes (2.03) experienced listening difficulties because of personal matters.

The result implies that most students find it difficult to recognize the words they already knew because of the way they are pronounced. The problem may have been due to lack of flexibility in their listening skill. They could not recognize almost similar sounding words or are unable to understand words in context. This result is also consistent with Ur's declaration (1984), which states that if a word is pronounced differently from the way it was said when it was learnt, the listener may not recognize it as the same word, or may even miss its existence completely. Listener anxiety can have a profound effect too on comprehension abilities. When listeners are so much concerned with the complexity of the passage their ability to concentrate falters, and comprehension declines.

## 1.6. Listening Difficulties Related to the Speaker

Many experts claimed that genres of accented speech would result in a significant reduction in comprehension. Fan (1993) pointed out that usually ESL/EFL listeners are used to “their teacher’s accent or to the standard variety of British or American English”. In this case teachers have to familiarize the students with both British and American accents. This is true and even necessary if the teacher would use a recorded speech, discourse, or passage which the students would listen to.

Table 6 reveals the findings on the frequency of difficulty experienced by the students due to the speaker/reader her-/himself.

Difficulties	M	D
1. I find it difficult to understand well when the speaker speaks too fast.	2.81	O
2. I find it difficult to understand the listening text when the speaker does not pause long enough.	2.21	S
3. I find it difficult to understand the meaning of the spoken text without seeing the speaker’s body language.	2.16	S
4. I find it difficult to understand the meaning of words which are not pronounced clearly.	2.12	S
5. I find it difficult to understand well when the speaker speaks with a variety of accents.	1.93	S
6. I find it difficult to understand the natural speech which is full of hesitation and pauses.	1.88	S
7. I find it difficult to understand the recorded material if I am unable to get things repeated.	1.55	S
Grand Mean	2.1	S

Table 6. Listening difficulties related to the speaker

It could be seen from Table 6 that the students often (2.81) experienced difficulty in understanding well when the speaker speaks too fast. The following four descriptions of difficulties were sometimes experienced: 1) Understanding the listening text when the speaker does not pause long enough (2.21); 2) Understanding the meaning of the spoken text without seeing the speaker’s body language (2.16); 3) Understanding the meaning of words which were not pronounced clearly (2.12); and 4) Understanding well when the speaker speaks with a variety of accents (2.81).

The above findings suggest that hesitations and pauses in spontaneous speech cause perceptual problems and comprehension errors for non-native speakers. When people speak, they often hesitate, repeat themselves, say things that are ungrammatical and change their minds halfway through a sentence. These things are a natural feature of speech and may be either a help or a hindrance, depending on the students’ level. So, the teacher’s tasks when teaching listening will be to train students to understand what is being said.

### 1.7. Listening Difficulties Related to Physical Setting

Sometimes inconvenience in the classroom affects students listening comprehension. In the large classrooms, students who are sitting at the back rows may not hear well the recording unlike the students who sit in front. Students who prefer to stay next to the windows are effected by the noise that come from outside. Such observations suggest that teachers have to take into account all this conditions and try to reduce all these distractions in the listening environment. The size of the classroom also makes difficult for teacher to manage the all class in group activity or to get feedback from students. The temperature of class can be counted as a factor that makes listening comprehension difficult.

Table 7 shows the results on the frequency of difficulties experienced by the students due to the physical setting or environment.

Difficulties	M	D
1. It is difficult for me to concentrate with noises around.	3.08	O
2. Unclear sounds resulting from the poor quality of the CD player of the recorded speech/text interfere with my listening comprehension.	2.85	O
3. Unclear sounds resulting from poor equipment interfere with my listening comprehension	2.54	O
Grand Mean	2.82	O

Table 7. Listening difficulties related to the physical setting

The data in Table 7 shows that students often experienced difficulty in concentrating due to the noises around (3.08). Unclear sounds resulting from the poor quality of the equipment, e.g., CD player that played the recorded speech interfered with students' listening comprehension. Majority of the students thought that the difficulties they encountered in listening comprehension were due to the bad recording quality / poor-quality tapes or disks.

The findings concurred with those of Bingol, Celik, Yidliz, & Tugrul Mart's (2014) studies who observed that the quality of sound system had impact on the listening comprehension of the students.

### 1.8. Listening Difficulties Related to the Content of the Text

Research have shown that the material itself may be the main source of listening comprehension problems. Unfamiliar words, complex grammatical structures, and the length of the spoken text may cause listening problems. One factor of concern in L2 listening comprehension is passage length and the extent to which listeners can cope with the amount of information that is presented for processing. Unlike reading, listening comprehension occurs in real time. Listeners may not have the option of going back to something they failed to comprehend.

Table 8 present the frequency of difficulties experienced by the students due to the content of the text.

Difficulties	M	D
1. I find it difficult to understand listening texts in which there are too many unfamiliar words including jargon and idioms.	2.43	S
2. I use my experience and background knowledge of the topic to understand the spoken text.	2.31	S
3. Complex grammatical structures interfered with my listening comprehension.	2.24	S
4. I find it difficult to interpret the meaning of a long spoken text.	2.11	S
5. I find it difficult to understand listening texts when the topic is unfamiliar.	1.99	S
6. I feel fatigue and distracted when I listen to a long spoken text.	1.97	S
7. I find it difficult to understand every single word of incoming speech.	1.97	S
8. I find the listening passage difficult to understand.	1.78	S
Grand Mean	2.11	S

Table 8. Listening difficulties related to the content of the text

Table 8 shows that the students sometimes (2.43) had difficulty understanding listening texts in which there were too many unfamiliar words that included jargons and idioms. Many also admitted that they sometimes (2.31) used their experience and background knowledge of the topic to understand the spoken text. Others sometimes (2.24) considered complex grammatical structures as interference to their listening comprehension. Sometimes (2.11), they also found it difficult to interpret the meaning of a long spoken text, likewise when the topic was unfamiliar (1.99).

This finding coincides with Butt (2010) who reported that the major problem hindering listening comprehension was that the students' vocabulary was too limited to understand the message. This also conforms to Vogely's study (1998) which shows that the difficulty in listening comprehension was partly due to the structural component of the text. Background knowledge about a topic is also an important variable that can influence listening.

The result also proves that the length of the text can be one major factor that negatively affects the learners' listening comprehension. This confirms Ur's assertion (1984) which justifies that the difficulty in listening comprehension is partly due to the length of the listening text itself which bores listeners and distract their concentration. Therefore, it can be inferred that long spoken texts interfere with the learners' listening comprehension.

Below is a summary of the factors and specific categories of difficulties experienced by many students when they listened to aurally-presented English texts/passages.

Factors	M	D
Process Physical Setting	2.82	Often
Failure to Concentrate	2.4	Sometimes
Psychological Characteristics	2.21	Sometimes
Linguistic Features	2.2	Sometimes
Content of the Text	2.11	Sometimes
Speaker	2.1	Sometimes
Listener	2.03	Sometimes
Listening Comprehension Process	1.88	Sometimes

Table 9. Summary of data on the factors causing listening comprehension difficulties experienced by the students

Table 9 discloses that students *often* experienced difficulties in listening to aurally-presented texts due to physical setting that was noisy likewise with listening aids/materials/equipment that had problems with the volume or the quality of sound. This factor obtained a mean of 2.82. They sometimes had problems with concentration, psychological-related characteristics, linguistic features, content of the text, with the speaker, the listener, and with their listening comprehension process.

It is noteworthy that the physical setting or the learning environment was considered as the major factor that often caused their difficulties in listening comprehension.

Noise likely imposes an additional load on working memory. Student listeners may be slower and less accurate at speech processing in the presence of noise, and find understanding the speech to be more effortful or tedious under noisy environment. As argued by most teachers, when noise interferes with the perception of a signal, this will be likely to increase the proportion of processing capability which a listener must devote to comprehension.

## **2. Proposed Remediation Strategies To Improve Students' Listening Comprehension**

Not all the problems described above can be overcome. Certain features of the message and the speaker, for instance, are inevitable. But this does not mean that the teacher can do nothing about them. She/He can at least provide the students with suitable listening materials, background and linguistic knowledge, enabling skills, pleasant classroom conditions, and useful exercises to help them discover effective listening strategies. A few of the remediation strategies are listed below.

<b>Causes of Difficulties</b>	<b>Remediation Strategies That May Help Students Alleviate their Listening Comprehension Difficulties</b>
1. Listening Comprehension Process	The professor/instructor may: 1) Activate the schemata by encouraging the learners to think about and discuss what they already know about the content of the listening text 2) Repeat/rephrase question or instructions 3) Ask questions everyday so the student learns the skill through repetition and practice
2. Linguistic Features	1) Use clues which are the words or phrases coming after the unknown words. Students have to make sure that they do not spend much time on guessing the unfamiliar word or they will miss the speaker's next point. 2) Restate their instructions, and simplify the vocabulary, syntax, and grammar
3. Failure to Concentrate	1) Provide "wait time" for student to process and answer question. 2) Consider alerting the student that you are about to begin speaking by gently tapping her on the shoulder or calling her name. Face her, and make sure she has eye contact with you. 3) Vary tone and volume also might help keep her attention
4. Psychological Characteristics	1) Exploit visual aids or draw pictures and diagrams related to the listening topics to aid students to guess and imagine actively. 2) Reduce the anxiety, feel confident during listening tasks, and raise personal motivation in enhancing listening ability
5. Listener	1) Require the listeners (students) a conscious effort and a willing mind to listen 2) Use pictures, gestures, etc. when giving directions
6. Speaker	1) Help students expose themselves and get familiar with precise pronunciation of native speakers 2) Unimportant points or small details should be spoken more quickly. Important points, such as main ideas, are usually spoken more slowly and clearly.
7. Physical Setting	1) Seat the student in an optimum position in room free of distractions. 2) Stand directly in front of student when giving directions.
8. Content of the Text	1) Provide short listening texts. 2) Teach students how to take note . 3) Adopt and adapt listening materials that match their students' interest and background d. Use multiple hearing/listening

## Conclusions

The students often experienced difficulties in listening to aurally-presented texts due to physical setting (or learning environment) that was noisy and to listening aids/materials/equipment that had problems with the volume or the quality of sound. They sometimes had problems with the listening comprehension process, the texts' linguistic features, concentration, psychological characteristics pertaining to their interest, attitude towards the text, and their confidence, the listener, the

speaker/reader, and content of the text. Difficulties in listening comprehension which the college students experienced can be alleviated or reduced by applying appropriate or suitable remediation strategies targeting the causes of the difficulties. Therefore, the learning environment and the quality of the audio material/equipment are the most frequent causes of listening comprehension difficulties experienced by the students. Listening comprehension difficulties could be alleviated or reduced by applying remediation strategies across disciplines. Schools must provide a teaching-learning environment that is free from distractions (e.g. noise). Likewise, further studies on listening comprehension difficulties could be correlated with their general English proficiency or reading comprehension performance. Future researchers may also investigate physiological or neurological reasons for the listening difficulty.

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***A Strategic Framework for 3D Print Application and Business Model in Taiwan***

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**Abstract**

In this article, the authors develop a conceptual framework for 3D Print Supply Chain Application and Business Model that helps broaden the understanding of 3D Print industry and its role in enhancing and integrating manufacturing and service industries in Taiwan. After review the current literature on additive manufacturing technology Industry, that is, 3D printing industry; the authors interviews fifteen 3D printing services provided firms in selected Taiwan's markets and, develop a new conceptual framework based on the need for consumer, the supplier and the combining the requirements of applicants and consumers. The results of this study provide an appropriate business model which can help organizations to evaluate and investment in this technology to stand firm at all times.

Keywords: 3D Print Supply Chain, Business Model in Taiwan

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## Introduction

3D printing is a future trend based on the development of industrial manufacturing towards intelligent manufacturing and intelligent service. In combination with the digitization of production information, the huge amount of data and IoT (Internet of Things) technology, and the front-end scanning technology, the 3D printing (additively manufacturing) is one of the important means to enhance the productivity and competitiveness of the future manufacturing industry. It is also the stage goal of the 4.0 development Plan of the Taiwan Executive Yuan. The additively manufacturing technology which owns the advantages of rapid, flexible, customer-oriented and complex manufacturing, meet the demand of a small variety of new state manufacturing in the future, but the related market is still in the early stage of development. It is an important task for the commercial application of the 3D printing to enter the growth stage from the innovation stage. Therefore, based on the development process and functional characteristics of the technology, this study explores the future commercial application model and market development strategy in Taiwan, and integrates manufacturers and service providers through innovative application models to drive the development of future new 3D printing industries.

## Literature Review

### *Industrial Ecological Development*

3D printing technology originated in the mid-1980s, Charles Hull, the father of laminate manufacturing, invented the Stereolithography (SLA) technology in 1983 and obtained the US patent in 1984. At the beginning, due to the technology of product manufacturing and the efficiency limitation of the economic level, 3D printing is mostly adopted by large-scale industries. In recent years, 3D printing has been widely applied in the promotion of productivity revitalization plans in various advanced countries. From the introduction of industries such as air space, automotive components, to medical aids, cultural creativity or the use of personal daily necessities, such as prosthetic limbs, hearing aids, jewelry, shoes, etc., there has been considerable progress and commercial space. . According to Wohlers Associates' 3D printing industry annual report, 3D printers and their surrounding services have reached a market value of \$2.2 billion in 2012 with an annual growth rate of 29% (Wohlers, 2013). In 2013, it achieved the highest annual growth rate in 17 years, with a scale of US\$3.07 billion and a growth rate of 34.9% (Wohlers, 2014). In 2014, it achieved an annual growth rate of 35.2%, with a market capitalization of US\$4.1 billion (Wohlers, 2015). That's why Gartner (2015) predicts that 3D printing will reach the mainstream in the market in the five years from 2016 to 2020. As a result, Wohlers Associates further estimated that the market value of 3D printing and its surrounding services in 2021 could reach \$10.8 billion.

The current advanced national multi-layer manufacturing industry can be divided into industrial and personal/home. In the manufacturing sector, for example, the German industry 4.0 has a 3D printing industry policy, and the development of medical technology such as artificial joint printing technology is leading the world; 2. The US-made AMP "Made in the USA" industrial policy is developing in the aerospace industry. For example, LEAP series engine developed by the company (Safran and GE joint venture) CFM has outstanding performance in saving aircraft fuel

consumption and airline maintenance costs. 3. Japan TRAFAM program, printed in metal manufacturing and sand casting 3D Achievements in industry. Personal/home, such as the promotion of education policies in the United States, the popularization of 3D education, the use of 3D printing machines to popularize additive manufacturing technologies, even to the pre-school stage, or the inclusion of 3D printing in university courses. The development and application of manufacturing industry is more extensive than personal/home.

### *Taiwan's additive manufacturing ecology*

3 D printing ecosystems include a range of value creation activities, such as traditional manufacturing supply chains and digital production design and distribution. Figure 1 shows the architecture of the ecosystem proposed by Piller et al. (2015). The entire additive manufacturing system is divided into industrial upper, middle and lower reaches and a common basic environmental system according to the industrial function role. The upstream industry is equipment and system manufacturers and material suppliers, equipment and system manufacturers can be subdivided into mechanical equipment manufacturers and systems engineering design; the midstream industry is more diversified, functionally covering product design/ scanning, production processes and pathways. Figure 1 shows additive manufacturing ecosystem.

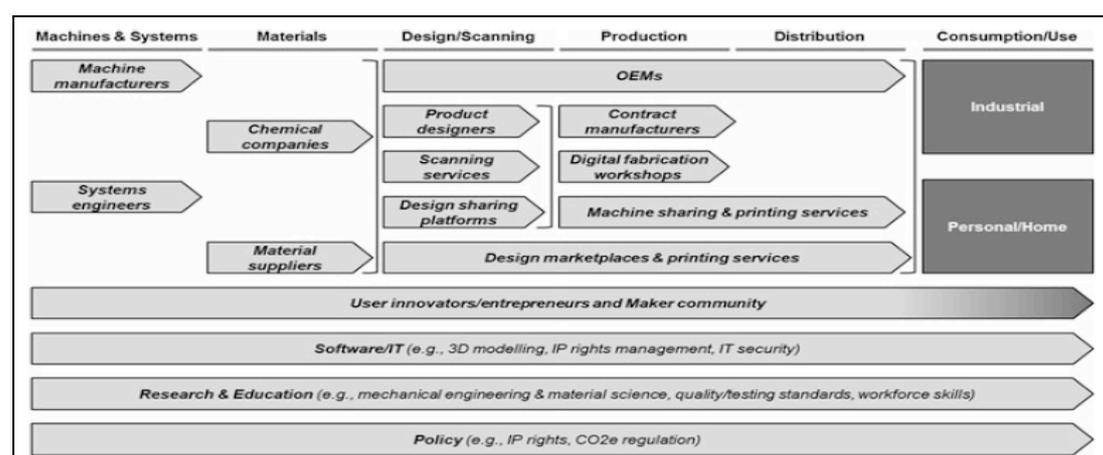


Figure 1: Additive manufacturing ecosystem, source: Piller et al.(2015)

There are five types of business types, such as the system integration vendor that includes above three functions provides complete production solutions for downstream customers, product designers and contractors, scanning services and digital modeling (CAD) vendors, product design platforms and printing services integrated design. The downstream can be divided into industrial customers and individual/family customers. The common basic services include user innovation / entrepreneur / maker community, 3D model, intellectual property management, IT security and other software, research and development education units, government / regulatory environment, constitute a complete industrial ecological environment.

According to the above-mentioned ecosystem, Taiwan's additive manufacturing industry structure includes the upstream 3D printing equipment/system supplier, material supplier, midstream design scan, process, access, and downstream application industry and final consumer.

In the upstream equipment manufacturers in Taiwan, with the expiration of related patent technologies since 2008, many domestic and foreign companies have continued to enter the ranks of manufacturing 3D printing equipment, but most of the printing machines produced are low-priced. Domestic manufacturers such as XYZ Printing, Aurora, Microjet Technology, Coretronic Corporation, MIICraft, Renishaw and tool machine factories such as Tongtai Machine & Tool (Tongtai) also have high-end equipment research and development.

In the desktop/personal printing machine, XYZ Printing, which aims at education/consumer level, has 25% share in the international market. In the fourth quarter of 2015, it sold 21,800 units and 31% of the shipments. In the whole year, it also won the championship with 50,100 units of shipments and 21% of shipments. In the manufacturing of metal materials, for example, Tongtai sold the first 3D printing equipment developed in 2015 to the Taiwan Creative Metals Museum, which is used in the creative factory of Taiwan's creative metal for cultural and creative purposes. Tongtai further signed a memorandum of cooperation on metal additive manufacturing software with the Materialise Software Company of Belgium and the Industrial Technology Research Institute (ITRI) of Taiwan, and marched towards the domestic manufacturing of self-made 3D printing smart devices. In addition, related component manufacturers, in the energy source part such as heater (Yao Hong Precision Technology co. Ltd.), print head (MicroJet Technology co. Ltd.), piezoelectrical ink jet printhead (National Taiwan University), UV light (Dingxin co. Ltd.), LD (Nichia Taiwan Corporation); Scanning Some are such as DLP (Young Optics), Transmission (Hiwin Technologies Corp, ChiefTek Precision CO., LTD, Motor (TECO Electric & Machinery Co., Ltd, Delta Electronics, Inc.) In the material manufacturers, plastics such as ABS (Chi Mei), PLA (Zhaoqing Co. Ltd.), UV Cureable Resin (Pro-magic Co. Ltd., Changchun Group), metal powder (ThinTech Materials Technology Co., Ltd, Solar Applied Materials Technology Corporation) and other manufacturers to participate. Taiwan's industrial policy has a lot of influence in this respect. Since 2011, ITRI has been actively investing in the development of key laser sources and systems for laser additive manufacturing and has achieved good results.

The mid-layer manufacturing industry can be divided into product design/scanning services, printing processes and channel distributors/agents. In the product design/3D scanning part, some manufacturers such as 3D Digitech Co. and Logistic Technology Corporation have invested in the field of equipment development. Although there are some applications for general consumer such as scanning with mobile phones, Such products are still targeted at enterprise users who are capable of controlling variations in the light, angle, etc. of the shooting environment. In the printing process and channel distributors/agents, Road Ahead Technologies Consultant Corp, Detekt Technology Inc, SolidWizard Technology Co.,Ltd and other agents represent foreign equipment manufacturers such as Stratasys, 3D systems, EOS, Envisiontec, Voxeljet, Mcor, Optomec, Matsuura to provide total integration solutions for the market. In terms of sharing, Detekt Technology constructed the "Ink network" cloud as a solution for 3D printing service platform integrating the design/printing process, but the market response is poor.

## Research Methods

The purpose of this project is to view the current ecological system and challenges of Taiwan's 3D printing industry and to exploring the current applicable business application model.

In this study, literature review was adopted. First of all, the paper reviews the current situation of the development of the industry, carries out market research on Taiwan's 3D printing industry and the operation relationship between the upper and lower reaches of industry, explores the current application demand of the domestic industry, and then describes the application and business model with potential in the context planning. Put forward feasible strategy suggestion for the ecological system of the 3D printing industry.

## Findings

In the middle of the printing service, the initial development of the industry is to use the 3D printer built by the company to assist customers in the rapid prototyping service, and collect the cost of the prototype. It is a kind of OEM service type state for manufacturing industry. As the price of 3D printers gradually declined, however, it would gradually spread to general even individual consumers or company numbers. The market has already appeared in advanced countries to provide a large number of 3D image files for general users to download. Consumers can print the works according to their needs and cooperate with the 3D printers purchased for educational, entertainment or other purposes. Taiwan players have also begun to build 3D libraries for general users to download, but there is still a gap in quantity and quality.

We find little in-depth strategy for the mid-stream industry in the Productivity 4.0 Initiative. Only two specific action measures were set up under the fourth and sixth key strategies of the program. Since both of strategies are based on the industrial innovation of key technologies, the specific actual cases of target industry innovation in research and development will be the key achievement and efficiency goal instead of industrial output. In other words, Taiwan government seems to focus on the establishment of upstream industries and the development of downstream industries such as medical, automobile, mold and metal manufacturing.

3D printing industrial basic common environment such as the development of design software includes four functions: 3D drawing, scanning, analysis reconstruction and printing format processing. We also observe Taiwan-related manufacturers in the 3D graphics software are foreign graphics software program agent, domestic software is less. These professional graphics software are expensive, but there are many free open for the drawing software, such as Sketchup, Auto123D Etc. Although the drawing function is not as good as the professional drawing software, it can still meet the needs of users such as education and consumer experience.

In addition, in the industrial policy of loosening the medical regulations, financing, tax reduction and other policy tools, the government's policy support and efforts can be seen in the main sixth strategy of Taiwan Productivity 4.0 Initiative. Regulatory lifting issues in the medical industry and biotechnology industry, such as 3D printing human organ reconstruction / transplantation clinical trials, 3D printing biomaterial

safety assessment issues, etc., will involve clinical or non- Clinical trial specifications, or biomaterial certification and experiments. At present, relevant Taiwan regulations are scattered in the relevant laws and regulations, inspection and registration, etc., and there is no exclusive regulation. The 3D printing application has been introduced in the medical supplies from orthopedic surgery guides and dental bed guides. For building a good industrial environment, government should continue to establish the relevant regulations to achieve the ultimate goal of introducing intelligent manufacturing and cross-border integration platforms.

Other legal issues arising from 3D printing technology, such as: 3D digital information intellectual property management, how to control the digital information intellectual property rights obtained through 3D scanning in the future, the 3D digital database wisdom built by the cloud platform Property rights management issues, bio-printing extensions such as medical ethics, ethics and legality related issues and legal norms, food printing safety GMP regulations and regulations, dangerous goods printing such as gun printing control issues, printing defects Dissipate control issues and so on. Figure 2 shows the 3D print supply chain and business model in Taiwan.

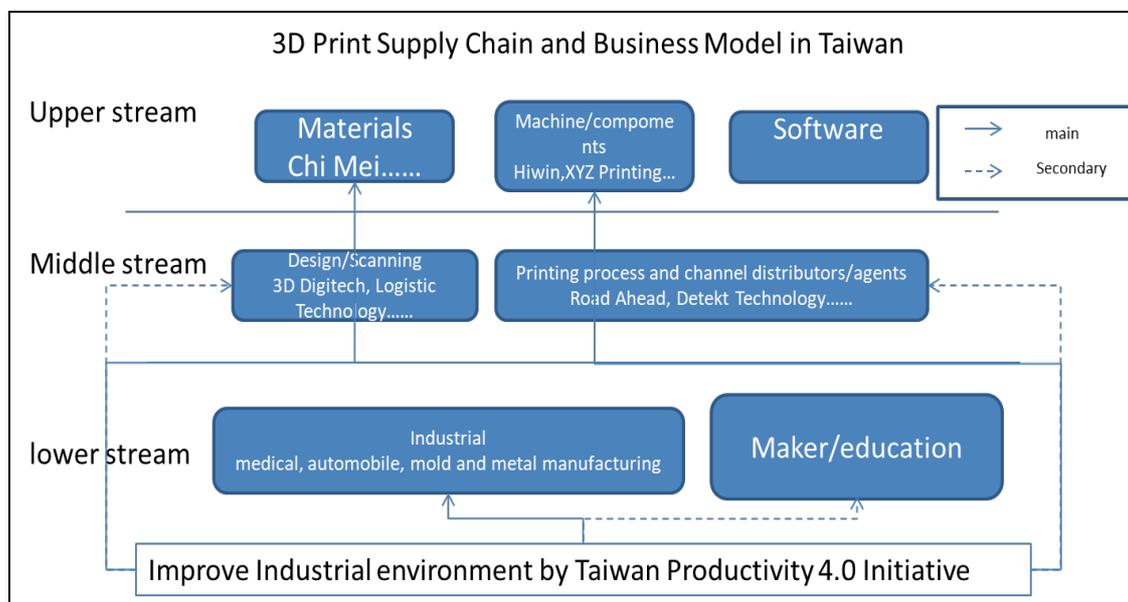


Figure 2: 3D Print Supply Chain and Business Model in Taiwan

**Conclusions**

Driven by the industrial 4.0 initiative, Taiwan is committed to the environmental creation and technology enhancement of 3D printing industry ecology to achieve the goal of Industry 4.0. However, advanced countries (Germany, the United States, Japan, etc.) is currently in a leading position, especially in aerospace, automotive, medical, precision manufacturing, printing equipment, and software. Taiwan government is aware of the fact that more and more products will be printed in 3D in the next five years. And the surrounding services will reach the mainstream position in the market. These developments will create economic value and market opportunities through the design of intelligent ecosystems and business models. Through the literature research, this research finds that most of the resources are concentrated in the upstream industry and specific downstream application industries under the fact. The development of the midstream industry mainly lies in the private

sector. Companies propose integrated solutions to serve the domestic market through the distribution of foreign equipment and software agents. The Market transactions show a very active phenomenon than the upstream.

This paper believes that the midstream industry has a lot of room for development and it is worthwhile to further observe the development of the Taiwan market in this regard. Taiwanese SMEs have considerable flexibility. In the future, more innovations will be discovered in commercial services. For example, the current cloud data platform is built, 3D printing technology is used to create product models, and product market testing is conducted among social media. This enables operators to conduct more accurate and effective market research before listing, and shorten the feedback process between manufacturing design and development and end users.

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## *Developing Peer Review Skills in EFL Writing*

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### **Abstract**

The use of peer review in EFL writing helps develop analytical skills and a greater sense of agency in foreign language students. Many EFL students lack peer review skills and so teachers need to encourage the development of these skills in their students. One way is through the use of rubrics, or component-based analysis, and checklists of common student errors. Peer review skills allow students to become better writers through increased exposure to the writing of others as well as pushing students to take on a more teacher-like role in assessing writing. In addition, increasing peer review in the writing classroom demonstrates a more social nature of writing, rather than simply performing for a teacher. The peer review process develops a more student-centered classroom as students create greater student-to-student interaction through, in this case, a three-draft cycle. This research project tracked a first-year writing course at a university in Japan as the teacher and students went through six rounds of peer review over the course of three writing assignments. This project seeks to demonstrate the development of peer review skills through the use of rubrics and document the relationship between the students' and teacher's evaluations.

Key words: writing, peer review, student agency, rubric, foreign language teaching, assessment, student-centered learning

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## Introduction

Peer review in EFL writing develops students' analytical skills as they read their peers' drafts. It also encourages students to reflect on and improve their own writing. A third and pivotal benefit of peer review is that it de-emphasizes the role of the teacher and allows students to take greater control over their own learning (Benson, 2013). A key issue with peer review is that many EFL students may have little to no experience with peer review and may lack the critical skills required (Hyland, 2014).

## Use of Rubrics

This research project used component-based rubrics for peer review sessions. The use of rubrics by both teacher and students creates a more transparent classroom paradigm as the students see and use the same evaluation criteria as the teacher, thus demonstrating the grading process (Bitchener & Ferris, 2012). The specific rubrics used listed the criteria to be evaluated (organization, language and content) and three grade ranges by which the students could evaluate their peer's drafts.

The two first-year writing classes were given two different rubrics. The first class was given a rubric that listed the criteria and grade ranges (shown below in Figure 1).

	>80%	70-80%	<70%
<b>Organization</b>			
<b>Language/ Accuracy</b>			
<b>Content</b>			

**Figure 1**

The other rubric used in the second class contained explanatory text of the criteria and grade ranges (an abbreviated form is shown below in Figure 2). The first research question posed by this project is what (if any) difference in peer review quality can be seen between the two classes and if the explanatory text in the second rubric helps the students make more effective evaluations or if the "blank" rubric allows students to create their own values in evaluation.

	>80%	70-80%	<70%
<b>Organization</b>	<b>All major parts are fully developed.</b>	<b>Some parts have problems.</b>	<b>There are major problems.</b>

**Figure 2**

This project also seeks to track the difference (if any) between students' and teacher's evaluations of drafts. As the first-year students are assumed to have essentially zero experience at evaluating other students' writing, the difference and potential progress over the term may be used to track the development of peer review skills in contrast with the teacher's evaluations. This is the second research question of this project and will be addressed in the final section of this paper.

## **Methodology**

This project tracked the progress of two first-year writing classes at a university in urban Japan. Over the course of the 15-week term, the students wrote two paragraphs and one essay, each with a three-draft cycle. The students were given in-class instruction on how to write a paragraph and then expand their writing into a full essay, the third assignment.

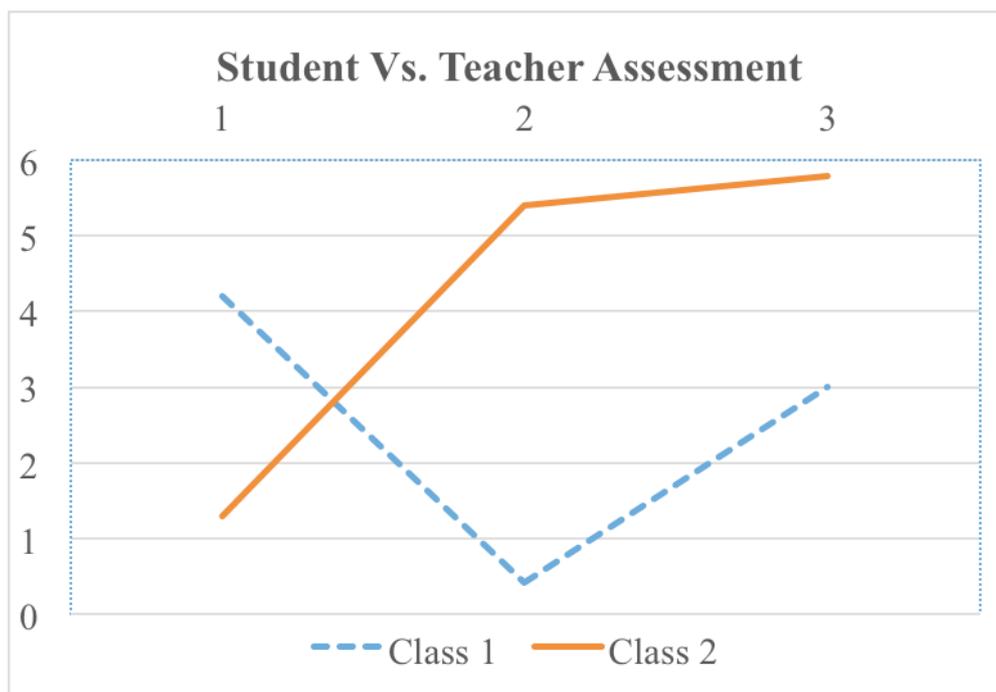
Peer review sessions were conducted on the second and third (final) drafts. The students submitted two anonymous copies of these drafts: one for peer review and the second for the teacher. Students were arranged into small groups of 3-4 individuals and then provided with the appropriate rubric. The students were instructed to keep each draft together with the same rubric, with each member of the group providing evaluation and feedback on the same rubric. Students were instructed to read and review each draft and then rotate through the entire review group so that each student would read the drafts and each writer received more feedback from more peer reviewers.

Students in both classes were instructed to mark which grade range of each criteria they thought corresponded to the draft read. They were also encouraged to give more explicit feedback in the form of comments (in the blank spaces on the first rubric and at the bottom of the rubric in the second class).

The final task of the reviewers was to provide a hypothetical grade to the third drafts. The teacher instructed the students that variation in feedback and grades was natural and acceptable. The hypothetical grades were averaged together and recorded by the teacher and then physically removed before returning the drafts and rubrics to the original writer. This was done as the students' grades could possibly artificially encourage or discourage the original writers. After class, the teacher's and students' grades were recorded and compared for the purpose of this project. The results will be presented and interpreted in the next section.

## **Results**

Looking at the chart below (Figure 3), it is apparent that the teacher's assessment was consistently lower than the students', or the students consistently assessed their peers' drafts as being of higher quality than the teacher did. Having said that, the variation over the term and between the two classes is quite strong and appears to follow divergent trajectories.



**Figure 3**

The first class (with the no-text rubric) started the course with a significantly higher assessment than the teacher (average 4.2 points), then moved to almost equal with the teacher (average 0.4 points) on the second unit and finished the course with slightly higher assessment (average 3 points) on the third and final unit. While it was predicted that students' assessment would move towards the teacher's (indicating development of peer review skills), the first class does not show steady progress and in fact appears erratic and unrelated to the teacher's assessment. This erratic behavior may be due to variation within the individual students and their interactions with the drafts.

The second class (with the full supporting text rubric) showed a more consistent pattern, but moving away from the teacher's assessment. With the first unit, the students were only mildly higher (average 1.3 points) than the teacher, while in the second and third units, the students moved sharply away (average 5.4 and 5.8 points, respectively) from the teacher's assessment of the drafts. This pattern, while counter-intuitive, may be due to students' misunderstanding of the rubric and peer review process or variation on the part of the teacher.

The first research question regarding variation between students' use of the two different rubrics can be answered in the positive as the graph in Figure 3 indicate two divergent paths of student/teacher evaluations. The results are puzzling to this researcher as they do not indicate students' peer review skills are improving and approaching the teacher's evaluations of the drafts. As such, the second research question should be answered in the negative as the data from the first class do not show any relationship between the students' and the teacher's evaluation and the data from the second set in fact demonstrates a negative relationship as the students' evaluations moved away from the teacher's.

## **Conclusion and Implications**

The data resulting from analysis of the rubrics do not demonstrate a strong pattern of students developing peer review skills. The data from the rubrics seem erratic and discouraging, while the data from the informal text comments on the rubrics indicate that students appreciate and understand peer review and its purposes. This alone should encourage teachers to continue using rubrics in future classes.

Future courses and research could include more teacher-directed instruction and use of rubrics and other peer review instruments, with more explicit instruction on the skills and functions of the instruments. Another opportunity for future research could involve more formal gathering, coding and interpreting of students' comments. This mixed method of research could provide greater insight into the development of students' peer review skills as they achieve greater understanding of process writing and take a more assertive role in the writing classroom (Noels, 2013).

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## *The Common Edible Shellfish Recognition System Applying Laser Measurement*

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### **Abstract**

Image recognition has been widely applied to sorts of fields. Nevertheless, the most common characteristics of image recognition, such as color, contour and texture, are liable to be affected by illumination and the light of background leading to bias the recognized consequences. In recent years the technology of three-dimensional scanning has developed increasingly mature which could precisely measure the contour of fixed-shape objects. We take the three-dimensional contour as characteristics in the project. The comparative sample which will be used as for recognition was scanned every one millimeter from the leftmost to the rightmost in order to establish the three-dimensional object database, besides we sampled 540 dots for each scanning line. In order to shorten the testing time, we merely scanned two scanning lines while doing testing. The edible shellfish was taken as example in the research so we examined the characteristic for recognition feasibility. There were nine edible shellfishes used for experiment. Each category has individual thirty samples. We take leave-one-out for recognition mechanism that the rate of recognition could reach 89.70 and the average of recognition time was 5 second. The three-dimensional scanning is a new option for characteristic capturing. Furthermore, we will do our best to continue increasing the rate and speed of recognition to improve the practicality in the future.

Keywords: edible shellfish, laser, three-dimensional scanning

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## Introduction

Taiwan is an island country surrounding by oceans. Nevertheless, the marine bio-industry was well-known by the people. Although the marine bio-industry is one key branch of the Taiwan's economy. The Marine affairs and Marine education of Taiwan still need to be strengthened. At the beginning, we were trying to bring the life diet of delicious seafood of the shellfish and fishes to arouse people's interest in marine knowledge. Then the issues of marine resources, environmental protection, sustainable operations will be introduced gradually. The edible seafood was the start for most people to know anything about the oceans [1][2]. It provided the learning channel of edible seafood to help people trying to recognize the oceans. The shellfish occupies an important position in sorts of seafood in Taiwan. Besides of the delicacy, the beautiful contours and unique shapes of outer shells of many shell fishes which attract people's attentions and collections.

It is not easy for non-professional to rapidly and exactly find the relating data of edible shellfish that there are tones of edible shellfishes and similar characteristics. Normally people will go to libraries or go surfing on internet to searching for related knowledge of the shellfish [3][4]. The shellfish has sorts of categories, complex shapes and colors. The general inquiry method would apply key words and representative graphs to search for shellfish. There is no way to get started with for those who were not expertise of this area. At present, the technology of image recognition in searching and probing which has been widely applied in sorts of inquiries [5][6][7]. On the other hand, practical teaching could increase the learning performance according to literature reviews [8][9]. The visitors could touch the physical shell by the practical teaching of shell demonstration and guidance. It could show the visitors the knowledge of three-dimensional shells under the circumstance of directly commentary. The comprehensive understanding of ecosystem, characteristics and related environmental protection knowledge of the shells which the visiting learners could touch, view from all angles, and listen to multimedia lectures. Such way of knowledge propagation is relatively effective and attractive. It is quite unfavorable for practical teaching that would consume much laboring commentary. The automatic recognition mechanism must be established before developing the automatic commentary system for practical shell knowledge. In general, such recognition mechanism could be accomplished by radio frequency recognition technology such as RFID and NFC. There different sizes of shell that for small-size shells were not inappropriate for recognition tag. It is no way for this system to recognize whether the audience brought their own test bodies or untagged ones.

Another way is applying image recognition algorithm to recognize shells which system had got good results already. Image recognition usually applying the characteristics of colors, shapes and textures of the shell's test body to proceed recognition. The characteristic distortion would happen during the process of image recognition while came across different environments and the changes of lighting. For example the shadows of shells will affect the judgment of characteristic of contours demonstrated as the figure 1 [15][16]. Whether the lighting differences or using different lens while capturing images which also could affect the determination of the

characteristics of colors and textures. The test body put on different locations while filming using the same lens which could lead to offsets of capturing angles. It demonstrated as figure 2 which A stands for shell put in front of the front edge of recognition box, B stands for shell put in front of the center of recognition box, and C stands for shell put in rear of the front edge of recognition box. The height of the object would lead to the variation of image characteristics [19].



Figure 1: The misjudgment of the characteristic of contours caused by the shadows of the shell



Figure 2: The distortions of the same shell putting in different locations

Besides the problems encountered of image recognition system above, shell image recognition still has to deal with the color differences of the dead shell and the live shell [19]. Once the shells exposed in the natural environments would fade away which could result to the losing exactness of recognition gradually while we took colors and textures as characteristics for recognition mechanism.

We build up a shell recognition system to solve up the problems above. The system is based on a closed recognition box to deal with the disturbs of outer lighting. The inside of the recognition box using four-sides of LED lightening board to provide sufficient light sources to resolve shadow issue and color differences caused by the variations of lights. The system could reach better recognition rate owing to overcome

the environmental problems. The recognition box of practical recognition box demonstrated as figure 3.



Figure 3: Four-sided LED lightening boarded recognition box

The price of these four lightening boards were expensive which dramatically increasing the cost of system establishment. In order to assure the quality of lighting environment while proceeding recognition that the system needed to have the doors of recognition box kept shut. It isolated the lines of observer's sight from the shell which waited to be recognized. It led to poor perception of the observer while the shell was out of sight of the observer. It also resulted in poor recognition throughput for having doors shut while doing recognition.

The technology of three-dimensional scanning has developed increasingly mature and the high-quality optical environment was needed to cope with image recognition system which led to another issue of higher cost can be removed by using this technique. The three-dimensional contour was taken as characteristics of recognition in this paper. At first the contour datum of shells was saved as database. As for the shells needed to be recognized, we measured a couple of three-dimensional contour lines used to compare with the contours in database. The 3D contours of test body were taken as the characteristics of recognition. It could avoid the recognition system from the environmental lighting affects which the contour capturing errors caused by shadows. We took three-dimensional contours was characteristics which could prevent errors of recognition from gradual fade and blur of the colors and textures of shells.

### System Architecture

The system consists of two hardware: one is for database, the other is for recognition. The hardware for database has to capture the complete three-dimensional contour of shells. While the hardware for recognition has merely to capture one or two lines of the contour.

The system for database was built up with a Raspberry Pi 3 Model B as the computing platform which connected a linear laser beam. The GPIO pin of Raspberry used to

control 5-volt relay in order to determine whether the negative electrode was connected to the power supply for switching on and off this linear laser. While establishing the database we placed the edible shell on the scanning recognition platform or beneath the capturing system to recognize. We measured the height and thickness of the whole shell from the leftmost to the rightmost area by a linear sliding rail to drive with. We used the pins of RxTx via Raspberry to control the pre-coded Arduino Nano and the baud rate 115200 was applied to drive the stepping motor into operation by our in-house-protocol. Follow up was the image capturing system above the shell to capture the images of linear laser beams. And the system will calculate height and thickness of every area via laser spot to be part of the three-dimensional data of the shell. The linear sliding rail carried the measuring system running through the whole shell to get the complete thickness data of the whole shell and save them into database. The hardware system architecture used for database depicted as figure 4 and the practical outlook demonstrated as figure 5.

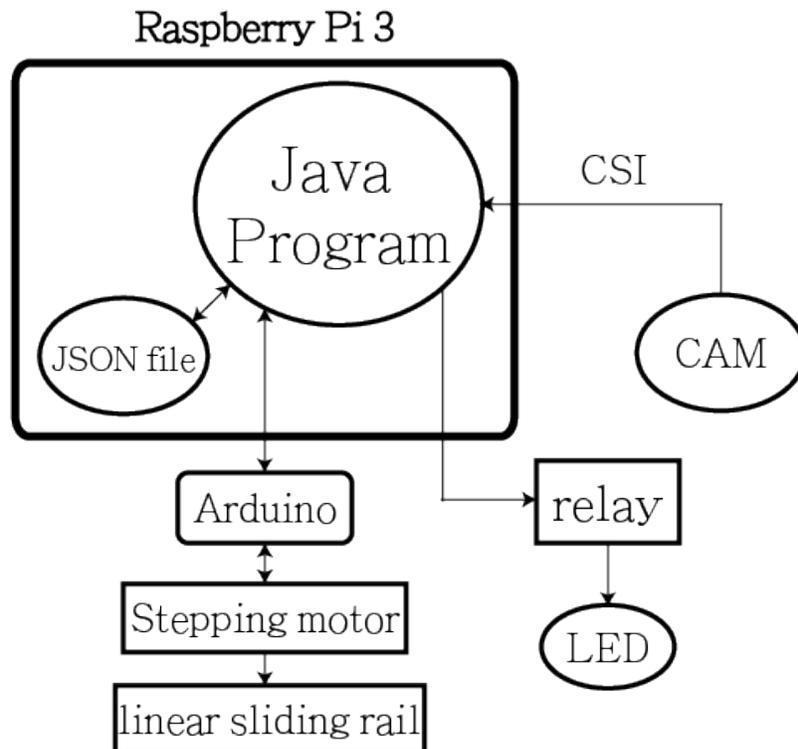


Figure 4: The hardware system architecture used for database

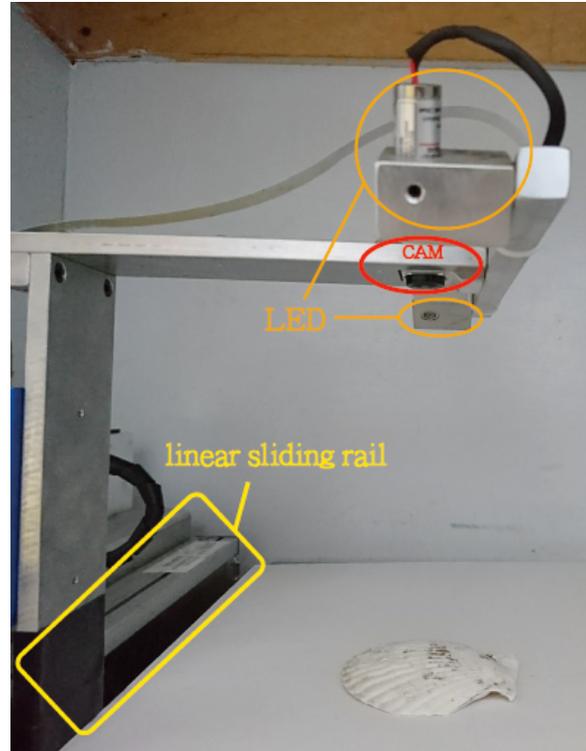


Figure 5: The practical hardware used for database

The recognition system mainly applying Raspberry Pi 3 Model B as its computing platform associated with two linear lasers to perform thickness measurements. In order to capture the images by system the users could place the edible shell on the recognition platform or beneath the capturing system which allows two linear laser's beams to project on the shell. Then the recognition process proceeded by two captured lines of thickness of the shell's contour, and the hardware architecture used for recognition demonstrated as figure 6. We applied two fixed-distance laser beam to sample measurements for recognition instead of sliding rail to speed up the calculation and reducing the cost as well.

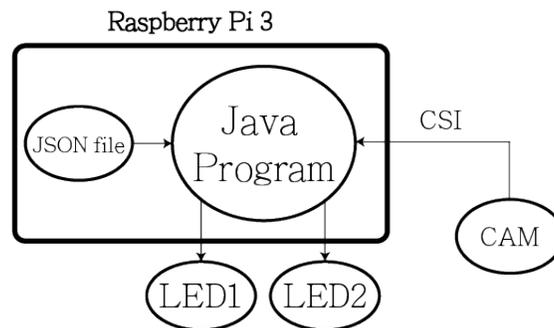


Figure 6: The hardware architecture used for recognition

### The measurement theory

The measurement theory of the system is to employ linear laser beam projecting on different thickness of the object will reflect on different positions for users to measure

with depicted as figure 7. To convert to the thickness of the edible shell by the reflection positions of laser beams via image capturing system. The linear laser was adopted by the system to measure the thickness of the straight line at a time for saving time. We could measure the three-dimensional data of the whole edible shell via shifting the sliding rail to alter the reflection position of the laser beams afterwards.

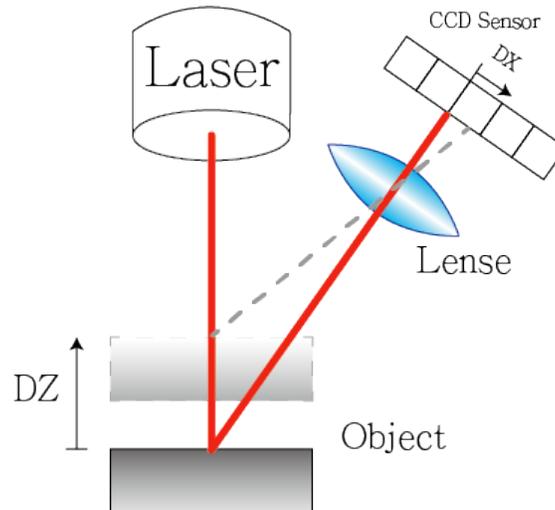


Figure 7: The schematic diagram of the projecting shifts of the linear laser beams

### The measurement system

It cost a lot to build up a recognition box to isolate the disturbs by the outer lighting sources in the pass. We built up the system by laser measuring technology to bring down the production cost of recognition equipment. Even though the recognition rate was low which still met the standards of the exhibition hall.

Under considerations of decreasing the volume of the product, speed and recognition rate, the CSI interface of Raspberry Pi 3 Model B was connected onto the lens of 160 wide-angle Raspberry Pi Fisheye camera to capture images which both were used for database production and recognition system in this study. The system applied a Java programming to control image acquirement and proceed image analysis. The wavelength of the laser beam is 650 nm in the recognition system. In order to reduce noises that every lens was pasted 625-665 nm bandpass filter to adjust focal length till the picture was crystal clear demonstrated as figure 8.



Figure 8: Wide-angle lens pasted with bandpass filter

The photographic parameters, such as focal length and area rate of lens, of low-price lens are unstable. Although there existed some descriptions of calculation in literature review. It was hard for us to neither directly and stably calculate the size of each image dot by our system, nor calculate the thickness of shell's contour by the amount of offset pixels. Moreover, it was too exactness to recognition. A lot of fixed-thickness' acrylics were used in which image calibration was applied to obtain the laser track's offset of each fixed thickness' acrylic. The related parameters in CSV format were stored in the text files of the system. Whenever the system gets started to operate the digital value of text file was accessed to be the measurement standards. While the image system obtained the laser offset image then compare with the closest record in the text files to be the thickness measuring data. Same as the length measuring data was gained through the image calibration.

### **The measurement algorithm**

While building up the database the shells were proceeding completely precisely measurements. So it consumed much longer time to measure with. We used simple measurement for shell recognition. The measurement algorithm for database establishment was described in detail as follows.

The outer shapes of some shells were close to circular one demonstrated as the figure 9: the lateral view of Areola Babylon. If we only applied one-side laser beams, then some parts of shell would be masked which resulted to no way to precisely measure. Therefore, in this study the database for the system would use left and right individual linear laser beams. At first the system started up the left-side laser till the laser beams was found out projecting on the left contour of the shell, began to scan scan shell's contour of each area until image capturing no sight of laser beams. Follow up we turn off the left-side laser beams and turn on the right-side laser beams to scan the last of

shell's contour until the right contour of the shell was discovered demonstrated as schematic figure 10 steps of shell's contour scanning.



Figure 9: The lateral view of Areola Babylon

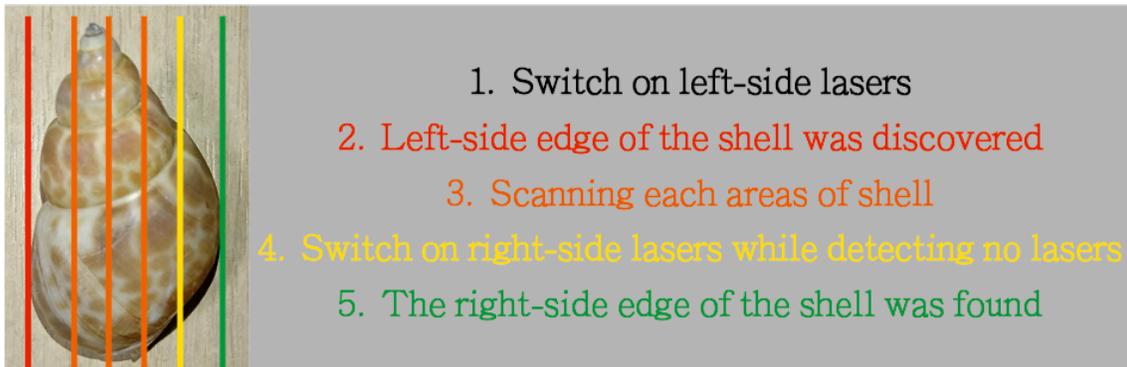


Figure 10: Steps of shell's contour scanning

While beginning measuring the system commanded the sliding rail return to reset, then it captured images via the upright capturing system. Each time the sliding rail marching on one centimeter to probe whether in the measuring range of object. When the system was in the measuring range, bisection method was applied by the system to control the sliding rail moving backwards and reducing the marching shifting distance. Every time the sliding rail will move on the half distance of last one until the left-edge of shell was located demonstrated as schematic figure 11: the marching way of sliding rail-left-edge of the shell.

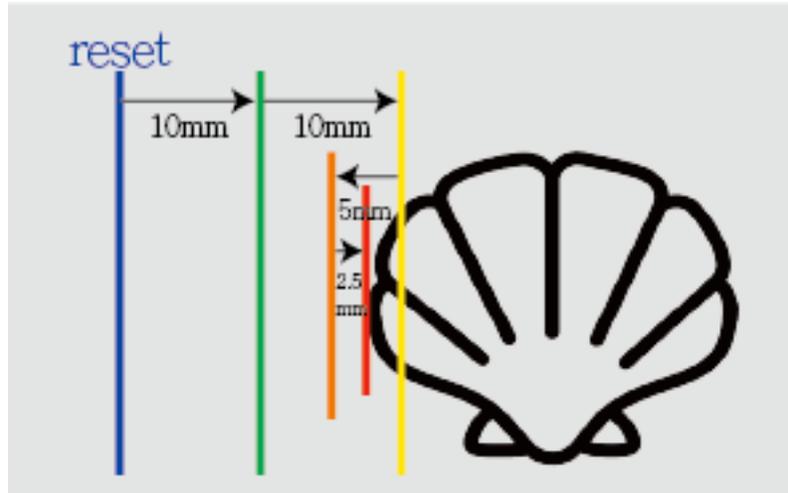


Figure 11: The marching way of sliding rail-left-edge of the shell

Once the left-edge of shell was located, the linear sliding rail moving forward 1mm to precisely measure each value of shell’s contour’s line. Till the system could not capture the values when left-side laser beams project on the shell, then the left-side laser beams were shut down immediately. In the mean time, the right-side laser beams were turned on and moving in 1mm at a time to measure. While the system discovered the right-side laser moving beyond the right-edge of the shell, it would move backwards and reduce the sliding distance till the right-edge of the shell was found. It is the same of searching for the left-edge of the shell demonstrated as schematic figure 12 the way of linear sliding rail moving - right-edge of the shell.

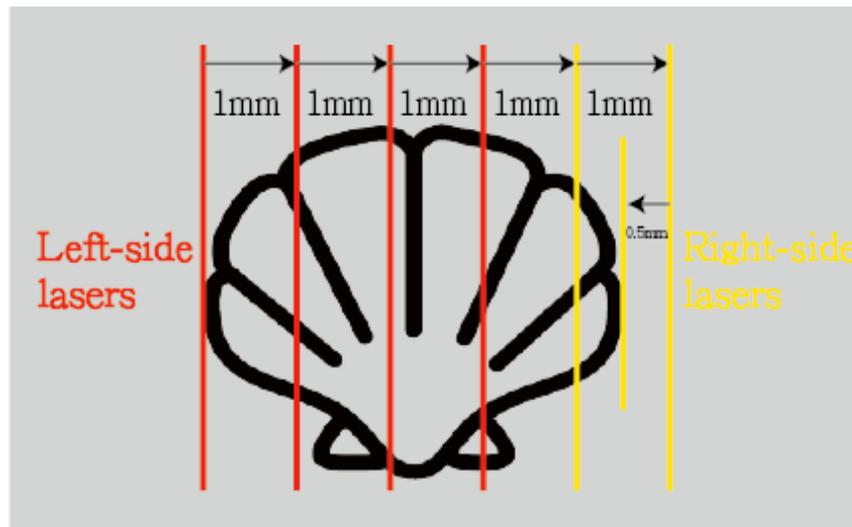


Figure 12: The way of linear sliding rail moving - right-edge of the shell

The same way will be applied in recognition measuring. There is neither no need to look for the edge of shells, nor having linear sliding rail for complete measurements. There were only data of two line captured by two fixed distance lasers to compare the data of the database.

### Characteristics captured and normalization

All lenses were pasted 625-655nm bandpass filter to reduce noises while the system using image system to capture images. The 625-655nm bandpass only allows those lengths of this range to passing through, therefore which lights out of the range would show in dark grey demonstrated as figure 13: the image of half-shell scallop captured by image capturing system, and the red lights are linear laser beams.

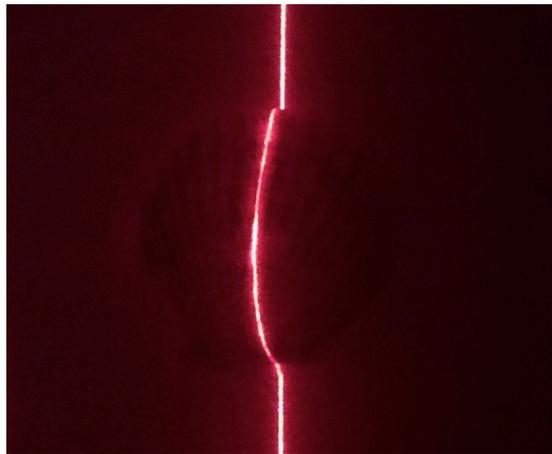


Figure 13: The image captured by image capturing system

Once images were captured the system would determine whether the dots of images were laser reflection or not. The length of laser beams was 650 nm belong to the range of red light, so we apply RGB as the way of judgment. The default is R is greater than 10 as a range to determine whether is laser reflection and probe the distance between center of red light and laser to be laser offset.

Shells were placing in different locations when measuring. We moving all data of shells to the top of Y-axis in order to reduce errors. The system scanned from the top of Y-axis while establishing database. If there were more than four consecutive Y-axis measured points belong to highly data, then they could be taken as the top of Y-axis. The system took this top of Y-axis as origin and moved all the scanning records to the corresponding positions. This is Y-axis normalization of the system demonstrated as schematic Figure 14.

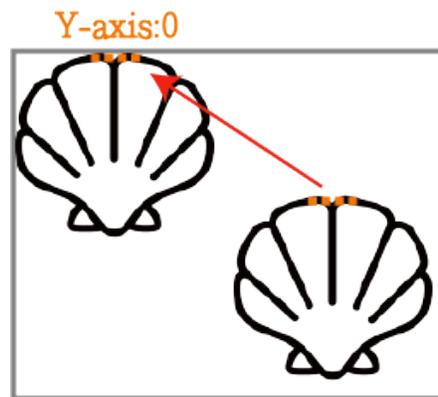


Figure 14: Y-axis normalization

### **Characteristics comparison mechanism**

We took these two measuring results of shell to be measured which compared respectively with all three-dimensional measured data with same distance within the database. Then the KNN[19] were be applied as characteristics comparison mechanism.

### **The experimental steps and discussions**

#### **The experimental environment**

In this experiments we captured images under the indoors light of resolution of 960X540. There were nine common edible shellfishes used to measure in these experiments. There were thirty pieces of each species of shellfishes to build up database system. The specimen of shells depicted as table 1.

Short-Necked Clam	Clam
	
Chlamys Madreporarum	Half Shell Scallop
	
Shelled Abalone	Corbicula Fluminea Formosa
	
Solen S trictus	Areola Babylon
	
Half Shell Oyster	
	

Table 1: Nine common edible shellfishes

## The Experimental Process

In order to speed up the recognition rate that we initially scanned all the shells in completely three-dimensional way to build up database. Then the way called Leave one out [21] was applied where one shell was taken out of database to be recognition target, and the others to be the testing database. The certain line data of shell of database was chosen to test its correct rate. In experimental process, the distance of two line was measured 11mm were chosen to compare with database. In the way of KNN, and K=1 to compare.

## Experimental results

The time for building up one single shell's data into database along with the size of the shells and how many time it measured. The average time is about three minute-ish to establish one piece of database.

The experimental results demonstrated as table 2. The correct rate reached 89.70% the highest one while we took the eleventh line as measured data (the distance with the edge was 1.1 centimeter).

Distance (mm)	Baseline	Recognition Rate
3	15	80.91%
5	14	83.03%
7	15	86.36%
9	12	86.36%
11	11	89.70%
13	8&12	86.67%
15	4	87.88%
17	4	88.48%

Table 2: Correct rate of recognition

## Discussions

From the experimental results, only taking two three-dimensional thickness' data to recognition was worse than the performance of traditional image recognition. However, the recognition rate of the system has reached 89.70%. If we listed the most similar top three as other users to apply other ways to recognition, then the correct rate could reach 100%. Furthermore, the placing locations by users could affect system recognition. In general, the recognition rate is high while the laser beams projecting on the center of shell (more effective measured points). On the contrary, it is lower. In the future, either associated with other characteristics to reinforce integral recognition, or detect the measuring amount of measuring point where locations users placing shells avoid from recognition failures, both are ways to strengthen this system.

## **Conclusions**

This study has achieved that one set of laser equipment to measure three-dimensional contour of shells to be recognition characteristics which could avoid taken image characteristics as recognition required highly stable light sources environment. Under the circumstance of applying Raspberry Pi associated with linear red line laser, thirty pieces of nine species of shellfishes to reach the recognition rate of 89.70%. If all the first three recognition results were correct, the recognition rate might reach 100%. In the future we will carry on either reinforce integrating other characteristics or warning for too less measured points, so that the system could be strengthen enough to demonstrate in exhibition hall.

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## *Set Up a Bridge Between the Classroom and the Real World*

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The IAFOR Conference for Higher Education Research – Hong Kong 2018  
Official Conference Proceedings

### **Abstract**

The research project will be named as “Set up a Bridge between the Classroom and the Real World”. This plan integrates the realities and theories of service learning, training methods and curricula, interdisciplinary research results in Industry-university cooperation, betterness education, and social expectations to create a new pedagogical praxis research platform. For the new generation with a fierce competition, how to enhance the ability to survive is an important issue in the future. There are seven competitiveness factors of communication skills, problem-solving ability, planning ability, information analysis ability, ambition, time management ability and leadership. Participating students can increase the professional skills through actual participation in the service learning process in the future world. Through service learning of activities enhance children knowledge and information technology applications of life in rural primary school. Service learning emphasizes the concept of "learning" combined with "service", and enhances each of these skills with professional coaching and curriculum design, service learning projects, and specialized studies. In the service learning process, different job attributes can train different abilities. Training and review of results will be conducted through various mechanisms and rotation of works. The researchers will observe whether there is a difference in the ability of seven aspects through these processes. Before doing project, the learner will be asked to fill in a competency analysis questionnaire. The learners need to fill in the working log in service process. After the service is completed, the learners will fill in the service experience and questionnaire. The final data will be analyzed by one-way multivariate analysis of variance (MANOVA).

Keywords: pedagogical praxis, service learning, technical and vocational education, rural, Information and technology applied in life

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## **Introduction**

Today, many scholars agreed with that the skills taught by schools are not sufficient for college graduates to work on an increasingly-changing and challenging workplace. Then how to strengthen students' ability to thrive in the future world becomes an important issue in higher education. This study proposes restructuring the educational goal using the principles and practices used by successful businesses to enhance student learning and ability. Seven New Generation Basic Skills are proposed: (1) the ability to communicate effectively with others both orally and in writing; (2) the ability to plan a new project; (3) the ability to solve problems; (4) the ability to read and analyze information; (5) the ability to manage one's time; (6) the ability to lead a group; (7) the ability to work in groups with persons of different backgrounds. The conclusion of this study can be used both by researchers to guide their investigation of student development—and by college administrators and faculty—to help them design more effective curriculum and learning environments in higher education.

## ***Research Motivation***

For the new generation with a fierce competition, how to enhance the ability to survive is an important issue in the future. Many things are not taught at school.

## **Literature Review**

Govekar and Rishi (2007) claimed that Service-Learning is an educational approach that combines community service projects with credit-bearing educational experience.

## **Methodology**

This section describes the methodology that will be used in this research. It includes the research model, description of the sample, instrument, and the statistical procedures.

Research Model

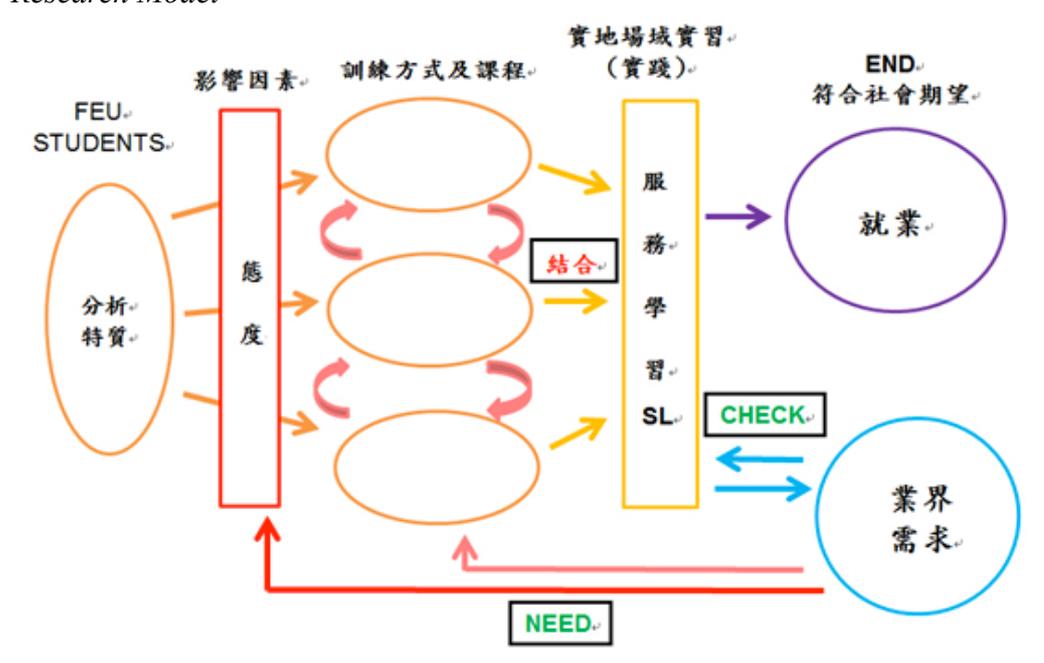


Figure 1: Research Model

Instrument

- Before doing project, the learner will be asked to fill in a competency analysis questionnaire.
- The learners need to fill in the working log in service process.
- After the service is completed, the learners will fill in the service experience and questionnaire.

Research Area

- A rural area elementary school in the Southern of Taiwan
- Information and Computer Winter Camp

Data Analysis

The final data will be analyzed by one-way multivariate analysis of variance (MANOVA).

Collecting Data

The researcher will collect data in winter vacation 2019.

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***The Effect of Project-Based Learning on Cloud Computing  
to Enhance Collaborative Skills***

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The IAFOR Conference for Higher Education Research – Hong Kong 2018  
Official Conference Proceedings

**Abstract**

Learning by Doing is the key factor in acquiring knowledge through practice from their own experiences. It addresses teaching methods, which are believed to achieve a beneficial outcome to the learning ability of students. This study investigated the effect of combining a Project-based Learning (PjBL) with Cloud Computing. The learning and teaching model designed was based on the PjBL seven steps principles using the cloud computing on six components as a tool for learning management and the PjBL activities to increase motivation and collaborative learning. Thirty-three undergraduate students taking a Innovation and Technology for Science Teachers course were required to work in groups to complete a PjBL project. The students will be assigned to work cooperatively to create projects using tools on cloud computing. The teacher acts as a facilitator and provide the students with a good learning environment. Results indicate that the learning and teaching method had a positive impact of on the development of Collaborative Skills of the students which are useful for their daily and work life after graduation.

Keywords: Project-based Learning, Cloud Computing, Collaborative Skills

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## Introduction

In recent years, Thailand educational technology and social developments has been changed via a new techno-cultural revolution to improve any active learning methods which can influence both instructors and students (Adkins, 2002). Resulting in a developed instruction, this output generates a new principle of learning for students. Many institutions are embracing these technologies into their system. Especially in education, development, science and technology applications have influenced the learning process (Inthachot, Sopeerak, & Rapai, 2013). Thus, this technology can be used to encourage learning process, support communication setting, assess learning activities, manage resources and create learning materials (Che Ku Nuraini, Faaizah, & Naim, 2014).

One of the newest technologies for online learning is cloud computing that has garnered a considerable amount of attention. In particular, students and teachers have to use applications without installing the cloud into their computers. They are also allowed an any access to save files from their own computer under internet connections (Siegle, 2010). In such a model, users access services based on their requirements without regard to where the services are hosted or how they are delivered (Buyya et al., 2009). Thus, these technologies must be suitable to the essential skills. Interestingly, students have leant pre-skills or fundamental abilities of the technologies from schools, and they are capable to build up and study new skills during undergraduate period (Vockley, 2007; Nevin, 2009).

The distinctive features of indigenous education are learning by doing, learning through authentic experiences, individualized instruction, and happy learning (Ratana-Ubol, & Henschke, 2015). One model of learning that emphasizes collaborative skills of students is a Project-based learning (PjBL). This learning model allows students to develop their creativity in designing and creating a project that can be used to overcome the problems. PjBL is a comprehensive approach to classroom teaching and learning that is designed to engage students in investigation of authentic problems in a learning environment that fosters creativity and teamwork, and advocated for more student-centered and experiential approaches to education that support deep learning through active exploration of real-world problems and challenges (Blumenfeld et al., 1991; Pellegrino & Hilton, 2012). During to do the project, students will be trained and developed their communication skills of observing, using tools and materials, plan projects, applying the concepts, ask questions, and communication through technology. They must apply those skills to create a work from any situations, problems or interests of learners.

This article is describing an existing the effects of PjBL on cloud computing to support meaningful learning outcomes. The core of the discussion. All students worked collaboratively with PjBL using cloud computing tools for their learning. Students expressed problems as a challenge or a question that must be exchange ideas and managed their own time to complete the project.

## Methodology

### 1. Participants

The participants were undergraduate students who registered the innovation and information technology for Science teachers course in the second semester of 2017 academic year, Faculty of Education, Phranakhon Si Ayutthaya Rajabhat University, Thailand. The students were 33 undergraduate students in Major of Science, Faculty of Education divided into 7 groups which the activities were run parallel by seven steps of PjBL.

### 2. Learning process

The researcher studied the document and related research then synthesize the learning process of teaching was found process of learning consist of seven steps as shown in Figure 1.

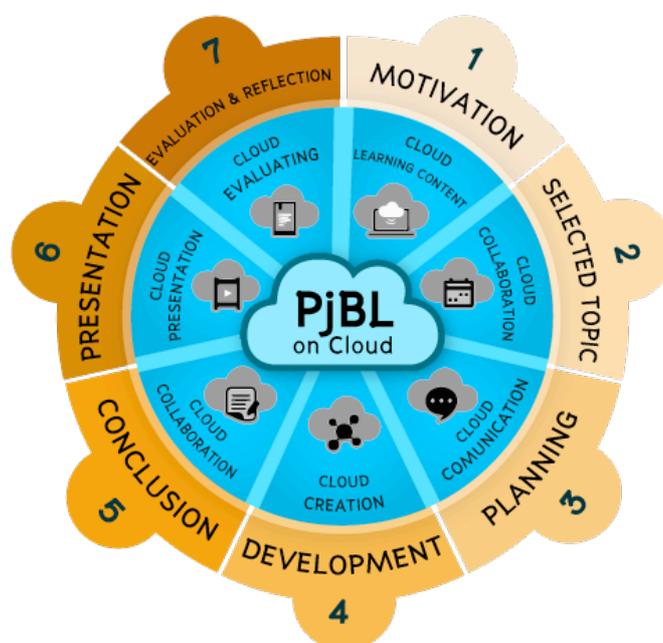


Figure 1: Learning process of PjBL on Cloud Computing

#### 2.1 Motivation

The first phase of learning. Students were activated via questions or problems and designed a project to solve their interested topic which was based on an actual content through the tool or system to manage the learning. The teacher will upload the content and instructional materials onto the web site for students to easily access. At this point, teacher and students can communicate via the communication tools provided by the system, such as Edmodo, Edpuzzle, Google Classroom, etc.

## **2.2 Selected Topic**

Each team of students was chosen the project topic based on their knowledges and experiences. In case the students had less experiences providing case studies, it was important to provide access to relevant experiences. Students could refer to them by linking relevant experiences as a way for learners to connect their experiences to learning. Students could use the tools to create together and fix it simultaneously. To create a document or collect documents of those involved in teaching. Examples of collaboration tools such as Google Drive, Google Docs, Google Calendar, Diigo, Linoit, etc.

## **2.3 Planning**

The team of students was discussed, planned, and executed on the topic received. It was step that students need to think creatively ideas consist of designed to work a lot, think in many different ways, think a new idea and more complete details. Students could use the tools to communicate with their team, teacher and the expert in anytime anywhere for advice and suggestion. Examples of communication tools such as Google Hangout, Line, Google+, etc.

## **2.4 Development**

The project was developed according to the operational plan. Students created a project that designed to be complete, clear and distinctive in terms of the identity of their team. Teacher gave advice that encourages the students to use the thinking process to correct the learning task that leads to creativity. Students chose tools that promoted the development of their work through the website, resulting in a collaborative skill. Examples of creation tools such as Google Drawings, MindMeister, Pixlr Editor.

## **2.5 Conclusion**

The students summarized the thinking of the work process more clearly and accurately. The teacher and expert provided guidance and encourage the students to think of finding answers to unmet mission to learn actively through collaboration tools.

## **2.6 Presentation**

Students created a media presentation using cloud presentation tools that convey the ideas of the team prominently in front of the class, classmates asked questions and exchange ideas with each other. Examples of presentation tools such as Google Slides, SlideShare, Issuu, Prezi, Emaze, etc.

## **2.7 Evaluation and Reflection**

It was the final step of project. Teacher, expert, and classmates shared idea and change their experiences in order to broaden their perspective could further improve the project for the future. The evaluation was based on cloud evaluating tool with clear

scoring criteria. Examples of evaluating tool such as Google Form, Google Sheets, Rubistar etc.

### Data Collection and Analysis

The students performed seven steps activities over a five weeks' period using a cloud computing tools and group work together. The teacher assigned the students to design project about video media on scientific knowledge while each student during the design of the project, the teacher observed the behavior of each member within the team encourage participants to express their opinions and work with students to complete their project then evaluate the collaborative skills after that to analyze the mean and standard deviation.

This study developed the evaluation form of collaborative skills by the concept and theory of Friend & Cook (1992) and Randy, Ken, & Alan (2014) had actual conditions assessment with multiple rating scales using five-level rubrics, consisted of 5 factors and 15 questions and the reliability of the evaluation was .83 at high reliability as shown in Table 1.

Table 1: Scoring Criteria for Measuring Collaborative Skills

Factors	Scoring criteria
<b>1. The voluntary and willing to work</b>	
1.1 Preparation	Prepare to work as a team
1.2 Participation in work	- Provide useful information and feedback - Provide a leadership skill - Attempt to engage with the team
1.3 The enthusiasm to tackle the problem	Be enthusiastic, try to solve problems arising from their own ideas
<b>2. The goals of the work</b>	
2.1 Targeting	- Engage the target team clearly - Provide feedback and useful comments and suitable immediately
2.2 Planning the work	- Engage in team planning - Provide feedback and useful comments and suitable immediately
2.3 Quality of targeted work	Can work on the target and achieve the quality work of its target
<b>3. The interaction with others</b>	
3.1 Communication for the exchange of ideas	Talking to team members on a regular basis on various issues that are beneficial to work
3.2 Working with others	- Participate in all team work processes - Support the work of all the team
3.3 Listening and understanding the ideas of others	- Listen to the opinions of others - Do not criticize the opinions of others in a negative light - Try to understand the ideas of others, and can be deployed in the operation.
<b>4. Responsibilities</b>	

<b>Factors</b>	<b>Scoring criteria</b>
4.1 Time Management	- Manage time in work to be done in time - Have responsibility, do not modify the deadline to submit applications
4.2 Attention to work	- Have commitment to work and what needs to be done continuously - Can control their own work as assigned
4.3 Working on their duties	- Can work on their own as well, no defects - Help the others
<b>5. Shared resources</b>	
5.1 Search and storage	- Find the information from a variety of sources - Save the searched data in every detail
5.2 Information gathering for sharing	- Gather information that you find yourself and from team members - Share all information to be able to get to work
5.3 Sharing information	- Cooperate to synthesize information - Select the appropriate information for team work from different sources

Interpretation Levels of Collaborative Skills meaning as:

Score	Range
4.51 – 5.00	Very Good/Highest
3.51 – 4.50	Good/High
2.51 – 3.50	Intermediate
1.51 – 2.50	Poor
0.00 – 1.50	Need to be improved

## Results

The result divided into 2 parts: as 1) Collaborative Skills, and 2) Satisfaction of Learners.

Table 2: Overall of Collaborative Skills

<b>Factors</b>	$\bar{x}$	<b>S.D.</b>	<b>Level of meanings</b>
<b>1. The voluntary and willing to work</b>	<b>4.47</b>	<b>0.56</b>	<b>Good</b>
1.1 Preparation	4.48	0.57	Good
1.2 Participation in work	4.29	0.53	Good
1.3 The enthusiasm to tackle the problem	4.65	0.55	Very Good
<b>2. The goals of the work</b>	<b>4.58</b>	<b>0.60</b>	<b>Very Good</b>
2.1 Targeting	4.55	0.57	Very Good
2.2 Planning the work	4.55	0.62	Very Good
2.3 Quality of Targeted Work	4.65	0.61	Very Good
<b>3. The interaction with others</b>	<b>4.32</b>	<b>0.53</b>	<b>Good</b>
3.1 Communication for the exchange of ideas	4.32	0.54	Good
3.2 Working with others	4.32	0.54	Good
3.3 Listening and Understanding the	4.32	0.54	Good

<b>Factors</b>	$\bar{x}$	<b>S.D.</b>	<b>Level of meanings</b>
ideas of others			
<b>4. Responsibilities</b>	<b>4.32</b>	<b>0.57</b>	<b>Good</b>
4.1 Time Management	4.29	0.59	Good
4.2 Attention to work	4.29	0.59	Good
4.3 Working on their duties	4.39	0.56	Good
<b>5. Shared resources</b>	<b>4.46</b>	<b>0.56</b>	<b>Good</b>
5.1 Search and storage	4.32	0.54	Good
5.2 Information gathering for sharing	4.52	0.57	Very Good
5.3 Sharing Information	4.55	0.57	Very Good
<b>Overall</b>	<b>4.43</b>	<b>0.57</b>	<b>Good</b>

Table 2, results showed that overall collaborative skills of learners that learned with PjBL model was classified as good score at  $\bar{x} = 4.43$ , S.D. = 0.57. This finding implied that the PjBL model provided a positive influence over successful in collaborative skills of students.

Table 3: The Satisfaction of Learners

<b>Factors</b>	$\bar{x}$	<b>S.D.</b>	<b>Level of meanings</b>
<b>1. The process of learning and teaching</b>	<b>4.47</b>	<b>0.50</b>	<b>High</b>
1.1 Preparation before learning	4.42	0.50	High
1.2 The process of PjBL	4.52	0.51	Highest
1.3 Measurement and Evaluation	4.48	0.51	High
<b>2. Support for learning and teaching</b>	<b>4.55</b>	<b>0.51</b>	<b>Highest</b>
2.1 Cloud learning manage tools	4.58	0.50	Highest
2.2 Cloud collaboration tools	4.58	0.50	Highest
2.3 Cloud communication tools	4.84	0.37	Highest
2.4 Cloud creativity tools	4.35	0.55	High
2.5 Cloud presentation tools	4.48	0.51	High
2.6 Cloud evaluation tools	4.48	0.51	High
<b>3. The benefits that learners receive</b>	<b>4.63</b>	<b>0.48</b>	<b>Highest</b>
3.1 benefit from teaching and learning	4.68	0.48	Highest
3.2 contributions can be developed collaborative skills	4.68	0.48	Highest
3.3 should be teaching this course to others	4.48	0.51	High
3.4 can be guideline for developing other learning	4.71	0.46	Highest
3.5 students are happy with the teaching	4.61	0.50	Highest
<b>Overall</b>	<b>4.56</b>	<b>0.50</b>	<b>Highest</b>

According to the table 3, the satisfaction of learners after learning with the PjBL model found that the learners satisfied with the designed instruction at the highest level ( $\bar{x} = 4.56$ , S.D. = 0.50), the most satisfied topic was “cloud communication tools” which was 4.84 of mean and 0.37 of standard deviation.

## **Conclusion**

The aforesaid results imply that the PjBL model have a positive influence over learners' success to working together because PjBL encourages students to organize and present information while working with others who have different thought processes and use different approaches to the same problem. The project work assigned required students to investigate a workplace problem in a real workplace setting (Musa et al., 2012) Students are taught using PjBL model turned out to have good learning outcome as well (Ardhyani & Khoiri, 2017). Moreover, optimal use of modern technology to facilitate access to student information. The use of cloud technology in educational process gives the chance to educational institutions to use computing resources and program applications as a service through the Internet; it allows intensifying and improving training process (Emelyanov & Klygin, 2016). Students and teachers have the opportunity to quickly and economically access various application platforms and resources through the web pages on-demand (Ercan, 2010). This automatically reduces the cost of organizational expenses and offers more powerful functional capabilities gives learners and teachers a potential environment to learn and teach more effectively. Therefore, this finding indicated that the learners with learning process that focused on practical skills using PjBL and learning environment on cloud computing appropriately affected to the collaborative skills with applications to the future which apparently will fulfill the needs of the 21st century education.

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***Level of Satisfaction of Employers on the Work Performance of NWU-CTE  
Graduates***

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**Abstract**

This study aimed to identify the level of satisfaction on the work performance of NWU-CTE (Northwestern University-College of Teacher Education) graduates along the 21<sup>st</sup> Century Skills. The descriptive survey method was used through the combination of quantitative and qualitative research. The questionnaire consisted of the 21<sup>st</sup> Century Learning Skills which were adopted and modified from the framework of the 21<sup>st</sup> Century Learning Skills. Under each century skill are six competencies adopted from the NCBTS (National Competency-Based Teacher Standards) which are learned in the BSEd (Bachelor of Secondary Education) and BEEd (Bachelor of Elementary Education) degree programs. Relative to the Level of Satisfaction of Employers on the Work Performance of NWU-CTE teachers based on the four areas of the 21<sup>st</sup> Century Skills, the employers were all very satisfied with Communication Skills having the highest mean score and Learning and Innovative Skills the lowest mean score. Based on the findings of the study, the NWU-CTE graduates showed manifestation of the 21<sup>st</sup> Century Skills although there is still a great room for improvement especially in Learning and Innovation Skills. With the rapid change of technology, NWU-CTE graduates should go for Continuing Professional Development (CPD) and at the same time NWU has to look at First-World Classrooms of Teacher Education Institutions to remain relevant as an effective purveyor of true learning.

Keywords: Employers' Satisfaction, Competencies, Work Performance

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## Introduction

The prevalence of “those who can’t teach” mentality is confirmed by the present “teacher over supply of mediocrity” with the high mortality rate of the Licensure Examination for Teachers (LET) now Board Licensure Examination for Professional Teachers (BLEPT) annually for the past ten years from sixty-five percent (65%) to seventy five percent (75%), and the congressional report on “Continuously deteriorating quality of education in the country.” (www.21stcenturyskills.org, Bilbao et. al 2012).

Wilson (2009) as cited by Abad (2015) argues that teachers’ quality has become a central concern of policy makers and education alike. The preparation of student-teacher is very important on how they will perform their role in the teaching-learning process. To remain relevant and interesting, the teachers must possess 21<sup>st</sup> century skills. The 21<sup>st</sup> century skills is categorized into four (4) namely: Communication Skills; Learning & Innovation Skills; Information, Media, & Technology Skills, and Life & Career Skills.

The 21<sup>st</sup> century teacher is one who is adequately equipped with communication skills, learning and innovation skills, information, media & technology skills & life and career skills. He/she collaborates and interrelates with others from all walks of life. He/she is innovative and embarks on lifelong learning. He/she uses technology to the maximum to improve his/her learning productivity. He/she critically analyzes and evaluates information derived from various sources and is able to read message from media whether directly given or in a subtle manner.

With ASEAN integration, the ingenuity, agility & skills of the Filipinos is crucial to competitiveness. The ability to compete as a nation, region & community demands a fresh approach to education. A 21<sup>st</sup> century education as the bedrock of competitiveness has to be recognized.

Employers cited professionalism, work ethics, oral and written communication, teamwork and collaboration, critical thinking, problem solving as the most important skills that hired graduates should possess. (The Conference Board, 2006). Top management should not only be the ones asked for their opinions on their satisfaction of their employees but also the direct superior of employees for they are the bridges that link down from top in order to attain the goals and objectives of the organization.

On the demand for a 21st century education & skills “the best employers will be looking for the most competent, most creative & most innovative people and will be willing to pay their top dollar/peso for their services.”

The ability of NWU to act as a driving force that could empower its graduates is of outmost importance. To compete globally would mean to prepare teachers who are capable of changing lifelong education needs. They must possess the competencies of a professional teacher as obtained in the National Competency-Based Teacher Standards (NCBTS).

The above issues motivated the researchers to investigate the level of satisfaction of employers on the work performance of NWU-CTE graduates.

## **Conclusion**

The study was delimited to graduates of Northwestern University-College of Teacher Education who were hired teachers in Laoag City, regardless of year of graduation. It is also delimited to four 21<sup>st</sup> century skills and six competencies as performance indicators taken from NCBTS under each 21<sup>st</sup> century skill.

Based on the findings of the study, the NWU-CTE graduates showed manifestation of 21<sup>st</sup> Century Skills. This implies that NWU heeds to the clarion call for continuing support for teacher education. However, excellence is a race without a finishing line so there is still much room for improvement especially in Learning and Innovation Skills in preparation for the Era of ASEAN Integration.

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## ***Feasibility Study of Gamification in Primary School Curriculum Design in Hong Kong***

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Official Conference Proceedings

### **Abstract**

Grew up with digital technology, primary school students expect education should be immersed into ICT and STEM. According to a recent local research conducted by The University of Hong Kong, students are addicted to gaming, spending more than three days per week on average. To steer students back to study, curriculum design needs to be reformed to be more attractive. The aim of the current work is to study and present the benefits of adding game elements into the current curriculum, such as increasing the motivation and engagement of students. The methodology used in this study is via a control experiment, which lasts for one semester. One class of students use the traditional curriculum, while another class uses gamified curriculum design, which the curriculum elements such as assignments, quizzes, and examinations are re-designed to become quest-based. Depending on the performance of students, each quest can reward students with game scores and certain single-use perks, such as privileges to extend the deadline of homework for one day. Without needed to wait for their classmates, students can finish a quest and start another if the prerequisites, such as completed related lecture, have been met. At the end of the semester, the effectiveness of the gamified curriculum design can be reviewed by comparing the performance changes of two classes of students. The experiment can as well be re-run and extended to a wider base of test subjects to obtain more accurate results. We hope that this study will give insights to future curriculum reform.

Keywords: Gamification, Class participation, Curriculum reform, game-based learning

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## Introduction

Students in Hong Kong are grown up with Information and Communication Technology (ICT); smartphones and tablets are the primary entertainment source since their childhood. At the same time, their schools are encouraged by the Hong Kong government to start offering Science, Technology, Engineering, and Mathematics (STEM) in recent years.

However, traditional curriculum lacks playful elements, only focuses on academic performance. Students tend to recite answers instead of learning the knowledge behind the assignments, quiz, and examinations. Such a result-oriented approach makes students and parents stressful. There are quite a number of student suicides recently; more than 10 students killed themselves in the last two years. The situation has to be remedied.

Gaming is proven to be an effective learning medium to educate students in the last decade [1]. However, excessive gaming will drive students away from study. In a recent local research conducted by The University of Hong Kong [2], upper primary school students are extremely addicted to gaming and lose focus on study.

Over two thousand primary four to six students from eight schools participated in the study. In average students play video games more than 8 hours per week; about 14% of respondents play more than 21 hours per week, which is more than 3 hours per day. The research only counts the video gaming time, excluding other entertainment such as watching YouTube and television. The students have insufficient time to study and rest. The phenomenon is indeed alarming.

Gaming addiction can lead to very serious problems. From the Diagnostic and Statistical Manual for Mental Disorders, fifth edition [3], authored by the American Psychiatric Association, gaming addiction refers to uncontrollable and persistent engaging in gaming, leading to significant impairment.

The problem is propagating, as it does not take long for these students to enter higher education. Curriculum gets more difficult in higher education levels, students will lose focus on study.

Traditional teaching method in Hong Kong has a general impression of boring, repetitive and examination-oriented. Students always struggle not to lose focus on study, especially when there is a lot of entertainment around them in Hong Kong.

It is suggested that the current curriculum should be redesigned to become as attractive as video gaming, to steer students' interest back to study.

The aim of the study is to study and present the benefits of adding game elements into the current curriculum, in order to increase motivation and engagement of students.

## Methodology

The methodology used in this study is through a control experiment. Duration of experiment lasts for two semesters, four months each. The experiment will take part in primary schools. For the sake of fairness, students will be randomly split into two groups. The first group will take part in the newly gamified curriculum, while another group takes part in the traditional

curriculum. At the end of the first semester, two groups will exchange curriculum methods in order to have more accurate results.

The first stage of the gamified curriculum changes the assignments, quizzes, and examination of students' Mathematics subject into quests.

In the traditional curriculum, after teacher teaches a topic, he/she will give out an assignment for students. Once the assignment is finished, the teacher will proceed to teach the next topic. Then, usually in the middle of the semester, there will be a quiz followed by an examination near the end of the semester. Student performance is evaluated by the accuracy of the assignments, quiz, and examination, in terms of marks.

In the gamified curriculum, teacher will announce a list of Quests, which has similar contents as the assignments of the traditional curriculum, to students. Some quests may have no requirements, that means that students can start and finish the quest at anytime they want; while some quests have prerequisites, such as students have to clear two other quests in order to start these quests. With this approach, students can learn time management as well.

Once students with fast learning pace have completed all standard quests, some bonus difficult quests with extra rewards will be unlocked, which requires students to team up with their classmates in order to complete the task. Such tasks not only can encourage them to take up tough challenges, but it can also train up the teamwork and leadership ability of primary school students. Students with slower learning pace can still finish all standard quests with the guidance of teachers. In such curriculum design, fast learning students do not require to wait for other students to start learning new knowledge. Additionally, teachers can issue limited-time Quests to students, for students to challenge and obtain additional rewards.

After finishing a quest, students will be rewarded with Quests Scores, which is the primary currency of the gamified curriculum. If a student performs well in a Quest, he/she will be rewarded with certain single-use perks, such as privilege to extend the deadline for one day.

There are two kinds of quest rewards: Quest Score and Perks. Quest Score is the primary key to rank students' performance. If the student finished a quest earlier than the deadline, he/she will earn extra Quest Scores; on the other hand, if the student finished a Quest accurately, he/she will earn more Quest Scores.

Perks are single-use special abilities. Students can only earn perks when they finished a Quest with excellent results. Some suggested perks are as follows:

- Extend the deadline for one day
- Double Quest Score for one Quest
- Unlock bonus Quest

Student performances are recorded on a web-based platform. Teachers, students, and parents can monitor the performance as well as completed and ongoing quests online, anytime and anywhere. Moreover, a leaderboard that displays a list of top students can be set up and displayed in school to encourage students to strive for the best among their classmates.

To review the performance of the gamified curriculum, the academic performance of both groups of students will be compared to review the effectiveness at the end of each semester.

Review metrics include the willingness of study, happiness throughout the study experience, and the problems encountered during the study. Reviews will be performed in a short interview as well as a questionnaire to the participating students.

To obtain more accurate results, the whole experiment can be re-run and extended to:

1. a wider base of test subjects, such that more primary schools can participate;
2. a wider spectrum of subjects, such as science subjects; and
3. secondary school and tertiary education students.

Furthermore, with the aid of modern technology, the gamified system can be integrated with existing Learning Management Systems (LMS) to provide seamless e-learning experience to the students.

Apart from web-based systems, a mobile companion app can be developed to allow students to keep track of their progresses when they are out of campus, and allow them to team up with other classmates; to facilitate constructive communication, students in the same team can communicate with each other using the built-in messaging feature. The app is also capable of delivering notifications to notify students once a limited-time Quest is available for them to complete.

## **Conclusions**

On the whole, it is hoped that the feasibility study of gamification of primary school curriculum design in Hong Kong elaborated above can give meaningful insights into the future curriculum reform and help alleviate the situation of students losing focus on their study currently faced by teachers and parents.

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*Taiwanese University Students' Retrospective Evaluation of a Textbook in Use*

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**Abstract**

In Taiwanese EFL contexts textbooks play an important role in the classroom. As teachers, textbooks provide learners with a resource of L2 input either in the classroom or outside the classroom. A recently published textbook, *Reading Time: A Strategic Approach to Reading in English*, needs to be evaluated from the perspective of its users. The purpose of this study is to examine how student users perceive this textbook and its effect on their English learning through conducting a questionnaire survey at the research context. The questionnaire was developed by the researcher according to the aim of the study, and the quantitative data was collected from eight Level 2 English classes at Wenzao Ursuline University of Languages and then analyzed by using SPSS 23.0 in 2018. The research findings reveal that the student participants reflected positively on this textbook and its effect of helping them learn English at Wenzao. Based on their written comments in response to three open-ended questions in the questionnaire, some suggestions on likely modifications to be done in the future have been made for textbook developers. The present study also addresses the needs of carrying out further research on the evaluation of the textbook from different perspectives.

Keywords: textbook evaluation, post-use evaluation, university students, low achievers

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## Introduction

Wenzao Ursuline University of Languages recruits its students mainly from vocational high schools, in which students' attention might not be focused on second language learning particularly. Once students are enrolled into Wenzao Ursuline University of Languages (Wenzao hereafter), which has established its reputation for language education, they need to take a compulsory 24-credit English course and start to attend English class for six hours a week if their scores of College Student English Proficiency Test (i.e. CSEPT) are below 144 (i.e. low proficiency level of English). These students are placed in either Level 1 or Level 2 classes according to their exam performance. In the present study, the student participants are Level 2 freshmen and sophomores from different departments at Wenzao, and their overall CSEPT scores ranged from 120 to 144. In the face of these low and comparatively low achievement students, English teachers have an important job to do in the beginning of each fall semester, that is, textbook selection. Normally, teachers tend to stick to the materials used in the past partially because their evaluation of the textbooks is positive in retrospect and partially because they have gained experience of employing these textbooks to improve students' English proficiency. If there is any possibility of looking for a new textbook in lieu of the one they are using, teachers must scrutinize the selection and keep weighing its pros and cons before, during and after the teaching/learning process. Before the fall semester began in September, 2017, six Level 2 English teachers had decided to use a new reading textbook (i.e. *Reading Time: A Strategic Approach to Reading in English*) to substitute three English learning magazines (i.e. *Studio Classroom*) that they used to ask students to purchase during the semester. *Reading Time: A Strategic Approach to Reading in English* was published by StudioClassroom.com in August 2017. No research has been carried out to evaluate its classroom use from users' perspectives within the teaching/learning contexts, which can be useful for teachers to work on future innovations in their teaching methods as well as for textbook developers to make necessary follow-up modifications. Hopefully this needed research is hoped to benefit learners, teachers, educational administrators and the publisher from the process of judging "the effect of the materials on the people using them" (Tomlinson 2003, p.15). The present study is to generate its key users' perceptions by collecting information concerning students' perceptions of this textbook and the perceived effect of using it to study English at school through a questionnaire survey. The questionnaires consisted of 33 items and were administered to 217 Level 2 students around the end of the fall semester in January, 2018. The findings help us see how the L2 students reflect on this textbook in use. The survey results in more details will be presented in the section of Findings and Discussion.

## Literature Review

The role of textbooks and the importance of using them in classrooms must be different from person to person and can hardly be defined flawlessly. Textbooks can affect the effect and quality of teaching and learning squarely and in turn engage or lose their users' attention. While some teachers are striking a balance between being restricted to the rigid structure of a textbook or burning themselves out to self-produce teaching/learning materials, more teachers cannot help but accept a textbook assigned by the higher authority and get ready to present it to students. For novice teachers, textbooks may provide them with guidance in course and activity design (Mohammadi & Abdi 2014) so that they can

shift their energy from ‘what to teach’ to ‘how to teach it’. Under such circumstances, using textbooks might open a door to fulfilling pedagogical aims as well as accommodating learner needs. Frankly, textbook adoption is never an easy task. Although selection and evaluation might not be new to teachers, the whole process tests teachers’ wisdom of analyzing the strengths and weaknesses of a textbook thoroughly and then challenges their professional skills to make necessary adjustments accordingly from the old textbook to the new one.

The main advantages and disadvantages of using textbooks have also been discussed by many scholars (e.g. Richards & Renandya 2002; Riazi 2003; Ur 1996). Since no course is complete until it has found its relevant textbook (Hutchinson and Torres 1994), teachers or educational administrators select textbooks with extreme caution at all times. Not surprisingly, for years a vast amount of studies suggests various systematic and objective procedures for teaching practitioners to select and evaluate textbooks (e.g. Azizifar et al. 2010; Ansary & Babaii 2002; Carrell & Korwitz 1994; Khodabakhshi 2014; Litz 2001; Marc & Rees 2009; Mohammadi & Abdi 2014; Sheldon 1988; Soori et al. 2011; Tosun 2013; Yarmohammadi 2002; Yasemin 2009). Based on a list of factors such as rationale, activities, skills, content, availability, layout, cultural biases, and so on, these checklists give evaluators a sense of security as they can do their job in a systematic, comprehensive and efficient way which renders the results more objective and reliable. Despite these handy checklists, Ansary and Babaii (2002) makes it crystal clear that not all of these factors shall be present in each and every textbook. That is, teachers need to be under no illusions about finding a perfect textbook. All in all, the core of textbook evaluation is set on helping evaluators identify the edge of a textbook over other options in hand. Afterward teachers need to make good use of it and see if this book closely reflects the aims, methods and values of the course or attends to learner needs as anticipated.

The extent to which a textbook fits the purposes of a course, learner interests and its alliance with the syllabus of the program or can satisfy teaching/learning needs may determine its overall evaluation. Following Ellis’ (1997) three phases of materials evaluation, (1) pre-use evaluation, (2) in-use evaluation and (3) post-use evaluation, the predictive evaluation was no longer in need as *Reading Time: A Strategic Approach to Reading in English* had been evaluated beforehand and selected for the Level 2 English course at Wenzao. Another type of textbook evaluation which can be employed to examine the textbook being currently used in the classroom so as to find immediate solutions for any probable problems of using the textbook was beyond the stage of data collection. Therefore, the retrospective, post-use evaluation was carried out to investigate the perceived values of this textbook from the perspective of its student users in the present study.

### **Objectives of the study**

The present study aims at researching into Level 2 students’ perceptions of one of their learning materials, that is, *Reading Time: A Strategic Approach to Reading in English* when they study English in the Level 2 English Course at Wenzao. Their perceptions of this textbook will be identified to answer the following questions:

1. What are Level 2 students’ perceptions of general contents of *Reading Time: A Strategic Approach to Reading in English*?

2. What are Level 2 students' perceptions of their English study through using *Reading Time: A Strategic Approach to Reading in English*?
3. What are Level 2 students' perceptions of Reading Time Web English, audio CD and unit exercises in *Reading Time: A Strategic Approach to Reading in English*?

For the purpose of illustration, *Reading Time: A Strategic Approach to Reading in English* will be abbreviated as *RT* in the following. The findings are expected to provide insightful information to understand how the Level 2 students evaluate *RT* and the effect of using it to study English in the Wenzao setting. This study may also provide English teachers with some pedagogical implications on using this textbook in their own Level 2 English course. As well as this, the findings may shed light on further modifications for the textbook developers and some suggestions on the strengths and/or weaknesses of *RT* for the publisher.

### **Research Methodology**

The participants in this study were 125 freshmen and 92 sophomores, who were attending the required General English Level 2 Course, constituting of a weekly six-hour integrated English skills class, in the 24-credit English program at Wenzao during the academic year 2017-2018. All these Level 2 students had roughly a homogeneous background in terms of their first language (i.e. Mandarin Chinese) and the amount of formal English instruction at Wenzao. Their overall CSEPT scores were between 120 and 144, which have been considered as an indicator of their English proficiency. The anonymity of the questionnaire respondents was established by specifically asking them not to write their names on the questionnaires unless they were voluntarily willing to be interviewed in the future if necessary.

Sheldon (1988) argues that no evaluation criterion is universally appropriate to any teaching/learning contexts. The evaluation checklists can be dated and modified according to the requirements of each learning situation (Khodabakhshi 2014). In order to make the criteria more applicable to the research context, I developed a questionnaire to make it comprehensible to the research participants in order to elicit their first-hand opinions of *RT*. Questionnaires were used as the survey instrument, and the final questionnaires were composed of 33 items including three open-ended questions. The finalized questionnaires were written in Chinese (shown in Appendix A). Questions 1 to 30 used a five-point Likert scale, (5=strongly agree; 4= agree; 3=somewhat agree; 2=disagree; 1=strongly disagree). These 30 five-point Likert scale items can be grouped into five scales of user perspectives, including contents (item 1 to 13), skills improvement (item 14 to 18), Reading Time Web English (item 19 to 25), the audio CD (item 26 to 28) and the unit exercises (item 29 and 30). Internal consistency reliability check of these five multi-item scales was examined by computing their Cronbach alpha coefficients with SPSS 23.0, presented in Table 1. As shown in Table 1, except the fifth scale (i.e. unit exercises,  $\alpha=.857$ ), Cronbach alpha coefficient of the other scales is higher than 0.90. These results suggest that the questionnaire achieves a very high degree of internal consistency reliability in this study.

Scale	Title	Number of items	Cronbach alpha coefficient
1	contents	13	.960
2	skills improvement	5	.921
3	online video channel	7	.969
4	audio CD	3	.928
5	unit exercises	2	.857
Total	5 scales	30	

*Table 1: Internal consistency reliability check*

Question 31 to 33 were three open-ended questions. Question 31 is about the respondents' favorite unit and any likely reasons. Question 32 is about their unfavorable unit and their reasons. Question 33 asks them to briefly describe why they favored this textbook. The questionnaires were administered to 217 Level 2 freshmen and sophomores around the end of the fall semester of the academic year in order to collect the students' perceptions of *RT* after their classroom use. Around the middle of January, 2018, most of the Level 2 English teachers were able to spare the time for their students to fill out the questionnaires as they were reviewing the lessons for the forthcoming final exam. The questionnaire data were gathered within 15 minutes of the students' class time, via prior agreement with the teachers. 217 questionnaires were collected and then analyzed through using the statistical software SPSS 23.0. The descriptive statistics such as mean (M) and standard deviation (SD) were calculated and displayed in the next section.

### **Findings and Discussion**

In this section, the questionnaire data is presented describing the key users' perceptions of *RT* and their English study by using this textbook. 217 Taiwanese EFL university students participated in this questionnaire survey. The research findings will be discussed by answering the three research questions mentioned earlier. In presenting the results of the study, the means and standard deviations of item 1 to 30 as well as the response percentage of item 31 to 33 were calculated to describe and summarize the students' perceived values of the textbook. The results of the items that relate to each research question will be presented in tables, and explanations will be provided accordingly.

The first research question: "What are Level 2 students' perceptions of general contents of *Reading Time: A Strategic Approach to Reading in English?*" was measured through 13 items (item 1-13) in the questionnaire and the responses are presented in Table 2.

<b>Item</b>	<b>Statement</b>	<b>M</b>	<b>SD</b>
1	RT meets my learning needs.	3.9401	.86126
2	Its level of difficulty suits my English proficiency level.	3.7097	.87852
3	The amount of its units (i.e. 18 units) is adequate.	3.9908	.89748
4	RT helps promote my motivation to learn English.	3.7788	.93140
5	RT helps develop my confidence of learning English.	3.6267	.97839
6	RT helps raise my interest in learning English.	3.6912	.97257
7	RT helps advance my reading skills.	4.0138	.85244
8	RT advance my listening skills.	3.7558	.92810
9	RT helps me learn English in an integrative way (integrating English listening, speaking, reading and writing).	3.7465	.93556
10	The topic of each unit in RT is interesting.	3.9355	.90548
11	I can learn multiple cultures in RT.	4.1152	.83920
12	RT helps improve my daily English communication.	3.6037	.96205
13	RT helps increase the amount of my vocabulary which is relevant to the topics in the book.	3.9862	.85786

(5=strongly agree; 4=agree; 3= somewhat agree; 2=disagree; 1=strongly disagree)

*Table 2: Perceptions of the general contents of RT (response frequencies in percentages)*

The first scale (item 1 to 13) that I measured is the respondents' perceptions of general contents of *RT* in meeting their learning needs, promoting their learner motivation, advancing their English skills, and appreciating different cultures. All these 13 items represent the Level 2 students' positive attitude toward *RT* and its general contents. All their means stay above 3.6, which represents their somewhat agreement and agreement with these statements. In terms of item 7 (M=4.0138) and item 11 (M=4.1152), we can clearly see *RT* has achieved some of the initial objectives of developing this textbook, including to improve users' reading ability through reading texts covering different topics and cultures. Through item 1 to 3, 10 and 13, their means might shed light on the students' self-awareness of learner needs, their current capacity of comprehending reading texts in *RT*, the amount of reading and relevant learning practices and therefore an expanded vocabulary bank relevant to different topics which they think are interesting (item 10) in *RT*. Item 5, 6 and 12 share similar means around 3.6. They are the lowest means in this scale though. Still, the students positively approve of the helpfulness of *RT* in developing their self-confidence and interest in learning English as well as their daily English communication. In addition to improving users' reading ability, *RT* performs quite well as it paves way for integrated learning, such as listening practices (i.e. item 8 and 9). The above is what numbers can tell us for now. As for any possible in-depth views on the perceived values of *RT*, the three open-ended questions (item 31-33) may say more.

The second research question is "What are Level 2 students' perceptions of their English study through using *Reading Time: A Strategic Approach to Reading in English*?" The means and the standard deviations of the five questionnaire items, presented in Table 3.

<b>Ite m</b>	<b>Statement</b>	<b>M</b>	<b>SD</b>
14	RT promotes my English listening ability.	3.7051	.91065
15	RT promotes my English speaking ability.	3.4608	.97638
16	RT promotes my English reading ability.	3.9816	.86583
17	RT promotes my English writing ability.	3.4931	.94829
18	RT promotes my ability of using English grammar.	3.6083	1.00394

(5=strongly agree; 4=agree; 3= somewhat agree; 2=disagree; 1=strongly disagree)

*Table 3: Perceptions of skills improvement by using RT (response frequencies in percentages)*

These 5 items were used to generate the respondents' perceptions of *RT* and its helpfulness of promoting their different English skills and use of English grammar. The results are not beyond our expectation as the mean scores are all between 3 and 4. Among these five items, item 16 regarding reading ability grabs our attention first. Since *RT* is to serve as one of the main resources of L2 input to sharpen Level 2 students' reading comprehension, *RT* did not malfunction or disappoint its users in this respect. The student participants acknowledged its value in promoting their English reading ability.

Lastly, items 19 to 30 were used to elicit the respondents' perceptions of the online video channel (item 19-25), the audio CD (item 26-28) and the unit exercises (item 29-30) of *RT* to answer the third research question: 'What are Level 2 students' perceptions of Reading Time Web English, audio CD and unit exercises in *Reading Time: A Strategic Approach to Reading in English?*' The findings are presented in Table 4.

<b>Ite m</b>	<b>Statement</b>	<b>M</b>	<b>SD</b>
19	Reading Time Web English improves my interest in learning English.	3.5853	1.01533
20	Reading Time Web English familiarizes me with each unit.	3.7051	.98396
21	Reading Time Web English helps me recognize correct intonation and pronunciations.	3.7650	.97898
22	Reading Time Web English helps develop my listening ability.	3.7788	.98456
23	Reading Time Web English promotes my motivation to review the lessons.	3.6452	1.02216
24	Reading Time Web English helps me practice my English speaking after class.	3.4747	1.02314
25	Reading Time Web English helps me learn English vocabulary.	3.8018	1.00111
26	Its audio CD helps me recognize correct intonation and pronunciations.	3.9078	.90307
27	Its audio CD helps me practice my English listening after class.	3.8664	.90555
28	Its audio CD helps me practice my English speaking after class.	3.6728	.94714
29	Its unit exercises familiarize me with the units.	3.9217	.97579

30	Its unit exercises helps me prepare for English proficiency tests, such as CSEPT.	3.5714	.99801
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(5=strongly agree; 4=agree; 3= somewhat agree; 2=disagree; 1=strongly disagree)

*Table 4: Perceptions of the online video channel (response frequencies in percentages)*

Today's youngsters can easily gain access to the internet and find whatever information they need anytime and anywhere. Naturally e-resources have come to be part of the package that users can obtain after they purchase textbooks published on the current market. *RT* is one of them. It provides its users (both teachers and students) with Reading Time Web English, a free online video channel, on which they can watch how Studio Classroom teachers instruct the text on the air, make the corresponding scripts (in)visible and make one's own vocabulary notebook. The purpose is to offer users extra access to the units and learn from a different angle. Users not only can listen to native teachers' interpretation of the text to gain a better understanding of the topic but also increase the frequency of exposing themselves to their L2 after class to achieve higher learner autonomy. Based on the questionnaire data, Reading Time Web English indeed familiarizes the Level 2 students with each unit (item 20: M=3.7051); they can recognize correct intonation and pronunciation (item 21: M=3.7650) and develop their listening ability (item 22: M=3.7788) through watching the online programs. By doing so, the students' interest in learning English (item 19: M=3.5853) and motivation to review the lessons (item 23: M=3.6452) can be promoted. Even more, the students somewhat agree that they can practice their English speaking after class (item 24, M=3.4747) and also learn English vocabulary (item 25: M= 3.8018). Two written comments made on item 33 might be used to support these descriptive statistics. A couple of students said, "I can preview or review the lesson by using Reading Time Web English. Using *RT* and its online resources can promote my learning efficacy.;" "If I miss the class, I can study the lesson by myself at home."

In addition to Reading Time Web English, users can get an audio CD which contains all the audio files of the reading texts of *RT*. Teachers can use the audio version of any text in class whenever necessary to lead students throughout the text, raise their awareness of intonation and pronunciations, or ask students to repeat after the recording in controlled practices. Students can also use these audio files to review the reading texts at home when they are assigned relevant homework assignments. From this perspective, this audio CD helps the students recognize correct intonation and pronunciations (item 26: M=3.9078) and practice their English listening (item 27: M=3.8664) and speaking (item 28: M=3.6728) after class.

Item 29 and 30 were used to generate the respondents' views on the unit exercises, which locate in the second section in *RT*. After teaching one unit, teachers can assign its unit exercise to students. These unit exercises can be used for the purpose of either homework after class or extra practices/quizzes in class. The main objective of this section is to give learners other kinds of practices for them to review the unit or to be more familiar with its content. Hence, the unit exercises can serve as a progress check (as homework) or proficiency check (as quizzes). Teachers can use them flexibly according to their immediate needs in different classroom settings. These unit exercises involve vocabulary (i.e. fill-ins), cloze test, and passage completion. Cloze test is a popular question type in English proficiency tests. As students at Wenzao

have to pass the benchmark before they graduate, item 30 was used to see if *RT* could assist them in preparing for College Student English Proficiency Test (i.e. CSEPT). The expected results show that the students almost agree with *RT* in familiarizing them with the units (item 29:  $M=3.9217$ ) and helping them take tests (item 30:  $M=3.5714$ ).

By computing descriptive statistics on SPSS 23.0, it was easy and quick to analyze numerical and quantifiable data. However, it becomes quite difficult to explore more into the research questions from the students' perspective. The current study is to draw insight on *RT* from its users' point of view. In order to counterbalance the downsides of only using the quantitative approach to collecting data, I put three open-ended questions in the questionnaire which were used to elicit more written responses from the respondents. Hopefully both the depth and the breadth of this study can be somehow enhanced together for me to make better inferences. Item 31 asked the respondents to pick their favorite unit and briefly state the reasons whereas item 32 asked them to come up with their disfavored unit and the likely reasons. Furthermore, item 33 asked them to jot down three recommendations on *RT* if any. As the questionnaires were administered by the end of the fall semester, only the former half of *RT* (unit 1-9) had been worked on. The generated comments were categorized according to different themes. The numbers and percentages are used to present the data in Table 5, which explain the quantitative aspect of the three items. Some response frequencies in percentages which are above 10% will be discussed in the following section. Comparing and contrasting written comments in response to item 31-33 is the qualitative aspect of the study.

Item	Responses	Number of responses	Freshmen	Sophomores	Percentages
<b>31</b>	Unit 1	25	12	13	12.95
	Unit 2	11	3	8	5.69
	Unit 3	20	15	5	10.36
	Unit 4	8	6	2	4.14
	Unit 5	29	14	15	15.02
	Unit 6	4	1	3	2.07
	Unit 7	24	16	8	12.43
	Unit 8	38	21	17	19.68
	Unit 9	34	12	22	17.61
		Total: 193 comments			
<b>32</b>	Unit 1	17	9	8	12.59
	Unit 2	11	5	6	8.14
	Unit 3	8	1	7	5.9
	Unit 4	9	3	6	6.6
	Unit 5	8	3	5	5.9
	Unit 6	9	4	5	6.6
	Unit 7	60	30	30	44.44
	Unit 8	11	5	6	8.14
	Unit 9	2	1	1	1.48
		Total: 135 comments			
<b>33</b>	vocabulary	77	41	36	15.87

grammar	11	8	3	2.26
skills	52	30	22	10.72
worksheets	26	15	11	5.36
contents	233	123	110	48.04
physical	46	29	17	9.48
appearance	16	10	6	3.29
package	10	6	4	2.06
convenience				
others	14	10	4	2.88
	Total: 485			
	comments			

*Table 5: Comments on the units and recommendations on RT (response frequencies in percentages)*

Their written comments were categorized carefully to represent their overall perceptions of different units and *RT*. I would like to focus on three units in particular. In terms of favorite units, Unit 8 ('Ten Fun Things to Do in Singapore') and Unit 9 ('Churchill: The Polar Bear Capital of the World') seem to be the most appealing based on the results. Around one fifth of the comments (19.68% and 17.61%) were made on these two units, which might release the information on the students' preferred topic, 'Travel'. Interestingly, the topic of Unit 7 ('Pennsylvania Dutch Country') is also travel-oriented but unfortunately attracts the most negative evaluations ( $N=60$ , 44.44% of the responses) in this study. After taking a closer look at those written responses to Unit 7, most of them were made on the level of difficulty of the text due to more new vocabulary, unfamiliarity with Pennsylvania and Amish and the text length. Compared to Unit 7, Unit 8 is popular ( $N=38$ ) because it is full of colored pictures, a shorter text, and a city in East Asia. Unit 9 is welcome too ( $N=34$ ) because it introduces polar bears, other natural creatures and fun activities in Churchill, which might interest college students more. Unit 7 is the final unit that Level 2 students need to study before the final exam. Unit 8 and Unit 9 are used for their self-study at home. Normally the closer the final exam is approaching, the more stress students might be under as there are other academic subjects they also need to attend to at the same time, plus essays, written exams, or final presentations to be carried out in other classes. These competing distractions might severely deprive students of sleep and in turn remove their energy or attention from English study to other missions. It is not surprising to see the student participants made such comments on Unit 7, which demands more of their concentration and commitment. Such results might also be relevant to the time of questionnaire administration. Probably different results would have been elicited if the questionnaires had been distributed at other times of the academic year. This finding has pointed a new direction of my future research on the influence of midterm/final exams on students' attitude toward their textbook.

Item 33 was used to encourage the respondents to come up with three strengths of *RT* from their own perspective. 485 written comments were collected and then categorized carefully according to nine different themes, including contents, vocabulary, skills improvement, and physical appearance. The contents of *RT* elicit the most responses from the students ( $N=233$ , 48.04% of the responses). For example, topics are interesting, comprehensive, up-to-date, international, multi-cultural, real-life, practical, and reader-friendly; the reading texts are interesting,

information-rich, knowledge-inclusive and understandable; Chinese translations of the texts are easily accessible for self-study at home. In the questionnaires, some students said, “The reading texts get longer and harder gradually. Compared to the textbooks that I have used, I prefer *RT*,” “In addition to learning English, I also can learn some knowledge, which makes English learning less dry;” “Some units arouse my curiosity;” “Studying *RT* is like reading a magazine, and it is relaxing;” or “Each reading text crosses two pages or so, which is not too long or too complicated.” Among these written comments, one student mentioned that “Its contents are abundant, so there is a lot to study for exams. It is not suitable for unmotivated students to use this book.” The richness of the contents in *RT* is regarded as one of its advantages, which, on the other hand, is also a possible downside for some students at this English proficiency level.

In terms of vocabulary in *RT* ( $N=77$ , 15.87%), most of the comments made on a large amount of words, frequently used words, proper level of difficulty, word definitions, Chinese equivalents, example sentences, practicality of words, word bank, and phonemic scripts. For example, one student said, “Compared to other textbooks, vocabulary in *RT* is more practical. But my limited knowledge of vocabulary sometimes interrupts my comprehension of a reading text.” Or, “these words are selected and so are more real-life.” The students also valued the improvements of their language skills in *RT* ( $N=52$ , 10.72%), such as reading skills, correct pronunciations, oral performance, colloquial phrases, listening comprehension, integrated learning of different English skills, and so on. One response indicates that “the level of difficulty of *RT* is a bit higher above my current English proficiency. But I think it can help me learn more vocabulary. As other materials are not challenging, *RT* can help me advance my English level.”

Another category of response frequencies in percentages around 10% is the physical appearance of *RT* ( $N=46$ , 9.48%). It relates to the characteristics of a book, such as photos, drawings, cartoons, art, colors, the texture of paper sheets, font, layout, weight, size of the book, covers, white space, and so on of a book. Around one tenth of the responses comment on this quality of *RT*. For example, “Drawings are pretty and everything is neat;” “With a rich variety of pictures and illustrations, I can learn a unit better;” “The reading texts are colorful, interesting;” “Pictures can help me understand the reading text;” “With illustrations, the reading texts get more interesting;” and “Its art design is excellent.” Indeed, if one flicks through *RT*, they will find this book does not have too much text crammed onto one page and has enough space to provide its reader with relief. Also, the sequence and separation of the units, the unit exercises and the worksheets is absolutely clear. Among these recommendations, one negative response caught my attention. A student complained, “I don’t like to tear off the unit exercises or the worksheets at all. I don’t want to ruin the completeness of my book. Once they are torn off, I can’t glue them back together and must get them lost somewhere.” Although only one student commented on the inconvenience of separate sheets, still it counts as a word of warning and make me alert to a likely change to be done.

## Conclusion and Suggestions on Future Research

The present study tried to examine the perceived values of *Reading Time: A Strategic Approach to Reading in English* from the perspective of its student users. It seems that this textbook has appealed to the Level 2 students at Wenzao and gained their positive reflections on its contents, Web English, audio CD and unit exercises in helping them learn English, improve their English skills, intrigue their motivation, boost their confidence, learn new world knowledge, expand their vocabulary bank and so on. However, not all of the comments made on the three open-ended questions are fully positive. For example, some students chose Unit 7 over other units which they disapproved of. One student mentioned that (s)he was unwilling to tear off the worksheets from the book. One student mentioned that this textbook might place a burden on those who are not committed to the Level 2 English Course. The textbook developers of *RT* should be open to such feedback from the students and re-evaluate the textbook by taking into consideration of the student users' perceptions of this reading material and improving its quality if possible. The results of the present study have also made the student voices heard by their English teachers. Hopefully they can gain some knowledge on adapting Unit 7 in their future teaching and never miss any influential factor which might affect their students' English study at Wenzao.

The present study has also indicated some gaps that should be regarded and filled with other kinds of research data though. First, as Ansary and Babaii (2001) argue, any perfect textbook is merely a tool in the hands of teachers. How teachers use *RT* or what teachers can do with *RT* has fueled my desire to dig deeper into the unpredictable potential of *RT* for classroom practices in any form which is beyond my current expectation. In the present study, there are deficiencies of the student participants' English teachers' post-use evaluation of the textbook and their actual material adaptations or any innovative class activities based on the contents of the book if any. A qualitative approach to unveiling how another party of users interpret this textbook has carved a niche for me to fill in order to make further pedagogical suggestions for those who are interested in using this textbook in different settings. An interview study or classroom observations might assist me in keeping qualitative, in-depth records of teachers' perceptions of the textbook, their actual teaching of the units, and students' direct responses to the lessons in the classroom settings. Second, the present study did not differentiate and analyze the responses generated from the L2 students in different grades (i.e. freshmen and sophomores). Through using SPSS 23.0, questionnaire data can be calculated to do a *t* test for independent samples and spot any statistically significant differences between these two student groups, based on which an interview study can be conducted to collect the students' comments on these differences. Third, each teaching/learning context has its unique culture and characteristics. A comparative study can be proposed to compare and contrast data generated from book users in different settings in Taiwan. Hopefully in the future there is a chance for me to interview or survey both teachers and students in different areas in Taiwan to gain a fuller picture of the effect of using *Reading Time: A Strategic Approach to Reading in English* on helping Taiwanese EFL learners to learn English and reveal more details of the worksheets of this textbook in helping teachers to prepare for and carry out their teaching of each unit. Such academic students conducted on the evaluation of *RT* are hoped to keep improving the quality of *Reading Time: A Strategic Approach to Reading in English* and the quality of English teaching and learning in the classroom.

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## Appendix A: Student questionnaires

同學對於使用 *Reading Time: A Strategic Approach to Reading in English* 學習英語之看法

親愛的同學：

本研究問卷目的在於了解您對於 *Reading Time: A Strategic Approach to Reading in English* (以下簡稱 *Reading Time*) 這本書的看法及使用它來學習英語的相關問題，問卷結果僅供學術研究之用，請放心作答。

若您願意參與本研究，請翻開問卷後開始作答。仔細閱讀問卷中第 1 至 29 題的每項敘述，並圈選出最符合您目前的想法的答案，數字 1~5 各代表不同的涵義 (5：非常同意；4：同意；3：還算同意；2：不同意；1：非常不同意)；第 30 至 33 題請以中文簡述您目前的想法。回答過程中若有任何疑問，請隨時提問，謝謝！

感謝您的參與！若您對本研究有任何疑問，歡迎隨時與外語教學系陳思安老師連絡。辦公室分機號碼：5240；Email：99033@mail.wzu.edu.tw

※ 請根據你使用 Reading Time 的經驗回答下列問題。

	5. 非常同意	4. 同意	3. 還算同意	2. 不同意	1. 非常不同意
題目敘述	5 非常同意	4 同意	3 還算同意	2 不同意	1 非常不同意
1. Reading Time 教材內容符合我的學習需求。	5	4	3	2	1
2. Reading Time 教材內容難易度適合我的程度。	5	4	3	2	1
3. Reading Time 教材內容量(共 18 個單元)是足夠的。	5	4	3	2	1
4. Reading Time 教材內容有助於提升我學習英語的動機。	5	4	3	2	1
5. Reading Time 教材內容有助於提升我學習英語的信心。	5	4	3	2	1
6. Reading Time 教材內容有助於提升我學習英語的興趣。	5	4	3	2	1
7. Reading Time 教材內容有助於提升我的英語閱讀技巧。	5	4	3	2	1
8. Reading Time 教材內容有助於提升我的英語聽力技巧。	5	4	3	2	1
9. Reading Time 教材內容有助於提升我聽、說、讀、寫整合式的學習方式。	5	4	3	2	1
10. Reading Time 各單元的主題是有趣的。	5	4	3	2	1
11. Reading Time 內容有助於我認識多元文化。	5	4	3	2	1
12. Reading Time 內容有助於我日常生活英語溝通能力。	5	4	3	2	1
13. Reading Time 內容有助於我增加與主題相關的字彙量。	5	4	3	2	1
14. Reading Time 可有效提升我的英語聽力能力。	5	4	3	2	1
15. Reading Time 可有效提升我的英語口說能力。	5	4	3	2	1
16. Reading Time 可有效提升我的英語閱讀能力。	5	4	3	2	1
17. Reading Time 可有效提升我的英語寫作能力。	5	4	3	2	1
18. Reading Time 可有效加強我的英語文法運用能力。	5	4	3	2	1
19. Reading Time 的影音典藏學習頻道能增加我學習英語興趣。	5	4	3	2	1
20. Reading Time 的影音典藏學習頻道內容有助於我熟悉各單元內容。	5	4	3	2	1
21. Reading Time 的影音典藏學習頻道有助於我認識正確語調及發音。	5	4	3	2	1
22. Reading Time 的影音典藏學習頻道內容有助於提升我的英語聽力。	5	4	3	2	1
23. Reading Time 的影音典藏學習頻道有助於我增加練習教材內容的動機。	5	4	3	2	1
24. Reading Time 的影音典藏學習頻道有助於課後自我英語口說練習。	5	4	3	2	1
25. Reading Time 的影音典藏學習頻道有助於我的英語字彙學習。	5	4	3	2	1
26. Reading Time 的課文朗讀 CD 有助於我認識正確語調及發音。	5	4	3	2	1
27. Reading Time 的課文朗讀 CD 有助於課後自我英語聽力練習。	5	4	3	2	1
28. Reading Time 的課文朗讀 CD 有助於課後自我英語口說練習。	5	4	3	2	1
29. Reading Time 的單元卷(回家作業)有助於我熟悉教材內容。	5	4	3	2	1
30. Reading Time 的單元卷(回家作業)有助於我應考英語檢定考試(如 CSEPT)。	5	4	3	2	1

<p>31. 我最喜歡的單元是 Unit : _____ 。</p> <p>請簡述原因 : _____</p>
<p>32. 我最不喜歡的單元是 Unit : _____ 。</p> <p>請簡述原因 : _____</p>
<p>33. 請簡述 3 個您喜歡 Reading Time 的理由。</p> <p>1. _____</p> <p>_____</p> <p>2. _____</p> <p>_____</p> <p>3. _____</p> <p>_____</p>

若您願意接受後續的訪談(約 15-20 分鐘，並備有小禮物一份)，請留下您的聯絡方式。

姓名：	Email：
手機：	Line ID：

本問卷到此結束，感謝您的參與及配合。



***Can Video-Conferencing Mediated Learning Improve Students' Oral Performance? A Study on a Learning Chinese as Foreign Language Program***

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**Abstract**

The researchers conducted a distance video-conferencing instructional design in which 45 Chinese language learners in the US and 26 Chinese language pre-service teachers in Taiwan completed a series of collaborative assignments together. Under this video-conferencing design, Chinese language learners could exercise the target language, and Chinese language pre-service teachers could also practice teaching foreign students. The pre oral-test scores of students in the control group (mean=71.10) were larger than those of the students in the experimental group (mean=62.62) but the difference was not statistically significant. After the treatment, the students in the experimental group(mean=87.77) outperformed significantly those in the control group(mean=79.27) on the post oral- test at the level .05 and  $t[42]=-2.351$ ,  $p=.02$ . The result of this study showed within a designed video-conferencing environment, Mandarin Chinese language learners working with their native speaker teammates performed better on the post oral-test than the control group, who worked on the assignments with teammates in traditional classroom.

Keywords: distance learning, video conferencing mediated learning, learning Chinese as a foreign language, Computer assisted language learning

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## 1. Introduction

Chinese Mandarin is the most spoken language in the world and has become one of the dominant languages in the world in past decades. To deal with the urgent needs of Chinese language learning, Learning Chinese as Foreign language (CFL) programs in non-Chinese speaking countries and teaching Chinese as a Foreign Language (TCFL) programs in Chinese-speaking countries have been growing rapidly all over the world in the past decades. And it was found that both CFL programs and TCFL programs were facing the similar challenges. Most learners in a Chinese as a foreign language (CFL) setting have limited opportunities to practice Chinese (Wu & Tsai, 2008) while the pre-service teachers in TCFL programs have narrow chances to teach foreign students in the Chinese-speaking countries (Tsao, 2007). The Chinese language learners need more Chinese language and cultural exposure for better Chinese learning outcomes. Vice versa, Chinese pre-service teachers in TCFL programs need sufficient Chinese teaching practices with foreign students to develop their teaching competence. In order to find the solution of this challenge, the researchers in this study utilized the framework of video-conferencing instructional design to integrate these two educational main streams and needs.

The aim of this study was to break through the boundary that restricts Mandarin Chinese learners and Mandarin Chinese teachers from contacting each other via the use of online conferencing and communication tools. In this article, the effects of video-conferencing instruction on students' oral performance in a CFL program are presented.

## 2. Literature review

Computer-Mediated Communication (CMC) allows for two types of online communication: synchronous communication (SCMC) and asynchronous communication (ACMC). For the purpose of this study, video-conferencing is framed under the principles of synchronous communication tools. Hung and Higgins (2016) paired six Chinese-speaking learners of English and six English-speaking learners of Chinese as learning dyads. Each dyad experienced four kinds of interaction: English text-based SCMC, Chinese text-based SCMC, English video-based SCMC and Chinese video-based SCMC. Their findings were consistent with the previous literature: while text-based SCMC enhanced the learners' attention to the language forms, video-based SCMC improved their target language fluency and pronunciation.

Video-conferencing can promote the instant interaction of the meeting members. Due to its features such as online presentations, video, screen-sharing, sharing of resources, polling, and chatting, video-conferencing tool increasingly popular in education. A number of studies have confirmed that learners enjoy using video conferencing, and its use is positively correlated with learning outcomes and students' satisfaction. Huang and McConnell (2010) studied the use of video-conferencing in higher education and found that it was correlated with learners' satisfaction. The frequent interactions in conferencing environments were also found to be correlated with students' satisfaction with online classes (Kuo, Walker, & Abas, 2010). When video conferencing was implemented to supplement traditional language courses, it led to higher academic scores (Charbonneau-Gowdy & Cechova, 2009) and increased the quality of the learning experience (Bower, 2009). Kristi, Graaff, Bergh and Kriz

(2012) conducted a quasi-experimental study without a control group to study that 36 Dutch language learners and 35 pre-service Dutch teachers engaged in a meaningful interaction with each other via synchronous video-web communication. It was found that foreign language learners' interaction with native speakers could have a positive impact on the motivation of learners.

Recently, some educational reviews indicated that there is still much to be studied in the area of Computer assisted language learning(CALL). These educational scholar thought the existing literature on the effectiveness of technology used in language education is narrow in three aspects: a) The languages studied are limited to Western European languages, especially English, b) the studies conducted focus on higher education and adult learners, and c) the CALL research lacks systematic investigation of the key factors that may increase the effectiveness of foreign language learning (Felix, 2005; Golonka, Bowles, Frank, Richardson, & Freynik, 2014; Stockwell, 2007; Zhao, 2003). In response to the above gap of the current CALL research, this researchers in this study aim to study the effectiveness of video conferencing application on high school students' oral abilities.

### **3. Method**

#### **3.1 Background**

One of the researchers was a professor working in a teaching Chinese as a Foreign Language (TCFL) in a university in Taiwan, and her students, native Chinese speakers, were training to be TCFL teachers. The other researcher was teaching Mandarin Chinese in middle and high schools in the US. In order to provide the Mandarin Chinese language learners with opportunities to practice the target language, and to provide the TCFL pre-service teachers with practice teaching foreign students, these two researchers designed a video-conferencing program in which the pre-service teachers tutored the Chinese learners to complete a series of assignments via online communication tools such as Skype. This program involved 26 pre-service teachers enrolled in a TCFL course in a university in Taiwan, and 45 teenagers taking Chinese courses in middle school and high school in the US. These teenagers have taken at least one-year Chinese courses and they were taking Elementary Chinese-1 class while recruited in this study.

Among the video-conferencing software, Skype had been the most prevalently used by the majority of the experimental group students and pre-service teachers. Only 6 students in the experimental group and 10 pre-service teachers never used Skype before the treatment. Therefore, the researchers chose Skype as the main tool for web-conferencing. Every teenager in the experimental group was randomly assigned with one pre-service teacher in Taiwan. The students in the control group discussed the assignment with their classmates in Mandarin Chinese and the Mandarin Chinese teacher would check out if there is any group need assistance. In the experimental group, students worked with their tutor in Taiwan to complete a series of assignments via Skype video-conferences. Since there were more students than teachers, the Chinese language pre-service teachers were assigned more than one student. However, they had to assist each student separately to complete the assignments via the video-conferencing software, Skype.

### **3.2 Research question**

The aims of this study were to understand the effectiveness of the video-conferencing instruction and to identify key confounding variables in the video-conferencing environment. Therefore, the research questions (RQ) in this study are listed as follows:

RQ: Would this distance video-conferencing program have positive impacts on students' oral performance?

### **3.3 Research design**

This study utilized a two-groups experimental design. Among recruited 45 Chinese language learners, twenty-one students were assigned to the video-conferencing group. The remaining 24 US students were assigned to the control group. In order to answer if the experimental group outperformed the control group after the intervention, the two groups' Chinese language pre-test and post-test results were compared. The research flowchart is detailed in Figure 1.

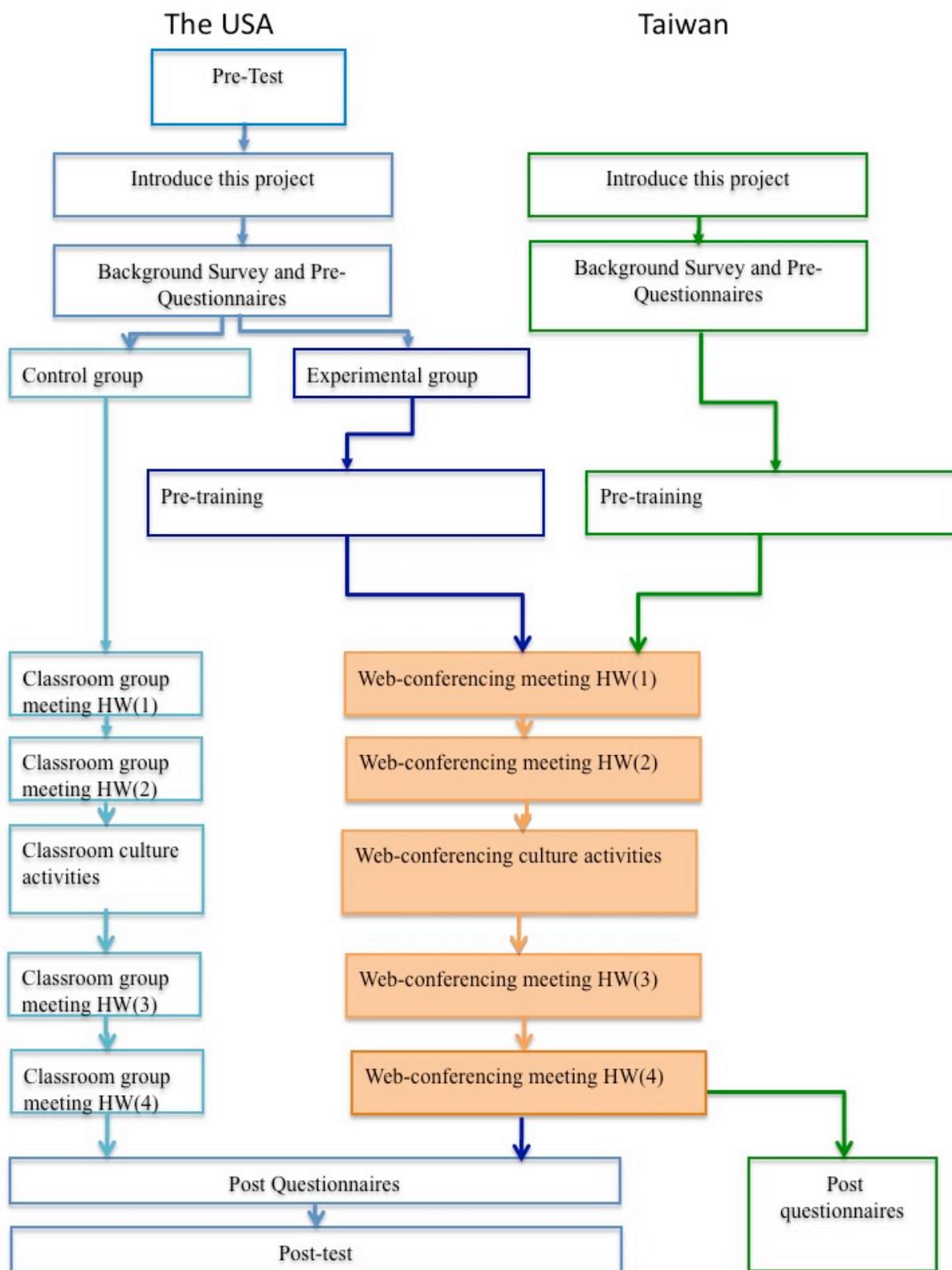


Figure 1: research flowchart

### 3.6 Data Analysis

Data analyses were performed after the data collection. Analysis of the control and experimental groups' pre- and post-test scores was performed using independent two-sample t-tests. All analyses were performed using the SPSS software version 22.

### 4. Results

In order to answer RQ, the academic performance of the experimental and control groups was compared. It was found that the average of the pre-test for the control group was 71.10 (SD=20.86) and that for the experimental group was 62.62 (SD=16.09). A test was run and found no significant difference, which indicating that the two groups had similar performance on the pre-test. After the intervention, an post-test was conducted. The mean of post-test for the control group was 79.27(SD=14.24), which is significantly different from the mean of interim test for the experimental group(M=87.77, SD=8.84),  $t(38)=-2.35, p<.05$ . Therefore, the students in the experimental group significantly outperformed those in the control group in terms of their test scores. This indicates that our intervention could improve students' oral performance.

Table 1. Pre- vs. Post-test score comparison.

	Control (N=20)		Experimental (N=20)		t-test
	M	SD	M	SD	
Pre-test	71.10	20.86	62.62	16.09	
Post-test	79.27	14.24	87.77	8.84	-2.35*

what \* means and the p-level of significance.

### 5. Conclusion and implication

The current CALL researchers reviewed the current CALL studies and found that CALL research limited to the studies of Western European language, adult participants and higher education. (Felix, 2005; Golonka, Bowles, Frank, Richardson, & Freynik, 2014; Stockwell, 2007; Zhao, 2003). In response to the above gap of the current CALL research, the researchers in this study researched the effectiveness of video conferencing application on high school students' Mandarin Chinese learning. Based on the results of this study, the video-conferencing program had a positive impact on the Chinese language learners' oral performance. Within a designed video-conferencing environment, Mandarin Chinese language learners working with their native speaker teammates performed better on the oral test than those who had practiced in a group in class. The result of this study can contribute to the current insufficient CALL literature. The finding is also consistent with the study of Hung and Higgins (2016) that video-based SCMC improved learners' oral performance in target language. The well-designed video-conferencing with native speaker can save foreign language learners' traveling time and expenses. Besides, it can be used to reduce the students' stress for the target language cultures and societies before they are going to travel to the target language countries.

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***Development of Mobile Royal Thai Armed Forced Personal Information Software  
on Android***

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The IAFOR Conference for Higher Education Research Hong Kong – 2018  
Official Conference Proceedings

**Abstract**

The purpose of research is to develop Mobile Royal Thai Armed Forced Personal Information Software on android devices. According to Thai military regulations, it clearly stated that all military personnel officers are required to submit their updated personal profiles for example name, surname, address, etc. basically once a year as a standard practice not only on computer information system but also hardcopy to keep personal data accurate and up-to-date. Thus, it will be more convenience to verify their own personal information via mobile application. They can access anywhere and anytime via the internet. Our development of the software is to apply software engineering model, a rapid application development as a software-development approach designed to produce high-quality products quickly. A rapid application development is the best selected to develop a mobile software as it is easily to apply for adaptive software, usability, and flexibility. To ensure the result of our development, we use technology acceptance model (TAM) to use as a tool to conduct responses of user's satisfaction in the development of the system to meet user's requirements and expectations. TAM is required to proceed two major factors, user responses which are to perceive usefulness and to perceive ease of use, and a perceived usefulness that user believes the technology could help to improve the performance and efficiency. Perceived ease of use is what an extent the user to be comfortable when using the features of the technology. Our software system development is mainly to be comprehensively, effectively, easily and flawlessly to use for users of the royal Thai armed forces. In this paper, we present the overall system design of the Thai military personal information software on mobile devices. It would be a prototype of the mobile applications development of the royal Thai armed forces.

Keywords: Mobile Software, Software Design, Rapid Application Development, and Framework

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## Introduction

Royal Thai Armed Forces Headquarters is the leading modern enterprise in co-ordination defense and military operations to retreat confidently of government and people for acceptance friendly countries. Royal Thai Armed Forces Headquarters is composed of five groups in which Directorate of joint communications has responsibilities for planning, development of connecting information all departments in country together. Information of Royal Thai Armed Forces also aims to exchange all over any allied countries. It commutes not only signs of electronic warfare but also information technology as the center of information technology and communication of the Royal Thai Armed Forces. In the past people use mobile devices to communicate between each other. Mobile devices have many functions such as SMS messaging, calendar, alarm clock, camera, FM radio, music player, GPS and etc. There are other features that mobile devices can apply; moreover, it can install software in devices in order to use variety of functions. In the past mobile phones were restricted to phone calls only, not text messaging, no internet browsing, no camera, etc. It was used mainly for making and receiving calls. From time to time, mobile device truly began to help and support works. It became smaller and slimmer in dimensions, and with longer battery life as well as it became an instant smash with publics. Furthermore it became less expensive over the following decade, and more-advanced facilities, such as internet access, so that called a third -generation (3G) [1]. Nowadays, mobile devices mature very widespread in many countries. These are primary part of our lives. This means that a mobile technology brings many advantages. Mobile applications are becoming so functional and popular among consumers.

As the market industrial mobile devices have many type of mobile operating systems such as Android OS, Symbian OS, Windows phone and iPhone OS (Apple). In the digital era many manufacturers need to step up their adoption as these developments will fundamentally change individual companies, as well as transform market dynamics across a full range of industries due to the use of mobiles devices have become a vital part of our daily lives. There are many smartphone manufactures, likewise various mobile operating systems for example Android OS, Symbian OS, Windows phone and iPhone OS (Apple) but the highest growth potential of mobile operating systems is belonging to Android OS as be shown on Figure 1. Android OS is available to develop by many languages e.g. Java, Kotlin, C/C++ and C# using android operating system kit, however, the official programming language of Android development is Java language because the largest part of Android is written in Java language. In the below graph shown operating system market share worldwide from July 2017 - August 2017, the Android OS has been the leading over the iOS.

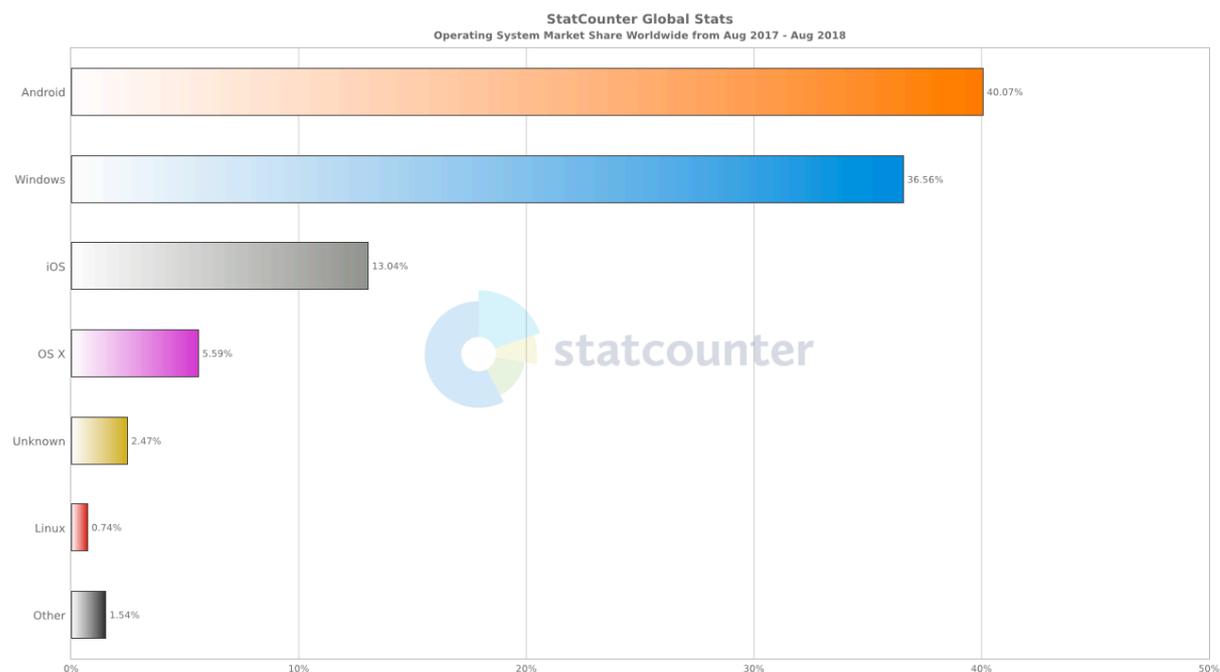


Figure 1. Operating System Market Share Worldwide from July 2017 – Aug 2018  
(Source from <http://gs.statcounter.com>)

This is a major reason that Java language is also selected to develop software on this paper. In addition, the researcher realized that Java language has significant advantages over other languages and most Android mobile application around the world have been applied by Java language. Java language is simply the official language of Android application development that the most supported languages by Google Play store and the most application are built. The purposes of our research, researchers who served in Royal Thai Armed Forces Headquarters have aimed to develop the software system on Android for all Thai military personnel. They could submit their yearly personal information without any difficulty on their updating personal information annually on their birth-date by themselves anywhere and anytime through the internet. The concept of development and implement of software system has been used rapid application development model (RAD) [3] [4]. To ensure result of any development, researching teams will take a technology acceptance model (TAM) to verify our development. TAM is a tool that uses to survey responses and user satisfactions after they use a prototype of the developed application [5].

## Literature Review

### *A. Software Development Life Cycle Models and Methodologies*

Once upon a time, software development consisted of a programmer writing code to solve a problem or automate a procedure. Nowadays, systems are so huge and complex that Teams of Architects, Analysts, Programmers, Testers and Users must work together to create the millions of lines of custom-written code that drive our enterprises. The researcher will be use SDLC as a framework for development software system. The software development life cycle is a defining tasks performed at each step in the software development that has a beginning and termination of the project. The software development life cycle is also known as the software development process. SDLC consists of following activities [6]:

1. Planning: The most main parts of development. In this stage consist of consider the needs of the project, Priority of necessity, Define resources such as budget, Staffs, Tools and Determine the team to develop the project.
2. Analysis: Refines project goals into defined functions of the intended application. Analyzes end-user information needs.
3. Designing: Consider the acquirement of hardware and software. Including the development of all specifics of the system.
4. Implement: In this phase the code is produced emphasis by developer. For building a system (coding) to test the validity of the data as a result of the system.
5. Testing: After the code is developed it is tested against the requirements to make sure that the product is working properly.
6. Deployment: After complete testing the product then teaches customer for how to use it.
7. Maintenance: Once when the customers starts using the developed system then the actual problems comes up. This phase have to repair, and needs to be solved from time to time.

### B. Rapid Application Development Methodology

RAD was selected as the appropriate for developing mobile software in this research. It is designed to give maximum advantage of powerful development software and higher-quality results than those achieved with the traditional lifecycle [7]. We use RAD to develop a mobile software because it does not require specific planning, and reduced development time. RAD was developed from waterfall model that consists of resources, developers to design and implement, particularly all every stages of development require interviews from users. As the RAD methodology can describe below.

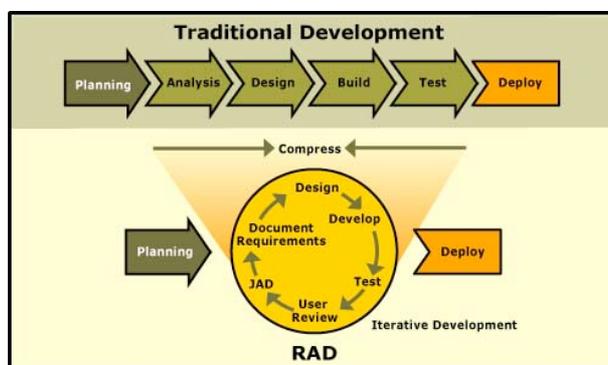


Figure 2. Rapid Application Development Methodology

(Source from <http://swenassignment.blogspot.com/2008/01/rapid-application-development-rad-model.html>)

### C. Type of mobile Application

Mobile application is a type of software designed to run on a mobile device. These days we see the mobile devices mainly running on Android OS, iOS or Windows. These are known as operating systems. In this information will help you to understand and differentiate these applications: Mobile web application are the web applications to render/deliver pages on web browsers running in mobile devices. Native application are built for a specific operating system. Hybrid application are a combination of both native application and mobile web application [8]. This type of application has cross-platform compatibility nevertheless can still access on mobile device.

*D. Android Operating System*

Android is a mobile operating system (OS) that is initially released around in September 2008. The OS is developed by Google [9]. Most applications that run on the Android platform are written in the Java programming language.

*E. Technology Acceptance Model*

TAM is an information systems theory explain that model how users come to accept and lead users for accepting a technology. TAM include two factors [10]: Perceived Usefulness (PU) is meaning as the potential user’s that use of a certain system. Perceived Ease of Use (PEU) is meaning as the user’s believes that using software will be effortless. “Perceived usefulness” (PU) and Perceived Ease of Use (PEU) will be effect to attitude, behavioral and intention for all the users.

**Our System Design**

In this section, we show aspect of how we designed and developed software system to develop this software as a very first prototype for RTARF HQ. Our design methodology follows a pattern of SDLC methodology as well as applies model of RAD to develop the software because agile model does not focused on the plan together with information technique professionals and user groups.

**Development of Mobile Royal Thai Armed Forced Personal Information Software on Android**

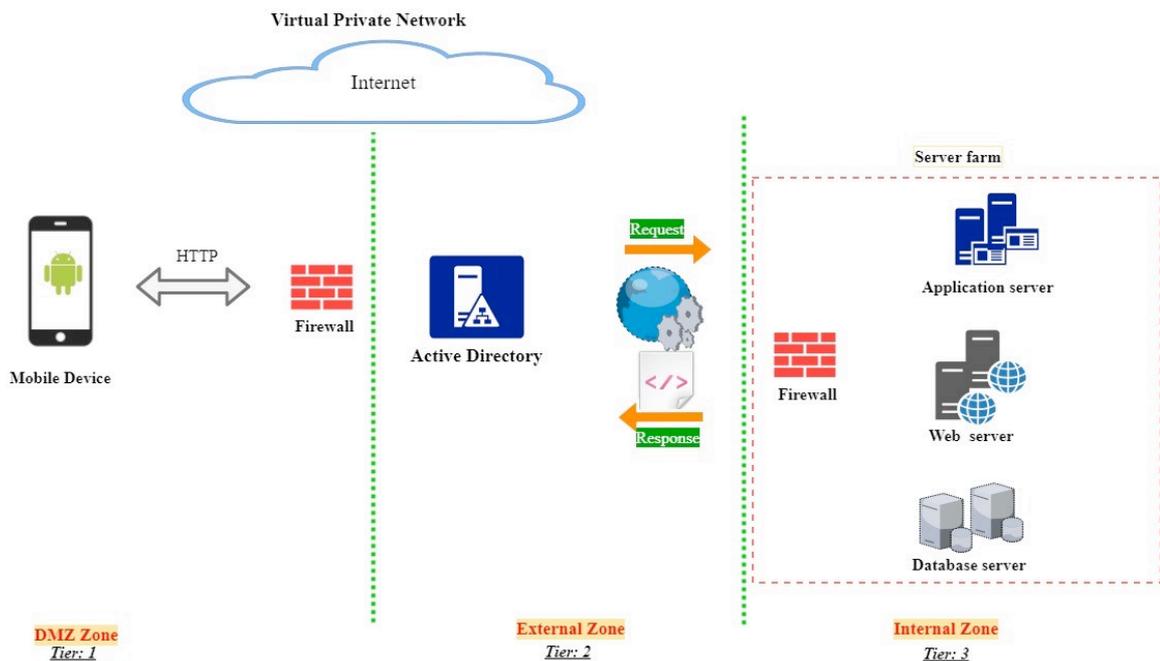


Figure 3. Conceptual of development software system in Royal Thai Armed Forces Headquarters

The conceptual framework shows the journey to develop is consisted of two (2) parts. First part is an operating software system and another part is an example of a software system design as illustrated in Figure 3.

1. An operating software system - as presented in figure 3 above has active directory that means management resource information and authentication. All the Users must

log-in by username & password through the virtual private network. It could be connect the server securely that means all data in RTARF HQ will be encrypted and has specific gateways to send information. The software will be send a request message from user to API on HTTP protocol. It means some functions processing to get data from data center for showing information personal on the screen mobile device.

2. An example of software system design – as present in figure 2 above is based on 3-tier application according to international standards. In many years ago software was connected the database directly. It means a data was not secure, nevertheless in this research will be design prototype software system in RTARF HQ for the future as follows.

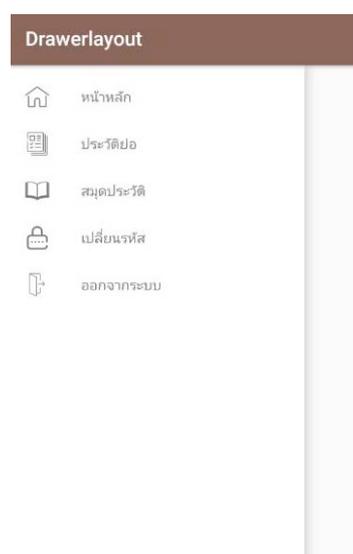
- Part 1 Presentation tier – this tier means represents user interface of Android devices. There are plenty of languages to develop the software. The researcher was selected java language to create the software because it is one of the most popular programming languages especially open sources and also supports multiple levels such as server computer, desktop computer until mobile device.

- Part 2 Business tier – This tier is an intermediate presentation tier and data tier that has some functions processing to connect between each other. The researcher has written code on server side as PHP language because of its known for excellent performance and scalability as well as be able to use with many operating systems e.g. Windows Unix, Linux. In the interface on this software system have selected the standard as the REST format because of the REST always used to make less data transfers between client and server, return XML, JSON or even in HTML format response. And also has a comprehensive library, supports the expansion of the various system. Besides, it could be appropriate to operate with mobile devices [11]. The principles described above is called an application programming interface.

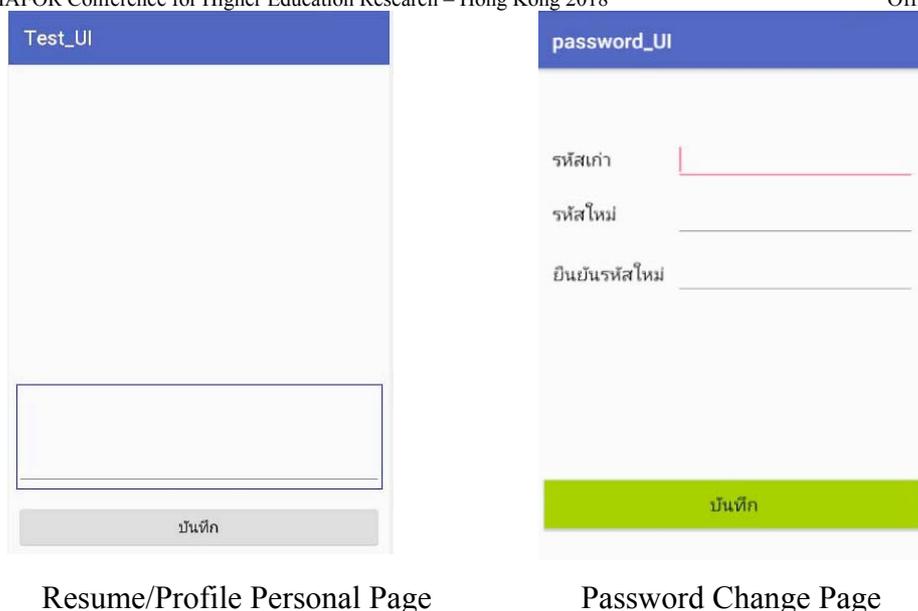
- Part 3 Data tier – this tier considered as data center because it is a logical database to provide store and retrieve data in the organization. It's consisted of many server such as server application, web server, and database server.



Login Page



Main Page



Resume/Profile Personal Page

Password Change Page

Figure 4. The Prototype for a Development Software Personal on Mobile System.

We create a prototype for a development software personal on Mobile System that presents in Figure 3. The prototype of software has consisted of 4 screens. The software development phase is based on functional requirements from users. The login screen allows all military of Royal Thai Armed Forced entering their username and password. After all the user have allowed to access will be simply show the main screen including information such as rank, first-name, last-name and position. When a user selects the slide bar menu, a menu list of options appears to slide out from the left edge of the screen. However, this menu list is hidden most of the time. Resume/Profile Personal Page could be used for submitting their update personal information annually on their birth-date accurately and will be notice in the RTARF mail of the users once the data personal have been updated. In the final screen, users could make a change of their password. Then the password will be change automatically. After the users select a logout menu, it will close the application and a login screen will be displayed.

## Conclusion

In this paper, our primary research uses a technology acceptance model (TAM) as a tool to verify the result of our software development ensuring responses and user satisfactions. Using the TAM model [12], it consists of two main factors: perceived usefulness and perceived ease of use. Firstly, Perceived usefulness refers to a user to believe that the technology will help to improve the performance and efficiency. Then our prototype version of our application could be verified the correct usefulness and perceived ease of use. Secondly, perceived ease of use is defined as what extents the user to be comfortable when using the features of the technology. This paper describes our framework for developing a mobile software system development for the royal Thai armed forced personal information software.

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***The Effects of Long-term Study Abroad on Second Language Identity:  
The Case of Korean International Students in Australia***

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**Abstract**

In this globalisation era, the number of people studying abroad is growing rapidly. The context of study abroad in the construction of one's second language identity itself is particularly important as for the majority of learners who are studying abroad, their efforts to engage and interact in their second language are creating natural effects in the construction of their second language identities. Sato (2014) assumed that study abroad with longer duration could lead to a more intensive experience which affects the construction of learners' second language identities differently from the shorter period. Based on that assumption, this study investigated second language identity in a long-term study abroad context; specifically, second language identity among Korean international students in Australia. The method used in this qualitative study was a narrative inquiry and for triangulation purpose, a combination of three sources of data collection was used: 1) self-reports about English language learning experience in Australia written by participants; 2) one-on-one semi-structured interviews; 3) in-class observations. Focusing on the outcomes on participants' second language competence with personal and social identity, it was found that even though all participants claimed to have developed something in their long-term SA experiences, not all participants were positively affected by it. This indicates that study abroad, despite all the positive outcomes that many people believe, is not always a good thing for learners.

Keywords: study abroad, second language identity, international students

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## Introduction

In this globalisation era, the ever-growing number of people studying abroad is parallel to the increase of overseas travel opportunities. The context of study abroad (SA) in the construction of one's second language (L2) identity is important (Kinginger, 2013) as for the majority of learners who are studying abroad, their efforts to engage and interact in their L2 are creating natural effects in the construction of their L2 identities. In fact, it is considered to be the major outcome of SA (Benson, Barkhuizen, Bodycott & Brown, 2013). Sato (2014) assumed that SA with longer duration could lead to a more intensive experience which affects the construction of learners' L2 identities differently from the shorter period. Based on that assumption, this study will be discussing about L2 identity in a long-term SA context. Specifically; L2 identity among Korean international students in Australia.

Korean people are enthusiastic about English (Han, 2014; as cited in Phan, 2009; p. 207). This is supported by the fact that they held the fourth highest number of student population in terms of international students in Australia (Australia's Department of Education and Training, 2015). Thus, investigating their L2 identity as they study in Australia would add new interesting insights to this area of research. Having said that, this small study will focus on two questions: (1) how participants perceive their sense of selves through L2 development, and (2) how does study abroad affect the construction of the participants' L2 identities.

## Literature Review

According to Block (2007; as cited in Kinginger, 2013, p. 341), "identities are about negotiating new subject positions at the crossroads of past, present, and future. Individuals are shaped by their socio-histories as life goes on. The entire process is conflictive as opposed to harmonious, and individuals often feel ambivalent". Similarly, Benson et al. (2013) define identity as the sense of self that evolves historically through various sides of concepts that guide people to investigate how self is being situated in the dynamism of social, cultural, and linguistics worlds. In support to this view, Yamat's (2012) qualitative research on three six-year-old Malaysian children living in the UK has shown that the combination of children's experiences in cultural diversity and their own individual characteristics were giving contributions to the constructions of their identities. This finding indicates that identity is contextual-based and therefore very dynamic.

In terms of language identity, Block (2009, p. 40) defines it as "the relationship between one's sense of self and a means of communication which might be known as a language (e.g. English), a dialect (e.g. Geordie), or a sociolect (e.g. football-speak)". Whereas second language identity is about the degree of one's development of identity in one or more additional language. Such development is concerning on one's audibility – described as "multimodal package required by a particular community of practice" (Block, 2009, p. 42) such as linguistic features, expressions, and many other kinds of semiotic behaviour related to the additional language.

By adopting the poststructuralist view of identity, Benson et al. (2013) define L2 identity as one's relationship with one or more L2s. It is linked to their knowledge and use of the L2 as part of their personal and social identity aspects. They also noted

that L2 learning has progressively become an essential variable in the constructions of identities in this postmodern era. As overseas travel becomes easier and less costly, the number of people studying abroad is only increasing. Hence, the tendency for people to engage in L2 learning is getting higher and it leads to the increase of not only identities in general, but also the construction of L2 identities as well.

Focusing on the outcomes on participants' L2 competence with personal and social identity, a number of studies found that there are both positive and negative outcomes related to the effect of SA on the construction of one's L2 identity. Phan (2009), Anwaruddin (2012), Yamat (2012), Sato (2014) and Barkhuizen (2017) pointed out in their studies that SA has many positive effects such as linguistic and intercultural developments. Phan's (2009) qualitative study on eight Asian international master students at a university in Thailand reports that all participants felt proud and superior for being able to speak English. One of them even represented herself as "successful role model" (Phan, 2009, p. 208) to other non-native English-speaking learners. As they took ownership of the language and gained positive experiences, they identified themselves in a preferable position and created meaningful senses of selves. Their identities were constructed, produced and reproduced in a dynamic way around the negotiations of English and being Asians. Likewise, other participants considered themselves as "privileged" for having the chance to learn English (Anwaruddin, 2012) and were able to gain more self-confidence (Sato, 2014). Using the three dimensions of second language identity introduced by Benson, Barkhuizen, Bodycott & Brown (2012), Barkhuizen's (2017) study also shown how a participant's linguistic self-concept has changed by him identifying himself as a successful user and learner of English due to socio-pragmatic success which contributed to his personal development in intercultural competence.

On the other side, other studies demonstrated that SA could also lead to negative effects such as linguistic anxiety and loss of motivation. One participant in Galucci's (2014) study reported that study abroad gave negative outcomes on the development of her second language identity due to uncomfortable learning environments and unsupportive social networks. Her difficulties got worse by her lack of efforts and commitment in L2 learning and in the end, she failed to improve her L2 and felt more attached to her home-country instead. Other cases can be seen from a study of an American in Japan who was frustrated in achieving his desired identity as a Japanese speaker because other people "consistently positioned in interaction in accordance with an outsider's status" (Benson et al., 2012, p. 178). Lastly, a study by Chik and Benson (2007; as cited in Benson et al., 2013) also revealed how a student from Hong Kong was frustrated by constantly being seen as "Chinese", "Asian", and "ESL student" during her undergraduate study in the UK.

In analysing one's development in the construction of L2 identity, Benson et al. (2012) introduced the three dimensions of L2 identity. The first dimension is *identity-related aspects of L2 proficiency*; the socio-pragmatic proficiency and the ability to enact the identity one's desired to project. The second dimension is *linguistic self-concept*; how people perceive themselves and negotiate their personal identities through L2. This includes the matters of one's self-confidence, self-esteem, motivation, and many more. Lastly, *L2-mediated aspects of personal development*; personal capabilities improved by SA experience and may have no relations to L2 learning or use, such as becoming more independent and acquiring intercultural

competencies. In relation to that, this current study explores these three dimensions further in the context of Korean international students in Australia.

## Methods

The method used in this qualitative research is narrative inquiry. Benson et al. (2013) pointed out that self-narratives are significant in the construction of L2 identities and effective to describe the development and changes in individuals. Moreover, it is considered to be the best way to represent the experiences/events from the perspectives of those who experienced them (Sato, 2014). For those reasons, narrative approach is considered to be the most appropriate for this research.

### 1. Participants

NAME	AGE	GENDER	MAJOR	LENGTH OF STAY
John	28	Male	Applied Linguistics and TESOL	1,5 year
Ruby	25	Female	Applied Linguistics and TESOL	1,5 year
Jenny	33	Female	Applied Linguistics and TESOL	1 year
Henry	32	Male	Applied Linguistics and TESOL	Almost 3 years

The participants in this research are four South Korean international students who were undertaking their postgraduate degrees in Australia; John, Ruby, Jenny, and Henry (all names are pseudonyms). Their age varied between 25 to 33 years old. With an equal number of male and female proportion, all of the participants were majoring in Applied Linguistics and TESOL in a university in Sydney. Three of the participants had spent more than a year in Australia, while the other participant, Jenny, had been living in Australia for one year.

### 2. Procedures

For triangulation purpose, this research is using a combination of three sources of data collection. Those are (1) self-reports about English language learning experience in Australia written by participants, (2) semi-structured interviews, and (3) in-class observations. Before conducting the interviews, participants were asked to write their English language learning experience and report it via email. The participants' reports were used as a baseline to arrange five main inquiries for the interviews. One-on-one semi-structured interviews were then conducted where participants asked to describe further and comment on their SA experiences and the ways in which they felt any development or changes. Arranged on a casual basis, the interviews took around 25 minutes (per person) to complete and was conducted in English. The interviews were also recorded and then transcribed and double-checked for accuracy (see appendix 2 for the transcription). In order to achieve a more rigour and credible research, in-class observations were conducted as well. In this respect, participants' actions and behaviours in class were observed for approximately 3 weeks and then noted for further analysis.

### 3. Data analysis

In order to interpret the data and find out how study abroad is affecting the participants, all the data obtained for this study was analysed using a deductive approach (theory-driven) of coding procedure. Following Benson et al.'s (2012) three main dimensions of L2 identity, the data were coded into *identity-related aspects of L2 proficiency*, *linguistic self-concept*, and *L2-mediated aspects of personal*

*competence*. The coding process was performed by using traditional techniques such as paper, pencil and highlighters. Once the data were coded with the coding scheme mentioned earlier, the code segments were organised and connected in order to obtain the appropriate interpretations.

## Results

### 1. Identity-related aspects of L2 proficiency

IMPROVEMENTS	JOHN	RUBY	JENNY	HENRY
In oral proficiency	✓	✓	✗	✓ Fluency in speaking through phone calls
In listening skills	✓	✓	✓	✓ Improvement in listening through phone calls
In reading and writing skills	✓	✓	✓	✓ Fluency in reading and writing through text messaging
Pragmatic competence	✓ Australian idioms and expressions	✓ Australian accents and expressions	✓ Australian idioms and expressions	✓

All of the participants in this research reported that their English language proficiencies had improved, especially in terms of pragmatic competence. Apart from Jenny, all participants also reported to have developed their speaking skills. First of all, Ruby claimed that she had learned and gained more knowledge about Australian accents and expressions. When she first arrived, she admitted that she could not understand 100% what people were talking about because, according to her, Australians speak really fast and have a different accent from the English that she used to learn. However, after living in Sydney for almost a year and a half, she claimed that she now could understand Australian English 100%. She also added that she learned many Australian expressions e.g. ‘heaps’ and started to use it too. Her response is captured in the following excerpt:

“I learned more about Australian accent too. When I first came, I actually couldn’t understand 100% what they’re talking about, especially Australian speak really fast, very different with the English that I used to know, but then now I can understand like almost 100%. And I learned about their expressions a lot. Like I used ‘super’ a lot ... but Australian use ‘heaps’ a lot, and I found myself using ‘heaps’ these days.”

Similar with Ruby, John pointed out that other than being able to significantly develop his English ability, he also learned many Australian idioms and expressions that he never learned in Korea before e.g. ‘no worries’.

“It’s very significant because I have never been to English speaking countries before, and the opportunities to practice in new communities and the experience, and the culture, getting into the native speaker society, experience how they behave and think. I also get many idioms and expressions that I never learn in Korea, you know, like ‘no worries’”

Lastly, Henry revealed in his self-report that he was able to improve his fluency in English conversation through text messages and telephone calls with his foreign friends. An interesting finding from this case is Jenny’s experience. Due to a large

number of compulsory readings and writing assignments from her course, she claimed that her English was improving in terms of reading, writing, and listening skills but not for her speaking skill. Jenny admitted that she gradually lost her English-speaking skill because she spent most of her time solely on her studies or assignments and had no enough spare time to spend with other people to practice her English. Her feeling is captured in the following excerpt:

“I really have not much time to spend with others ((laughs)). Actually, I am really sure that my reading and writing skills are improving now because I’m doing a lot of things in English and because this is school ((laughs)). Listening also the same. But frankly, for speaking, I feel like I’m losing my speaking skills. Because you know spending a lot of time on reading and listening, sometimes I really confuse choosing or selecting appropriate words in the speaking time. And sometimes I feel really nervous, because in Korea we learn American English but here they have different accent and spelling sometimes. So sometimes I feel nervous when I talk to Australian because they talk really fast and they use different vocabularies? So yeah.”

## 2. Linguistic self-concept

LINGUISTIC SELF-CONCEPTS	JOHN	RUBY	JENNY	HENRY
Increased Self Confidence in using English	✓	✓✓	✗	✓
Increased Self Esteem in using English	✓	✓✓	✗	✓
Increased Motivation in using English	✓	✓✓	✓	✗

In terms of linguistic self-concept, John and Ruby reported that they had become more motivated and more self-confident in using English, especially in speaking and understanding others. Ruby stated that she felt more motivated about English, really confident, and really comfortable in using it. In fact, she felt too comfortable that sometimes she’s worried about her Korean language because she rarely used it in her daily activities. To add, the observation results also indicate that Ruby had obtained positive outcomes on her linguistic self-concept by behaving proactively in class. Her response is captured in the following excerpt:

“I feel more motivated about English, and I feel really comfortable and really confident about using English. And like sometimes it makes me worry about my Korean actually ((laughs)) cause I rarely speak Korean. Like really. I only speak Korean with my parents maybe.”

Likewise, John claimed that the more information and experience he gained the more motivated he felt to learn English. He also acknowledged that grammar and reading skills were not the most important skills as he learned that many native speakers made that mistakes too. He explained that his self-esteem was increased, he made more friends with English native speakers and also discussed some topics based on Biblical principles with native speakers from his Christian society. His response is captured in the following excerpt:

“but sometimes even native speakers make grammatical mistakes too. So, yeah grammar is important, but speaking is also important. when I taught student in Korea, I think 10% I spoke in English and 90% in Korean. I realise I spoke too less during the class, so when I’m going back, and if I teach student again I will use English more, at least 40%.”

In contrast, Jenny reported that she felt a deterioration in her self-confidence to speak English. She explained that she used to practice English more when she was in Korea with her foreign colleagues than when she was in Australia. In Australia, she felt really nervous to talk to Australians because they speak really fast and have different accents and expressions. She also added that sometimes she could not distinguish written language with spoken language and often felt confused in selecting the appropriate words to communicate in English with other people. However, she argued that she was motivated to improve her English-speaking skill because English had become part of her daily life and not just a subject to learn. Her feelings are captured in the following excerpts:

“Because you know spending a lot of time on reading and listening, sometimes I really confuse choosing or selecting appropriate words in the speaking time. And sometimes I feel really nervous, because in Korea we learn American English but here they have different accent and spelling sometimes. So sometimes I feel nervous when I talk to Australian because they talk really fast and they use different vocabularies? So yeah”

“(in Korea) I used to work with foreign teachers that’s why I have to speak English every day and every time to share ideas or to tell them about the children and their moms. And here ((laughs)) is quite different ... Yea and you know in Korea I used the simple words, the common words to communicate with others. But here sometimes I really need to know how to use special terms in the classroom ((laughs))”

On the other hand, Henry admitted that he became less motivated in learning English. He admitted that it was hard for him to stay motivated to learn English like he used to because of financial problem and false expectations. He stated that even though he really wanted to speak English well, his decision to enrol in a postgraduate program was wrong and he decided to give up. His statements were supported by the observation results which he was found to never attend the lectures and rarely communicate with other students. Nonetheless, Henry claimed that as he lived in Australia his fear of speaking English that he used to have when he was in Korea had disappeared and he became more confident. His responses are captured in the following excerpts:

“In my case, it’s so hard actually. Cause I should work and study at the same time to pay tuition fee, it’s much higher than my country. And even I’m in Australia, I actually don’t speak English everyday cause(.) of my situation. Actually↓ I tried to be exposed to English environment, especially I bought TV and also sometimes I played radio when I drive, but now, I think a::h I think I give up ((laughs)) yeah give up to get many information(.) and the environment with English. So technically, I want to learn English, but because of my situation I cannot focus on this right now. So if I financially don’t have any problem, then I think Australia is good environment to learn English.”

“Yeah, there are some things you should know. This one is, <I really want to speak English well> but(.) the course(.) that we are on(.) a::h it’s not related to improve

my English skills. There's a lot of readings and writings, and I think I misunderstood that if I through this course I can be a good English speaker, but this course is just to be a good teacher. Not good English speaker. So they kind of different, between(.) truth and my expectation. Yeah, but it's my problem. My mistake, not the course. I don't wanna blame. It's me going to the wrong way. Yeah, I thought university here is just almost same with Korea. Cause in Korea they only focus on the English reading and writing."

"Korean has a kind of fear of speaking because of their grammatical problem, yeah, all English course and English test go with some kind of assessment which correct their grammars, so they kind of fear that you can make some kind of mistake when you speak English. And for me, that disappear in Australia."

### 3. *L2-mediated personal development*

John, Ruby, and Jenny mentioned that their SA experiences had helped them to be more open-minded, tolerant of other cultures, and more independent. With the exception of Jenny, all participants also claimed to have gained more self-confidence. John explained that his SA experience had made him become more independent as he looked after himself more and did everything on his own. He added that his biggest personal development in Australia was being more tolerant towards different cultures because he never experienced such a big cultural diversity when he was in Korea. With similar reason, Ruby admitted that her view about the world was broadened and made her felt really motivated and competitive in a positive way. She claimed that her biggest personal development was to become more concern with her future career and began to plan for a doctoral degree in Australia. Some of their responses are captured in the following excerpts:

"I think I got more open minded yeah and also become more tolerant. Tolerate of variety, because in Korea I think more than 90% are Koreans so there is no cultural and ethnical variety in Korea. They are not familiar with foreigners. Not like in here. And I think I also become more independent o:h for example when I need something I do everything myself in here and it's another kind of adventure." – John

"In Australia I planned a lot more about my future though. Maybe it's because of my age, it's time to plan something. And of course, my future is related to English and linguistics. I think the fact that I had designed a five-year long future plan for PhD here is the biggest impact. And I think it's also because different cultures in Australia kinda makes me feel like really competitive and see the world bigger and wider, and it motivates me as well." – Ruby

However, in Jenny's case, she believed that her study abroad experience had affected her personal development both in good and bad ways. According to her, it was good because she gained more knowledge of other cultures, but it was also bad because her confidence was deteriorated. Her response is captured in the following excerpt:

"Intercultural competences. Because Korea is a monolingual country and Australia has many people from other culture and use different language. I become more open minded. But it's (affecting in a) good way but sometimes I also feel like it's affecting me in a bad way. I agree that living in Australia is quite good opportunity to speak English in real life, everyday life. But maybe for me, as a master student, I don't have enough time to speak or you know because I told you spend a lot of time for reading and listening, so sometimes for someone like me, I get confused

on what is written language and what is speaking language. We have to know the differences but sometimes it's confusing me.”

## Discussion

Findings revealed that all of the participants' responses were in accordance with Benson et al.'s (2012) three main dimensions of L2 identity which are *identity-related aspects of L2 proficiency*, *linguistic self-concept*, and *L2-mediated personal development*. Even though each participant did not have the exact same kind of outcomes, all of them, especially John and Ruby, reported some positive developments along all of the three dimensions. Agreeing with Sato's (2014) assumption, this finding indicates that the context of long-term study abroad was indeed filled with intense opportunities for the development of the participants' L2 identities.

This study is addressing two research questions. The first one is how participants perceive their sense of selves through their L2 development. Findings showed that all of the participants in this research were able to describe what they had been able to do with English and how they improved their English proficiency while studying abroad, especially John and Ruby. As the acquisition and use of pragmatic competencies are highly related to the kind of identities one wishes to project (Benson, et al., 2013), both John and Ruby had explicitly articulated how their enhanced competencies were related to their ability to express their desired identities. For instance, Ruby argued that there was no other way than to learn English for her, because “*if you wanna live in Australia you have to learn English otherwise it's hard to live in Australia*”. Her English proficiency and the high level of tendency she had in using English had led her to project a strong identity as an English user. However, at the same time, it had also led her to project an unstable identity as a Korean. Nonetheless, both Ruby and John had positively developed their English skills to the level where they were able to function in English and project the identities that they desired and that English speakers around them would want to interact and make friends with. On the other hand, Jenny and Henry were unable to perceive themselves as how they wanted their identities as L2 users to be projected due to false expectation and loss of confidence.

In regard to the second research question, studies indicate that, of all participants, it is evident that John and Ruby's changes in attitudes and orientations towards English and study abroad had the most positive effects on the enactment of their L2 identities. For the other two participants, Jenny and Henry, despite the positive developments they had gained, they admitted that SA had also affected them negatively, especially in Henry's case. Both of them struggled for acceptance in their society as their access to ‘symbolic resources’ (Galucci, 2014, p. 932) such as friendship and interactions with native speakers, was jeopardized by the loss of self-confidence (Jenny) and false expectations (Henry). It is apparent that Jenny and Henry's experiences in Australia had affected the way they perceive SA and changed their initially positive attitudes towards learning and using English into negative attitudes. Consequently, their negative attitudes then had negatively affected their sense of selves and the enactment of their L2 identities; Jenny lost her confidence to speak English and Henry lost his motivation to learn English.

In relevance with Galucci's (2014) study, the results from this study have also shown that identity is a dynamic evolution which highly influenced by the way people perceive their sociocultural environments and construct their relationships to the new context around them over time and across space. Therefore, as demonstrated by the participants, one person would obtain different outcomes from another person depending on their own selves and their environments.

### **Conclusion**

This paper presents a small-scale study which focused solely on the effect of long-term SA. The findings showed that even though all participants claimed to have developed something in their long-term SA experiences, not all participants were positively affected by it. This indicates that SA, despite all the positive outcomes that many people believe, is not always a good thing for learners. The findings from this study could be useful for L2 learners and educators to deepen their understandings of L2 identity and be more aware of its dynamism and the different ways it might be affected. Moreover, despite the limited works of literature, the study of L2 identity in the context study abroad is very wide and requires more investigation in various other aspects. Hence, further investigation in this field is very encouraged.

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## ***Students' Perceptions of Research Integration in Graduate Education***

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The IAFOR Conference for Higher Education Research – Hong Kong 2018  
Official Conference Proceedings

### **Abstract**

The shape of education changed with time as the world opened to borderless, distance, and virtual learning. The confinement of students in the four-cornered classrooms transformed to globalized educational milieu. Side by side with the structural and instructional transformations of education emerged new pedagogical principles and paradigms at all levels in the hierarchy of academic institutions. One shift included the culture of research among students, especially in higher educational institutions. The contradictory perceptions of students on research integration provided a relevant springboard on the determination of the students' perceptions in a certain locale, particularly at the Graduate School of La Consolacion University Philippines. It was interesting to identify the perceptions of a particular community of students on research integration: optimism on the relevance of research in the current educational trends of globalization and internationalization or pessimism posed by the fear on the hurdles and difficulty of the conduct of research.

Keywords: graduate education, research integration, students perception

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## Introduction

The shape of education changed with time as the world opened to borderless, distance, and virtual learning. The confinement of students in four-cornered classrooms transformed to globalized educational milieu. Side by side with the structural and instructional transformations of education emerged new pedagogical principles and paradigms at all levels of the hierarchy of academic institutions. One shift included the culture of research among students, especially in higher educational institutions.

Mincu (2015) observed how research contributed to the school improvement process on a wider scale. The academic community witnessed the burgeoning culture of research which affected the educational pursuit among students. Students from high school, college, and graduate levels participated in the development of research studies with manifested enthusiasm. Thus, Gulli (2009) reported that the big universities in Canada located in Montreal, Toronto, Alberta, British Columbia, and McGill joined the bandwagon on research efforts focusing on world-class graduate education. Graduate education restructured its curriculum and methods emphasizing the relevance of research (Piotrowski and Guyette, 2013) and the primary source of innovative research (Heggelund, 2008).

With the new thrusts in higher education, academicians scrutinized the necessity of research. Freedman (2011), as cited in Leann (2017), believed in the importance of research, especially among ICT teachers, to find answers on issues that were once unknown and questions that had not been asked before. In the Research Report authored by Mary Louise Kearney, Director of the UNESCO Forum on Higher Education, Research, and Knowledge, she mentioned that “investment in research is increasing in emerging economies, such as Brazil, China, Singapore, and South Africa, and many more nations are prioritizing and committing more resources to higher education, research and innovation.” She cited the Singaporean experience which observed an increase in the number of research scientists and engineers from 4,329 in 1990 to 11,596 in 2004 and challenged researchers to ‘think global’ and ‘act local.’

On the other hand, Manathunga & Mellick (2009) observed that students opposed the inclusion of research in education which accordingly was already a frenetic experience for a lot of students. There were a number of reasons why students complained about the integration of research in graduate education. One was the inability of students to see its relevance in their personal and professional life (Braguglia & Jackson, 2012; Briggs, Brown, Gardner & Davidson, 2009; Deem & Lucas, 2006; Dorfman & Lipscomb, 2005; Edwards & Thatcher, 2004; Emery & Kalscheur, 2000; Fabelo-Alcover, 2002; Hardcastle & Bisman, 2003; Moulding & Hadley, 2010; Murtonen, Olkinura, Tynjala, & Lehtinen, 2008; Papanastasiou & Zembylas, 2008; Rodriguez & Toews, 2005; Spronken-Smith, 2005; Vandiver & Walsh, 2010 as cited in Early, 2013). Second in consideration was the low motivation and interest in the research activity (Aguado, 2009; Ball & Pelco, 2006; Birbill, 2006; Barraket, 2005; Braguglia & Jackson, 2012; Briggs, Brown, Gardner, & Davidson, 2009; Burkley & Burkley, 2009; Campisi & Finn, 2011; Fabelo-Alcover, 2002; Lehti & Lehtinen, 2005; Lie & Cano, 2001; Pietersen, 2002; Rash, 2005; VittengL, et al, 2004 as cited in Early, 2013). The negative attitudes of the students on research, also,

marked as a hurdle in the students' perceptions of the research integration in graduate education (Hardcastle & Bisman, 2003; Lei, 2008, 2010; Onwuegbuzie, Slate, & Schwartz, 2001; Ozturk, 2011; Papanastasiou, 2005; Schulze, 2009; Sizemore & Lewandowski, 2009 as cited in Early, 2013). Lastly, the students believed that research would be difficult since it would involve time and work ( Early, 2013).

Due to the globalization and internationalization of education, the higher educational institutions necessitated to adopt their curriculum and instruction to include research. Graduate students at La Consolacion University Philippines (LCUP) were oriented in the culture of research through their student outputs as they worked independently, as a group, or partnered with their professors. Since August 2017, LCUP had compiled the researches of graduate students into two-volumes of research outputs. Due to contradictory perceptions and beliefs of students on the research integration in the graduate education, this research was aimed at assessing the graduate students' perceptions, beliefs, and participation on the integration of research in their academic courses. The Slovin's Formula was accessed to come out with a valid number of respondents of the study which was 321 students of LCUP Graduate School randomly selected from the Master of Arts in Education programs during the Academic Year 2017-2018.

## **Conclusion**

The following conclusions and recommendations were arrived at after analyzing the results and findings presented by the gathered data.

1. The Master's students of the Graduate School at LCUP are familiar with how researches are produced paying attention on the research methodology and the ways research was conducted and carried out. The familiarity and encouragement of their teachers allowed the assimilation of knowledge about their research findings.
2. The Graduate School Department of the La Consolacion University Philippines provided opportunities to talk and interact socially with the researchers within the University which stimulated the students' learning process. The teachers explained the subject matter effectively and allowed sufficient time to carry out instruction adequately which was supportive of the learning process.
3. The Master's students believed in the value of research in their learning and understanding of the concepts in the field resulting to an academic disposition linked to current research practices. This allowed the students to develop an accurate picture of what was expected of them as students with critical thinking.
4. Inspiration to learn more, enthusiasm and stimulation to critically assess the literature in the field, stimulation on education grounded in research, and encouragement of the teacher's interest and motivate the students on research integration.
5. The students participated actively in the creation of the research culture at LCUP being involved in their own independent research and being involved with their teachers' research believing, among other things, that their research was important.

6. The students at the Graduate School Department of LCUP were encouraged and accepted the integration of research as part of their curriculum and courses with enthusiasm, interest, and without hesitation.

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## *Use Bean Counting to teach Binomial Distribution in the Classroom*

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The IAFOR Conference for Higher Education Research – Hong Kong 2018  
Official Conference Proceedings

### **Abstract**

Since the 1980s, many academics have engaged in the research of statistics education. The underlying reason is that there was an increasing number of students taking introductory statistics courses, which stimulated the need to improve the teaching of statistics courses. Some researchers have suggested that teachers should focus more on concepts by designing more active learning activities. On the other hand, a substantial number of teachers have using the traditional lecture method. Some studies have found that an active learning technique has correlated with more positive attitudes or higher test scores but some studies showed a detrimental effect when using active learning methods in teaching business statistics. This paper reports the result of an educational experiment by dividing a class of 70 students ( $n=70$ ) into two tutorial sessions (1-hour duration). One tutorial class was taught entirely with a lecture about the concept of binomial distribution. The other tutorial class was taught by using a minimal teacher-centered activity. At the beginning of the next tutorial class, an identical closed book exam of 20 minutes was conducted, and students' results on exams were analyzed. The result suggested that the activity session produced a better score both on conceptual questions and on application questions. However, one defect about this educational experiment is that the author did not control other factors that may affect the exam performance, such as the impact of previous GPA performance of the students in the two groups.

Keywords: teaching statistics, type of data, sample, binomial distribution

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## Introduction

The idea of using games and activities can be a better educational alternative in creating a fun learning environment in classroom settings. Educators and teachers have increasingly incorporated various games into their teaching curriculum. Although using games in classroom learning can be time consuming because they involve interactive communications and collaborations among students, they are very effective teaching tools for motivating student participation in the learning process. In McLester's 2005 article entitled "Game Plan", he investigated the use of games in U.S. major companies and the military, he found that "Nearly seventy percent of students learn best actively and visually" (McLester, 2005). Quinn and Iverson indicated that game activities can enhance students' learning experience by making them the active participants. In short, game activities can help the students by placing them "at the centre of the learning experience" (as cited in Pannesse & Carlesi, 2007).

When we used the bean counting activity in the classroom, we found that it can serve as an effective tool to help the students in understanding the statistical concept of binomial distribution which delivered in using the traditional lecturing method. We have noticed that most students voiced their enjoyment in using hands-on activities in the learning process. Although we may not be certain that hands-on activities could replace the traditional lecture format, it seems that they were very good supplements in understanding the lecturing materials.

By assessing the results of our bean counting activities, we found that many students did receive the positive learning benefits because the hands-on activities offered a chance of active participations in the learning process.

## Binomial Distribution

Two of the most widely used discrete probability distributions are the binomial and Poisson. In analyzing statistical data which can be counted rather than measured, statisticians frequently use the concept of binomial distribution. The binomial distribution is now widely used to analyze data in almost every field of human inquiry.

For example, in 1936 the British statistician Ronald Fisher used the binomial distribution to work on the famous experiments on pea genetics reported by Gregor Mendel in 1866. Fisher observed that Mendel's laws of inheritance would dictate that the number of yellow peas in one of Mendel's experiments would have a binomial distribution with  $n = 8,023$  and  $p = \frac{3}{4}$ , for an average of  $np \cong 6,017$  yellow peas. Fisher found remarkable agreement between this number and Mendel's data, which showed 6,022 yellow peas out of 8,023. By using the binomial distribution, Fisher found that all seven results in Mendel's pea experiments were extremely close to the expected values.

It applies to any fixed number ( $n$ ) of repetitions of an independent process that produces a certain outcome with the same probability ( $p$ ) on each repetition. For example, it can provide a distribution for the probability of obtaining 10 sixes in 50 rolls of a die. Swiss mathematician Jakob Bernoulli determined that the probability of  $k$  such outcomes in  $n$  repetitions is equal to the  $k$ th term (where  $k$  starts with 0) in the

expansion of the binomial expression  $(p + q)^n$ , where  $q = 1 - p$ . In the example of the die, the probability of turning up any number on each roll is 1 out of 6 (the number of faces on the die). The probability of turning up 10 sixes in 50 rolls, then, is equal to the 10th term (starting with the 0th term) in the expansion of  $(5/6 + 1/6)^{50}$ , or 0.115586.

Teachers who use traditional lecturing method can show an explicit formula for the  $k$ th term of a binomial expansion by a binomial theorem  $f(x) = \binom{n}{x} p^x (1 - p)^{(n-x)}$ . However, in order to help students in understanding the binomial distribution, show a visual presentation of the data would be a good way to point out facts which might otherwise be overlooked.

In our designed game, we adopt a special type of graph paper which was designed by Frederick Mosteller (Harvard University) and John W. Tukey (Princeton University). Mosteller and Tukey's visual presentation method can be traced back to R. A. Fisher's observation that:

$$\cos^2 \phi_i = \frac{n_i}{n}$$

transformed the multinomial distribution with observed number  $n_1, n_2, \dots, n_k$  into direction angles  $\phi_1, \phi_2, \dots, \phi_k$  which were nearly normally distributed with individual variances nearly  $1/4n$  (when the angles are measured in radians). Thus the point at a distance  $\sqrt{n}$  from the origin and in the direction given by  $\phi_1, \phi_2, \dots, \phi_k$  is distributed on the  $(k - 1)$  dimensional sphere nearly normally, and with variance nearly  $1/4$  independent of  $n$  and the true fractions  $p_1, p_2, \dots, p_k$  of the different classes in the population. The rectangular coordinates of this point are  $\sqrt{n_1}, \sqrt{n_2}, \dots, \sqrt{n_k}$ .

Mosteller and Tukey's graph paper employed R.A. Fisher's inverse sine transformation for proportions. The transformation itself is designed to adjust binomially distributed data so that the variance will not depend on the true value of the proportion  $p$ , but only on the sample size  $n$ . In addition, binomial data so transformed more closely approximate normality than the raw data (Mosteller and Tukey, 1949). By using the special designed graph paper, plotting binomial data in rectangular co-ordinates, using a square-root scale for the number observed in each category would makes the angular transformation  $p = \cos^2 \phi$  or  $p = \sin^2 \phi$  easily available at the same time. With such paper, most tests of counted data can be made quickly, easily and with what is usually adequate accuracy. In Mosteller and Tukey's article, they gave 22 examples to demonstrate the use of such plotting method.

### Good Educational Game

What are the factors that determine a good "educational game"?

Some education games are by nature competitive; while other games just simply allow students to work together as a team to solve a general problem. Prior researches indicated that by supplementing traditional lectures with active learning activities in the classroom, as summed up by Franklin, Peat & Lewis (2003), "games foster group cooperation and typically create a high level of student involvement that makes them useful tools for effective teaching".

Okan (2003) questioned whether or not learning should always have to be “fun.” Some educators argue that “meaningful learning may sometimes be difficult and requires cognitive and emotional effort, especially in considering the fact that post-secondary education is not usually a fun undertaking”. Other educators view that the mere act of problem solving by itself is full of fun. In MacKenty’s 2006 paper entitled “*All Play and No Work*”, it observed that “it is the act of problem solving that makes games so engaging”.

Then the next step of investigation is whether the risk of failure in participating in a competitive learning game would destroy the fun part of the learning process. Despite the feeling of failure, Schaller (2006) noted that by repeating the game activities, it may encourage students to work on those high level thinking skills, such as “experimentation, hypothesis testing and synthesis”. The positive aspect can be strengthened by using non-competitive games, in Tom Schrand’s 2008 published article in *Collegiate Teaching*, he discussed how interactive multimedia activities can help students to work together as a team in grouping relevant information and facts into proper categories.

Harris (2009) found that if an educator can choose a well-designed game in the classroom, regardless of whether the game is competitive or non-competitive, it helped the students to build their problem solving skills while having fun simultaneously. His paper also investigated the best way to integrate the game activity into the teaching curriculum (Harris, 2006, p.26). Van De Bogart (2009) conducted a research about how the personal beliefs on teaching pedagogy of instructors would affect their choices of educational activities in classroom.

### **Teachers’ intent**

Teachers’ intent is one of the key factors affecting the values of educational games. Audrey Amrein-Beardsley (2009) found that many teachers were simply “teaching to the test” with games. Their intent was merely helping the students to “become experts at answering the test questions without entirely understanding the concepts justifying their answers”. She argued that such underlying purpose may negatively affect the “inquiry-based, higher order, problem-solving activities” that we valued the most (Beardsley 2009).

The very purpose of a good education games is active learning, and active learning can be defined in many ways. One way is to define it as “an effort to make learning authentic” (Van De Bogart, 2009). In addition, active learning can be referred to teaching techniques that enable students to engage in something rather than merely listening to a lecture, such as “discovering, processing and applying new information”.

Finally, one last concern regarding educational games comes from a recent case study that focused on teachers adopting educational computer games. Kebritchi (2010) poses the concern that games are becoming such innovative learning tools that teachers may conclude that they don’t need to lecture, and instead they intent to “rely on the game and use it as a teaching replacement and not as a supplement” (p. 263). It is important to remember that games are supplement teaching tools and teachers ultimately need to be actively involved for them to be truly effective.

### **Pre-game preparations**

Rotter (2004) investigated the aspects of pre-game preparations. One way is by encouraging the “student to predict questions that will be asked on the test” and then providing the teams whose questions are chosen with bonus points on the game. This kind of pre-game preparations will motivate the students to study and prepare outside of the classroom, and such activities are very positive for additional reinforcement.

To address the issue of lagging student participation when one student is answering the question, teachers can “ask all student to bring their prepared notes to class on the day of the game” and then “instruct all pupils to add or highlight the answers to questions as part of the game” (Rotter, 2004). Although Rotter’s 2004 paper did not address the issue of how to incorporate the pre-game preparations into scoring, it would be beneficial to give additional points for students as their incentives.

### **Assessment**

There are many computer based games that can provide active learning opportunities and can reinforce topics learned in the classroom. One issue the teachers need to consider is the nature of students’ interactions with the computers. Will the students work independently and individually compete against the computer? And in what way such individual efforts can promote cooperative learning? Teachers may divide the game into two stages. The first stage consists of competing with the computer individually for “skill exercises”. The second stage involves students compete against other students in a team. Such arrangement tend to help the learning process because it provides “both group rewards and individual accountability”

In their case study, Ke and Grabowski (2007) compared pre-test and post-test results of three groups of students. The first group competed using the TGT format (cooperative gameplay.) The second group of students worked independently as they competed individually with the computer and their scores were posted weekly to compare their results with their peers (competitive gameplay.) The third group participated in paper/pencil review sessions and did not play the games at all (control.) Results showed that there “was no significance for maths performance between cooperative game playing and competitive game playing but both performed significantly higher than the control group”.

Another teaching methodology that incorporates active and cooperative learning pedagogies is the knowledge net framework (Williamson, Lee, Butler, Ndahi, 2004). The researchers selected a group of fifth grade students using the rules of baseball. Students were divided into two teams where they were allowed to choose the teams and questions were provided beforehand. For the game, each student takes a turn “at bat” to score a “hit” by answering the question correctly. Players advance one base at a time. As in baseball, if a student gets a question wrong, he is “out”. After three outs, the other team takes a turn “batting”. The researchers found that the student achievement in science at the test school showed dramatic gains. In addition, the game fosters self-categorization that motivate the students to learn science in meaningful ways.

## **Conclusion**

This paper conducts a brief literature review, which gives the readers a greater understanding of the benefits and constraints of using games in the classroom. Games conducted in classroom would require pre-game preparations conducted outside of the classroom through studying the process and review questions beforehand. By participating in a game, it provides rewards to the participants yet still holds students accountable.

Certainly, incorporating games in the learning process would require significantly more class time to prepare and conduct when compared to the traditional lecturing method. Based on our studies, we would predict that the games would motivate the students to become active learners in the classroom setting. And it would generate evidences for our assessments. We can compare students' performance in plotting the binomial distribution in the graph paper with their performances in their final examination.

### Appendix

Make a frequency table and work out the relative frequency of getting red beans and green beans.

No. of red beans	frequency	Relative frequency = $\frac{\textit{frequency}}{\textit{total number of beans in each trial}}$
0		
1		
2		
3		
4		
.		
.		
.		

Table 1: Frequency Table.

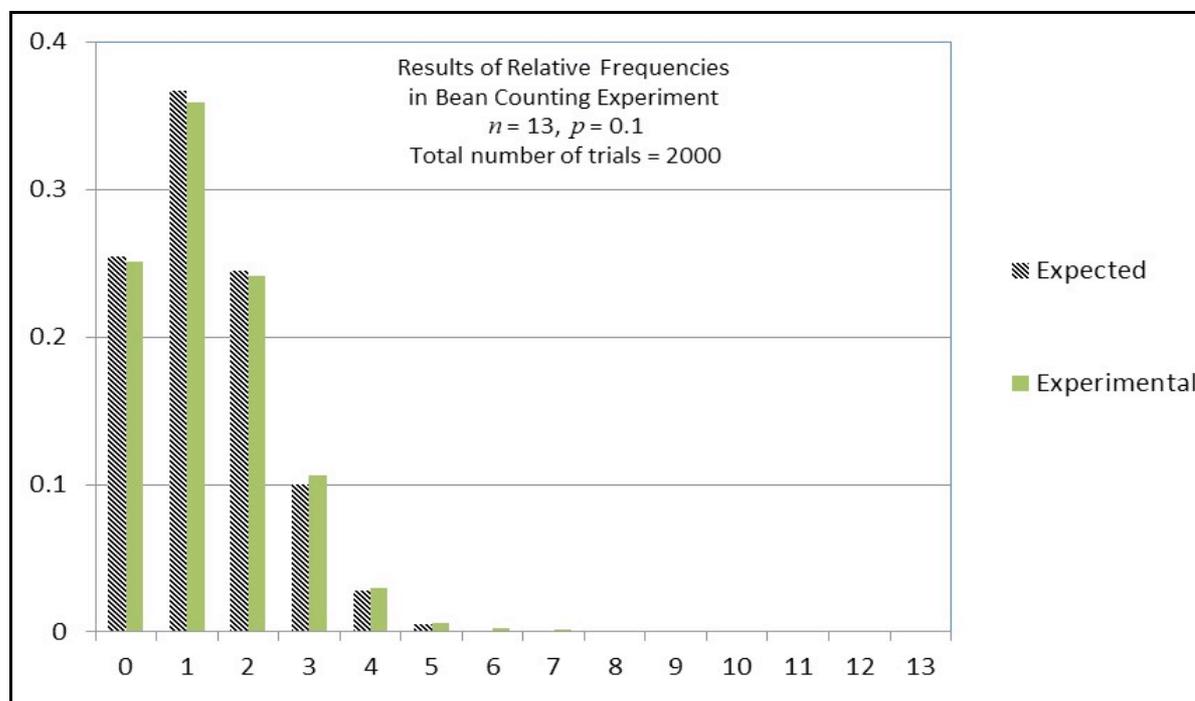


Figure 1: Results of Relative Frequencies in the bean counting activity.

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