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# *Universal Journal of Education Research*

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# Editor's Preface

Dear readers and contributors,

Recently, the student learning received considerable attention from the researchers. Learning is an important aspect of student's life. Many theories have been evolved on student learning mechanisms in past two decades. There are 5 overarching paradigms of educational learning theories; cognitivism, behaviourism, design/brain-based, constructivism, humanism and 21st Century skills. Recent technological development largely reshaped the existing understanding on the student learning theories and practices. The researchers have investigated how technology advancement, class room setting and teaching methodology influence the student learning process. Recently, the teaching methodologies have been shifted from teacher centred learning to student centred learning. The concept of education 4.0 altered existing practices of teaching and learning.

This special issue documented research work related to the education and learning in the modern age. The main aim of the special issue is to highlight current practices of teaching and learning in the education section of south east Asia in order to provide the future agenda for the educationist. Also this special issue contributed to enhance our current understanding of student learning mechanisms through deep rooted research. Studies mainly composed of primary data using both cross-sectional and longitudinal methodologies. We hope the readers will like our efforts to bring these new students learning concept to your knowledge.

The articles included in this special issue were presented in the 3<sup>rd</sup> ASIA International conference 2019, Universiti Teknologi Malaysia, Johor Bahru Malaysia on 1 May 2019 under the theme of Education 4.0 and beyond. More than 1000 articles were presented in this conference held at Universiti Teknologi Malaysia and selected articles were given opportunity to be submitted for possible publication in Universal Journal of Educational Research. We are really thankful to the reviewers who willingly spent their time to provide their precious inputs in improving special issue quality. We also obliged the journal editor who provided us opportunity to publish special issue of AIMC 2019.

I would like to thank the journal editor, all the journal team and the authors in your peace of mind.

Kind Regards,

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# Exploring the Digital Divide between Pre-clinical Teachers and Students in an Integrated Medical Curriculum from a Malaysian Private University

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**Abstract Background:** The effectiveness of the integration of technology within the classroom setting has been well documented, however the use of this technology is still far from reaching its true potential. Although the presence of digital divides between teacher and staff documents, the extent and nature of the divide is not well defined. This could have limited the potential exploitation of technology in teaching and learning, especially in a medical school with an integrated curriculum. Our study intended to identify the student's and teachers' perceptions of benefits of using technology in teaching and learning in a medical school and also investigate the nature of the gap that is present between teachers and students. **Methodology:** This cross-sectional study was conducted through a census during which we had 212 pre-clinical medical students and 30 lecturers engaged in the teaching of these students in an integrated curriculum. A pre-validated self-administrative questionnaire survey was conducted for Usage of ICT in learning and Perception of the Use of E-education Tools and Implementation of E-courses. The significance of the association between teachers and students was tested using Kruskal-Wallis test. **Results:** Over 3 hours in a day was spent by teachers and students on desktop and smartphone for TLA, indicating that students are mobile learners engaging in learning activities in their time and place of choice. 60-65% of students preferred using YouTube for their leaning activates, and around 50% of the teacher used this platform in teaching and related activities. Usages of journals as found to be high among teachers (55%) while the use of other popular learning applications. This study also showed that both teachers and students strongly agreed that they enjoy using technology, indicating the acceptance and willingness to explore its potential. **Conclusion:** The study

shows the use of ICT is prevalent between both medical teachers and staff; the difference was only in the degree of usage and also both the groups enjoyed the use of technology. It was also clear that both medical teachers and students viewed the use of ICT to be integral in delivering the curricula.

**Keywords** Information Communication Technology, Digital Divide, Teaching Learning Activity, E-learning

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## 1. Introduction

From a teacher's point of view, the difference between an un-engaging and a disruptive classroom is most often not in the causes but the degree. Over the last decade, one element that has been alleviating this form of student behavior is the incorporation of information and communication technology (ICT) into the students learning environment. Several studies have shown the effectiveness of technology in education among students, and also among teachers (1-3). The integration of technology as a tool in teaching and learning has been widely studied and experimented, particularly in the context of higher education (4). The aim of ICT integration has been linked to improve and increase the quality, accessibility, and cost-efficiency of the delivery of education while taking advantage of the benefits of networking to equip students to understand regional relevance in their learning and face the challenges of global competition. It is imperative to understand the role of ICT in crafting student's learning styles and preferences and its influence on teachers' teaching approaches.

### 1.1. Use of Technology and Its Effectiveness among Students

The future workplace driven by industrial revolution 4(IR4) will require students to have technical and digital ability to use standard programs such as spreadsheets and presentations along with the understanding of sophisticated technology behind Artificial Intelligence. It has been suggested by many researchers that interaction in online learning programs promote student-centered learning, encourage broader student participation, and produce more in-depth and reasoned discussions than observed in a traditional face-to-face program (5, 6). Davis and colleagues have also shown that several educational institutes had started moving from textbooks to tablet in classrooms (7) and had demonstrated impressive results with regards to the student's learning behavior.

Domingo et al. suggested that facilitating access to information and increasing engagement to learning are the two main impacts of mobile technology in the classroom(8). A study conducted in Clearwater High School reported an 18% increase in the test score when student learning was substituted with the use of the internet using the Kindle instead of a textbook. The study also showed that students were able to see their homework assignments, complete work, read their textbooks, and much more right at the touch of a button. Studies also report that technology has the potential to improve quantitative assessment performance in core subjects, as well as overall GPA. The use of ICT also leads to qualitative improvements; resulting in higher-quality student work. Gulek et al. in their study concluded that students using computers when learning to write are not only more engaged and motivated in their writing but also produce work that is of greater length and higher quality, especially at the secondary level(9). Although an array of studies have demonstrated many advantages in student learning, most of which were set up in schools with sparse data available from professional courses and even fewer from medical schools.

### 1.2. Use of Technology and Its Effectiveness among Teachers

Teachers, who are also lifelong learners, are now expected to have to adapt to the integration of ICT in their learning process in varying degree either by updating their skill set via various online courses or using online search engines in research or using YouTube and other video streaming portals enhance teaching activities. Most of the studies conducted on digital immigrants have observed acceptance of this integration among a large number of teachers and reluctance among a significant teacher's population.

Kim et al. conducted in-depth interviews and classroom observations of five middle school science teachers to conclude that teachers perceived that using Web resources made students' learning more dynamic and active as it promotes the interaction and communication among students and between students and teachers (10). Another study

examined pre-service teachers' computer acceptance and concluded that the perceived usefulness of technology had a significantly positive effect on teachers' intentions to use computers in the classroom (11). On the other hand, few reviews also suggest that many teachers feared that using technology would harm students' understanding of basic math concepts, make them overly dependent on technology, and not be useful as an instructional tool (12).

A research conducted in 2005 involving 15 teachers from two urban schools and two rural schools in Canada showed that none of the teachers considered that technology could increase students' confidence. They also concluded that nine teachers claimed that they would use technology only for keen students and that the use of technology demands time and specific skills. Weak students needed to focus on the practice of necessary skills rather than wasting time on technology integration. Several teachers said that the traditional textbook-based approach would be more appropriate for weak students than technology-supported learning (13). In our understanding, the research community had presented a broadly divided view among teachers over the incorporation of ICT in a student learning environment, more so with among those teaching in a professional course.

### 1.3. Digital Gap between Students and Teachers

A study conducted in Shanghai showed that Chinese students spend a long time using ICT than their teachers, with teachers using ICT more inside the classroom than outside (14). Their findings also revealed a complicated relationship between personal factors and social influence that explained the teacher's ICT adoption. In contrast, Ertmer et al. found that teacher's pedagogical beliefs (i.e., student-centered or teacher-centered pedagogy), as well as their beliefs and attitudes about the relevance of technology in education, played vital roles in shaping ICT practices(15). Several studies have explored the influence of technology and concluded that technology could motivate students to learn mathematics and science (11, 16, 17).

An earlier review of the literature indicated that many teachers feared that using technology would harm student's understanding of basic math concepts, make them be overly dependent on technology, and not be useful as an instructional tool (18). The study further showed that a significant number of teachers perceived that they had never been introduced to any software that aided in teaching and believed that using the software did not save time in teaching or evaluation (18). The digital gap that can exist in teaching and learning between teachers and students can be partly owed to what we identify as the generation gap. This gap examines differences not among students, but rather between students and teachers. Many youths today have spent much of their lives surrounded by, and multitasking with, computers, video games, cellular phones, digital cameras, digital music players, and the Internet (19).

In contrast, today's teachers being digital immigrants have grown to use computers, the internet, and other digital media

which could be used by the teachers depending on their interest, dependency, and inclination towards technology. Like all immigrants, teachers learn to adapt to their environment, but “they always retain their accent and their foot in the past. Their teaching style, which likely reflects the way they were taught as children, may not match well with the learning styles of their digital native students.

Although several studies have demonstrated the effectiveness of technology integration within classroom setting for subjects such as mathematics and sciences, our study is intended to identify the students and teachers perception on benefits of using technology in teaching and learning in a medical school and also investigate for the possible gap that may be present between teachers and students. This study aims to investigate the perception on the effectiveness and usage of information and communication technology (ICT) in teaching and learning activities (TLA) among pre-clinical medical students and medical lecturers in a private medical university and further evaluated the association between the perception of ICT between pre-clinical medical students and teachers.

## 2. Materials and Methods

A cross-sectional study was conducted between November 2017 and July 2018 at a private medical university in Malaysia. Census was used to gather information from 212 pre-clinical medical students and 30 lecturers engaged in the teaching of these students in an integrated curriculum. Among the pre-clinical students, 100 were from year 1, and 112 were from year 2. Ethical clearance was obtained from the medical faculty research committee.

A self-administrative questionnaire survey method was chosen for data collection because of the large and scattered number of participants (across different campuses). Usage of ICT in learning(20) and Perception of the Use of E-education Tools and Implementation of E-courses(21) questionnaires were used. These are validated five-point Likert-scale questionnaire with numbers indicating 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree. Before the commencement of this project, a pilot study was conducted with students outside the medical faculty to

establish the validity and reliability of the questionnaires.

Written consent was obtained from volunteering participants who were involved in the TLA from within the faculty of Medicine. The final data was then analysed by using Statistical Package for the Social Sciences (SPSS) software package 23.

## 3. Results

### 3.1. Socio-demographic Characteristics of the Study Population

A total of 212 participants were included in this study, which comprised 30 teachers, 112 year 2, and 100 year 1 medical student. As shown in table 1, the mean age of lecturers was 49.61(± 13.763), year one students were 20.35 (± 1.358), and year two students were 21.14 (± 1.172). Over 60% of the student population were females, while among teachers, 60% were males. Over 80% of the medical students were from an urban background, while around 50% of the medical teacher’s population were from urban.

**Table 1.** Demographic characteristics of the study population

Variables	Category	Year 1	Year 2	Teachers
Number(n)		100 (41%)	112 (46%)	30 (13%)
Age (Mean ±SD)		20.35±1.35	21.14±1.17	49.61±13.73
Gender(n)	Male	31 (31%)	41 (37%)	18 (60%)
	Female	69 (69%)	71 (63%)	12 (40%)
Previous Residency (%)	Urban	85%	82%	55%
	Rural	15%	18%	45%

### 3.2. Utilization of Devices for TLA

The y-axis in Figure 1 indicates the degree of usage measured on a Likert Scale where 1 = Never, 2 = <3 hours a day, 3 = 3-5 hours a day, 4 = >5 hours a day, for the devices represented in the x-axis. As observed (Fig. 1) that the majority (65%) of the teachers prefer to use a desktop when compared to a student who has shown to prefer smartphones (60-65%) for their TLA. It is also noted that the usage of the laptop was prevalent among both teachers and students alike.

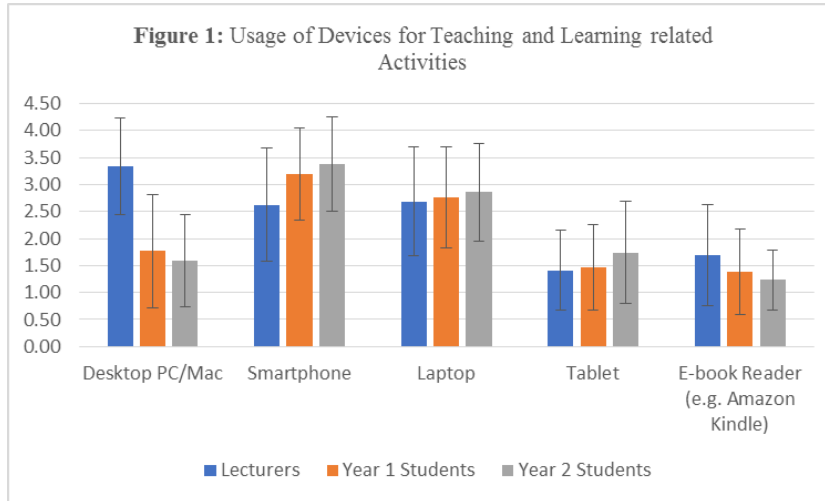


Figure 1. Usage of devices for Teaching and Learning related Activities

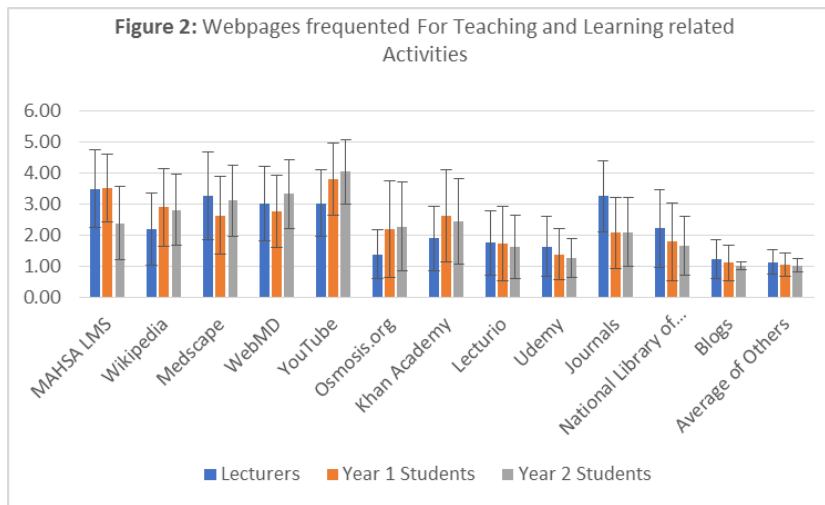


Figure 2. Webpages frequented for Teaching and Learning related Activities

### 3.3. Webpages Engaged for TLA

The y-axis in Figure 2 indicates the degree of usage measured on a Likert Scale where 1 = Never/Very Rare, 2 = Rare, 3 = Moderate, 4 = Frequent, 5 = Very Frequent, for the webpage engaged during TLA indicated in the y-axis. Around 55% of teachers and year one medical students were engaged in the utilization of university resources from Learning Management System when compared to 40% of year two students. It is also observed that 60-65% of students from both year 1 & 2 preferred using YouTube for their learning activities and around 50% of the teacher also used this platform in teaching activities. Usages of journals are found to be high among teachers (55%) while the use of other popular learning applications such as WebMD and Medscape was popular among students. Other popular applications such as Khan’s Academy, Osmosis, Lecturio,

etc. were sparingly used by both teachers and students alike.

### 3.4. Utilization of Technology for Recreational Purposes

Table 2 presents the mean and SD of the score for interpreting the usage of technology for recreational purpose on a Likert Scale where 1 = Never/Very Rare, 2 = Rare, 3 = Moderate, 4 = Frequent, 5 = Very Frequent, for the recreational activities engaged during indicated in the x-axis. It is noted that there is a statistically significant difference between the teachers and students with students clearing engaging in higher activity. The stark difference is observed in activities such as playing games, chatting, and online shopping. It is also noted that a student’s engagement with web surfing and non-academic/non-recreational usage was also significantly higher when compared to the teacher. This table further indicates that the students are far more engaged with technology-related activities than teachers.

**Table 2.** Technology usage for recreational purposes among pre-clinical teachers and students

Activities	Participants	Mean	SD	Significance* (ANOVA)
Games	Lecturers	1.24	0.577	0.000
	Students	2.65	1.408	
Downloading Media	Lecturers	2.52	1.214	0.001
	Students	3.31	1.230	
Chat	Lecturers	2.69	1.391	0.000
	Students	4.07	1.007	
Email	Lecturers	3.97	1.149	0.005
	Students	3.33	1.113	
Web Surfing	Lecturers	3.38	1.374	0.029
	Students	3.86	1.062	
Online Shopping	Lecturers	1.83	1.256	0.000
	Students	2.84	1.310	
Online Business/ Banking	Lecturers	2.76	1.573	0.026
	Students	2.22	1.153	

**Table 3.** Perception of usage of technology for TLA Activates

	Questions	Mean (Standard Deviation)			Kruskal-Wallis test	
		Lec.	Year 1 Stud.	Year 2 Stud.	Gender (Sig*.)	Lec. Vs. Stud. (Sig*.)
1	I spend most of my free time on gadgets and technology.	3.17±1.11	3.90±1.02	3.73±1.10	0.064	0.002*
2	Technology allows me to communicate with colleagues/parents/lecturers more efficiently.	4.17±1.02	4.08±0.86	4.34±0.77	0.720	0.920
3	I use smartphone to take photos and videos.	3.97±0.96	4.33±0.86	4.19±0.95	0.735	0.078
4	I use technology to send or receive instant messages.	4.53±0.73	4.41±0.86	4.41±0.73	0.029	0.412
5	Technology allows me to participate in group discussions.	3.93±1.01	4.22±0.87	4.17±0.81	0.167	0.194
6	I enjoy using technology.	4.03±0.89	4.34±0.80	4.04±0.94	0.027	0.326
7	I am using ICT to search for what I want to learn.	4.10±0.96	4.25±0.96	4.23±0.83	0.089	0.388
8	I am using ICT to look for pictures for better imagination and better memory.	4.10±1.09	4.14±1.02	4.14±0.87	0.043	0.964
9	I am using ICT to watch videos for a better understanding of a concept.	3.93±1.17	4.04±1.05	4.10±0.89	0.247	0.711
10	I am using ICT to listen to music to gain focus during the study.	2.80±1.34	3.43±1.38	3.77±1.18	0.246	0.002*
11	I use my computer to make my notes during lectures.	4.63±0.66	2.34±1.31	2.24±1.16	0.001	0.000*
12	I am keeping all my data, notes, files on my computer.	4.30±1.11	3.73±1.22	3.84±1.13	0.005	0.008*
13	I believe that I can improve my language skills using the benefits of the Internet.	3.83±1.20	3.74±1.07	3.77±0.89	0.326	0.497
14	The Internet is especially useful in completing assignments.	4.33±0.84	4.32±0.79	4.23±0.84	0.141	0.604
15	I can understand new concepts more easily when I use web services such as YouTube.	3.93±1.01	4.10±0.89	4.14±0.93	0.367	0.314
16	The Internet can reduce the duration of information lookup.	4.10±0.92	4.11±0.98	4.10±0.99	0.002	0.861
17	Technology can increase my daily productivity.	4.07±0.94	3.77±1.14	3.75±1.04	0.735	0.165
18	Smartphones can relieve my stress.	2.87±1.16	3.60±1.21	3.45±1.13	0.535	0.006

Likert Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

\* = Significance with p < 0.05

### 3.5. Usage of Technology for Teaching and Learning related Activities

The relationship between all the items for the perception of usage of technology for TLA was tested by Kruskal-Wallis test, and the results are shown in Table 3. The meaningful relationship was found between mean of questions 4, 6, 8, 11, 12, & 16 between males and females in the study population. Whereas questions 1, 10, 11, 12, & 18 were significantly different when tested between teachers and students.

### 3.6. Usage of Technology for Teaching and Learning related Activities

Table 4 shows the value of mean & SD along with the relationship between all the items for Perception on the Use of E-education Tools and Implementation of E-courses was tested by Kruskal-Wallis test. A meaningful relationship was found between mean of question 7, 12, 16, & 17 between males and females in the study population. Whereas questions 2, 3, 5, 6, 7, 10, 11, 12, 13, 15 & 17 were significantly different when tested between teachers and students.

**Table 4.** Perception of the Use of E-education Tools and Implementation of E-courses

	Questions	Mean $\pm$ Standard Deviation			Kruskal-Wallis test	
		Lec.	Year 1 Stud.	Year 2 Stud.	Gender (Sig*.)	Lec. Vs. Stud. (Sig*.)
1	A mix-up between traditional and online learning would provide students with more help and support.	4.30 $\pm$ 0.79	4.13 $\pm$ 0.83	4.00 $\pm$ 0.77	0.484	0.120
2	Clear vision, mission, and objectives should be set for the online curriculum.	4.30 $\pm$ 0.75	3.98 $\pm$ 0.85	3.87 $\pm$ 0.79	0.209	0.018
3	Rules should be set for delivering online pre-clinical medical courses regarding online communications, culture, methodology, and process.	4.50 $\pm$ 0.77	3.96 $\pm$ 0.81	3.65 $\pm$ 0.82	0.183	0.000
4	Online assessment tools can be used to assess the success of online pre-clinical medical courses.	3.83 $\pm$ 0.95	3.87 $\pm$ 0.83	3.58 $\pm$ 0.89	0.181	0.470
5	Clear policy and bylaws should be developed concerning the implementation of online learning courses in the pre-clinical medical education.	4.10 $\pm$ 0.88	3.79 $\pm$ 0.90	3.56 $\pm$ 0.81	0.123	0.012
6	Online learning courses require students to be more self-disciplined, independent, and more organized.	4.13 $\pm$ 0.93	3.80 $\pm$ 0.92	3.71 $\pm$ 0.92	0.564	0.027
7	A strategy and clear plan should be set on how to implement and integrate online learning courses into the pre-clinical medical education.	4.37 $\pm$ 0.80	3.94 $\pm$ 0.77	3.72 $\pm$ 0.82	0.023	0.000
8	E-education system is more suitable for theoretical courses.	3.43 $\pm$ 1.16	3.59 $\pm$ 0.88	3.23 $\pm$ 1.00	0.173	0.849
9	Online courses would provide remote learners with an opportunity for mid-level qualifications.	3.50 $\pm$ 0.90	3.58 $\pm$ 0.86	3.39 $\pm$ 0.91	0.975	0.983
10	Online learning courses are more convenient and more compatible with students' and tutors' lifestyle.	3.07 $\pm$ 0.78	3.60 $\pm$ 1.02	3.57 $\pm$ 0.92	0.949	0.001
11	Resources and tools that support online courses are always available.	3.03 $\pm$ 1.033	3.56 $\pm$ 1.00	3.30 $\pm$ 1.02	0.510	0.037
12	Online learning courses would provide the same quality of face-to-face courses.	2.37 $\pm$ 0.96	2.90 $\pm$ 1.04	2.67 $\pm$ 1.03	0.011	0.030
13	Technical support for online courses is always available.	2.67 $\pm$ 0.92	3.20 $\pm$ 1.02	3.08 $\pm$ 0.95	0.769	0.013
14	Lab or practical courses can be taught online.	2.03 $\pm$ 0.96	2.66 $\pm$ 1.19	2.35 $\pm$ 1.23	0.274	0.063
15	Online learning courses are too complicated for my computer skills.	2.00 $\pm$ 0.98	2.54 $\pm$ 1.13	2.58 $\pm$ 1.023	0.168	0.007
16	Online learning courses would provide the student with a degree that is somehow equal to the on-campus degree.	2.50 $\pm$ 0.82	2.74 $\pm$ 0.91	2.59 $\pm$ 0.97	0.018	0.426
17	The phase 1 modules can be taught online.	2.33 $\pm$ 1.06	3.00 $\pm$ 1.04	2.86 $\pm$ 0.99	0.001	0.007

Likert Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

\* = Significance with  $p < 0.05$

## 4. Discussion

The Fourth Industrial Revolution (IR 4.0) is expected to change how we live, work, and communicate; it is also likely to change the things we value and the way we value them in the future. The impact of this change has already been observed in various sectors, including the healthcare industry. Button D (2014) and others in their article showed that over the last two decades, the educational sector had been significantly invaded by ICT (22, 23). The use of digital technologies and social networking has grown rapidly over the last decades, and these technologies are increasingly being incorporated into the teaching of higher education (1, 2, 24). As a result, both medical educators and medical students are expected to incorporate and use digital technologies to facilitate teaching and learning in undergraduate medical curricula. This is of greater relevance in integrated curricula when compared to the traditional curriculum as the latter demands the students to use TLA to investigate, gather resources, segregate, compile the learning materials and present them in various forums such as PBL and ECE sessions.

In this era of digital explosion, innovative devices have flooded the market over the last decade. Both teachers and students alike are spoilt for choices. The results in this study show that among these devices used to explore TLA, the usage of laptop and desktops was commonly preferred by teachers, while smartphones and laptops were used by students while engaging in various teaching and learning activities. This indicates that students are mobile learners engaging in learning activities in their time and place of choice (25). This further indicates that the TLA activities that are used to deliver medical curricula should use such platforms to deliver the resources and learning contents compatible with these devices. Studies showed that medical teachers, especially in an integrated curriculum are primarily involved in the process of integration of ICT however, belonging to the category of digital immigrants they are yet to garner the potential in the use of these devices (26,3). Understanding this divide will help us resolve the issues over the hesitancy that exists over a particular section of the teacher's population in adapting to this new teaching and learning environment.

With the abundant availability of free information on the internet, it has been often commented that the choice of teaching and learning content should be carefully screened. In our study, we found that students used web services like Wikipedia, YouTube, Osmosis and Khan Academy more frequently than lecturers in engaging with TLA while on the other hand, the lecturers preferred services like Udemy and online journals. These results indicate that students are more likely to use quick and easily readable resources like Wikipedia and YouTube where the information is easy to comprehend and less reliable while lecturers prefer using resources like journals and the National Library of Medicine of The United States for teaching activities. It could be reasoned that the student's approach towards TLA could be

innate to the curricula which further can be due to various factors such as cognitive load, timetable constraints, assessment strategies etc. (27) in their article mandate that medical curricula should be developed with ICT integration as a core component and also report the challenges in changing the medical teaching process. Hence increased usage of videos taken from these students' preferred resources may prove to be helpful in the lecture hall as well, since that would support the lecture's theoretical information with a visual idea in the video format.

It is widely accepted that the digital revolution has not only impacted the learning process but also has an undeniable effect on the usage of this technology to foster our social needs. Table 2 shows the involvement of both students and teachers with various non-academic activities. It is noted that students have significantly spent more time on such extra-curricular activities when compared to teachers. However, activities such as downloading media, chatting, emailing, and web surfing have been frequently used, indicating the willingness of the teachers to adapt to new technology. This further indicates that acceptance and usage of ICT can be nurtured among teachers who are the most important contributors for integrating ICT into the curricula.

Item numbers 10, 11 & 12 from table 3 show that students have been utilizing information and communication technology to enhance their learning, especially while taking notes and storage of data. Both teachers and students have strongly agreed that they enjoy using technology, indicating the acceptance and willingness to explore its potential. However, as indicated in item 15, students preferred web services such as YouTube to understand new concepts more readily when compared to a teacher who continues to engage in using hardcopies in the form of textbooks and journals. It is also noted that choice to actively use technology in the classroom, storage of data, and internet to lookup for information was more commonly used by males.

The results indicated in Table 4 show that the teacher believed that clear objectives, rules, and policies should be set up to implement online learning courses and to integrate ICT in MBBS Phase 1 modules. Students, on the other hand, choose to be flexible towards the rules and regulations that can restrict their autonomy for learning. Teachers also agreed that the challenge in the extensive use of ICT is that it requires students to be more self-organized and disciplined (28). It is observed in Table 4 that teachers appear to be cautious regarding online courses being integrated into pre-clinical MBBS. This could be because they are either not equipped with the necessary skills or enthusiastic about considering the change (26, 29).

Based on the results it is inferred that students support the view that most of the MBBS Phase 1 modules teaching content including lab or practical courses could be taught online, whereas the majority of teachers rejected this idea. This indicates that students' general perception regarding the possibility of integration of ICT (Information and Communication Technology) into pre-clinical modules is

better than that of lecturers, as shown in table 3. This shows a gap between the perception of ICT integration into teaching and learning activities among lecturers and students. (29) also showed that there is a gap between the teachers and the curricula that are implemented in higher education.

More students also perceived online learning courses to be more convenient and compatible with their lifestyles and also indicated that online courses would provide the same quality that face to face courses provide, hence showing that according to their opinions, online courses or classes would be easier to participate in. Exploring this possibility might lead to higher engagement with selected learning content, especially in an integrated curriculum. (30) showed the need to engage in online TLA such that the students are ready for their workplace challenges, which are fast integrating artificial intelligence(AI) for better performance. The study also shows that in both years 1 & 2 medical students there are students who have technological barriers due to issues like ineffective internet connection, or slow website loading problems that may hinder students' ability to perform their best.

Although the sample size calculated was for students and teachers in integrated medical curricula, we suggest a large sample to validate this study further. Our study looked into the perception of usage of ICT in one curriculum; this could be further compared for those teaching in integrated and traditional medical curricula. Thus data across different curricula and regions could further help us understand the perception of the use of ICT and investigate the extent of the digital divide between teachers and students.

## 5. Conclusions

This study has conclusively shown that the use of ICT is prevalent between both medical teachers and staff; the difference was only in the degree of usage and also both the groups enjoyed the use of technology. It was also clear that both medical teachers and students viewed the use of ICT to be integral in delivering the curricula. The incorporation of ICT in classroom activity was far more prevalent with students than teachers. Students widely used technology for non-academic activities such as gaming, online shopping, and downloading media. The use of smartphones to relieve stress was also prevalent among students.

On the other hand, teachers were content to use technology for activities such as email and banking; they further choose to use Wikipedia and YouTube sparingly when compared to students. Although both students and teachers indicated their willingness to engage in online courses for their learning needs, students preferred autonomy and flexibility in delivering these contents. This indicates that although there has been the migration of teachers towards incorporating ICT in their TLA, there still exists a significant digital divide between them

Understanding this divide can help the effective

integration of ICT into the medical curricula and thereby better prepare our students to meet the 21<sup>st</sup>-century workplace demands.

## Conflict of Interest

We hereby declare that this project in part or full has no conflict of interest or financial obligations towards any individual or organization.

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# Rasch Strategies for Evaluating Quality of the Conceptions and Alternative Assessment Survey (CETAS)

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**Abstract** Due to society demand for educational development, education in Malaysia has begun to utilize alternative assessment approach in schools and universities. This study developed Conceptions and Alternative Assessment Survey (CETAS) to examine lecturers' conceptions of assessment (AC) and their practice of alternative assessment (AAP). In order for CETAS to be useful, a pilot study was conducted to examine quality of items in using Rasch Analysis approach. A total of 38 lecturers involved in this study. After item analysis, this study found that four items, Item 7 (AC), Item 8 (AC), Item 16 (AAP) and Item 30 (AAP) did not meet the requirement of fit statistics analysis and local item dependency. Therefore, four items were deleted while other 58 are suitable to be used for measuring the intended constructs. In addition, the scale calibration analysis also revealed that Scale 3 (slightly disagree) was not well-functioning. Therefore, after consideration of analysis and expert review, Scale 3 was collapsed leaving CETAS with 5 scales. Nevertheless, CETAS has a good item and person reliability and can be used to examine lecturers' conceptions of assessment and their practices of alternative assessment.

**Keywords** Alternative Assessment, Assessment, Rasch Analysis

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## 1. Introduction

Recently, alternative assessment has regained increasing attention after it was first introduced in 1990 (Quenemoen, 2008). In general, assessment is defined as a measure of performance including knowledge, skills, attitudes and beliefs. Generally, for an educator, the major purposes of assessment merely revolve around classroom such as

diagnosing students' strength and weakness, monitoring students' progress, assigning students' grades and determining their own instructional effectiveness (Popham, 2014; Green & Johnson, 2010). In addition, Popham (2014) listed three more important purposes of assessment such as influencing public perceptions of educational effectiveness, evaluating educators, and clarifying instructional intentions.

Traditional assessment which usually employed pen and paper tests has few limitations; it can only measure what learners can do at one particular time (Law & Eckes, 1995; Dikli, 2003); focus on lower level thinking skills such as knowledge and comprehension (Dikli, 2003; Ince & Yilmaz, 2012); no immediate feedback is given to the learners (Bailey & Brown, 1998); the purpose of traditional assessment is usually norm-referenced (Dikli, 2003) and it does not necessarily reflect students' own experience (Brempong, 2019). Generally, traditional assessments are for assigning students grade, diagnosing students' strength and weakness. In contrast, alternative assessment is also known as non-formal testing and focuses on assessing higher-order thinking skills (Bagley, 2010), life-long skills (Ince and Yilmaz, 2012), real-life tasks (Quansah, 2018) which allow students to demonstrate best what they have learned (Quansah, 2018). In addition, alternative assessment allows instructors to evaluate what students can do and cannot do instead of what they know and do not know. Alternative assessment also has been evidently reported to motivate students to learn (Tal & Miedijensky, 2005; Bachelor, 2015). In general, alternative assessments are useful for monitoring students' progress and determining instructional effectiveness.

In Malaysia, a shift of assessment approaches from traditional assessment to alternative assessment occurs in both schools and universities. This is due to society demand for educational development in order to move towards a more powerful learning environment. Assessment has

always been a responsibility of the instructors. Watkins et al. (2005) pointed out instructors' conception of assessment is influenced by their viewed of theories of teaching and learning. Additionally, Badariah et al., (2014) study revealed that lecturers in higher education have limited practice of assessment for learning. This may be due to unfamiliarity with formative assessment. The study did not further examine lecturers' view on conceptions and alternative assessment. Therefore, this study developed a survey to examine lecturers' perspective on conceptions of alternative assessment and focus on assessing quality of items in CETAS using Rasch Measurement Analysis (Rasch, 1960).

## 2. Rasch Measurement Model

Rasch Measurement Model (RMM) is item response theory-based model that has been used numerously in evaluating item quality. RMM estimates only one parameter; difficulty parameter. While item discrimination and guessing are assumed to be constant (Magno, 2009). One of RMM strengths is its measurement requirement in which items in

any instrument should fit the model well enough to produce useful measures (Boone & Noltemeyer, 2017). Another strength of RMM is that it can convert nonlinear raw data to linear scale once the requirement is met (Boone & Noltemeyer, 2017; Boone, 2016). Therefore, once the requirement is met, researchers can make meaningful interpretation of their survey score.

There are varieties of ways of how RMM can be used to evaluate items quality of social science research instrument (Bond, 2003; Boone & Noltemeyer, 2017; Boone, 2016). Among analyses that RMM offers are; (i) examining internal consistency, (ii) examining fit analysis statistics, (iii) examining unidimensionality and item dependency, and (iv) scale calibration. Internal consistency includes person and item reliability and separation. Fit analyses include examining point measure correlation, mean-square error (MNSQ), and standardized fit statistic (ZSTD). As for unidimensionality, the analysis should focus on its eigenvalue. Lastly, to measure local item dependency, Rasch Analysis can examine residual correlation. As for the analysis guideline, Table 1 shows requirements for all analyses above.

**Table 1.** Analysis Requirement

Analysis	Requirement	Interpretation
Item Reliability and Separation	Reliability should be larger than 0.80	Item reliability of 0.80 with separation more than 2.00 indicates that the sample is able to confirm the item hierarchy to at least two levels.
Person Reliability and Separation	Separation index should be larger than 2.00	Person reliability of 0.80 with separation more than 2.00 indicates items are sensitive enough to separate at least two levels of person ability.
Point-measure Correlation	Value should be positive, at least more than 2.0	Negative value indicates that the item contradicts the direction of the latent trait
MNSQ	0.5 to 1.50	Productive for measurement
ZSTD	-2.00 to 2.00	Reasonable predictability
Eigenvalue	Should not be larger than 3	Eigenvalue larger than 3 indicates some kind of secondary effect
Residual Correlation	Should not be larger than 0.70	The correlation that is more than 0.70 indicates the item is independent with another item.

### 3. Methodology

#### 3.1. Instrument

Conceptions of Alternative Assessment Survey (CETAS) have two main dimensions; conception on assessment in general and also alternative assessment practice. For assessment conceptions; CETAS measures how lecturers view assessment in terms of improvement on teaching and learning, institutional accountability, irrelevances, and student accountability, while for alternative assessment practice; CETAS also measures lecturers' alternative assessment practice approach such as authentic assessment, challenge-based, integrated, performance, personalized, profiling, project-based and real-time. The distribution of items is shown in **Table 2**.

**Table 2.** Tabulation of Items

Dimension	Sub-dimension	Items	Total
Conception	Improvement on Teaching and Learning	1,2,9,10	4
	Students Accountability	5,6,14,15,16	5
	Institutional Accountability	3,4,11,12,13	5
	Irrelevance	7,8,17,18	4
Practice	Authentic Assessment	1,9,17,25,33	5
	Challenge-based	7,15,23,31,39,43	6
	Integrated	4,12,20,28,36	5
	Performance	3,11,19,27,35	5
	Personalized	2,10,18,26,34,41	6
	Project-based	5,13,21,29,37,42	6
	Profiling	8,16,24,32,40,44	6
Real-time	6,14,22,30,38	5	
<b>Total Items</b>			62

#### 3.2. Sample

The pilot study involved 38 lecturers from Universiti Teknologi Malaysia. The number of respondent required by Rasch Analysis is 30 persons. According to Wright and Tennant (1996), 30 well-targeted samples are enough to evaluate items quality.

### 4. Results

#### 4.1. Internal Consistency

As shown in **Table 3**, overall analysis indicates that Conceptions of Alternative Assessment Survey (CETAS) has a person reliability of 2.67 and person separation of 0.88. Based on the person separation and person reliability, items in CETAS are able to separate people to  $2.67 \approx 3$  level. Person separation that is more than 2 and person reliability

that is more than 0.80 indicate that CETAS is sensitive enough to distinguish between low and high respondents.

As for item analysis, item separation indicates that how able person sample is to distinguish items between different levels of difficulty. CETAS has item reliability of 0.94 and separation of 3.90. Item separation that is more than 2 and person reliability that is more than 0.80 imply that the person sample is large enough to confirm the hierarchy of the items in CETAS. In this pilot study, the total of respondents is 38, which means that 38 respondents are enough to confirm the hierarchy of the items in CETAS.

**Table 3.** Summary Statistics

Summary Statistics	Value
Person Separation	2.67
Person Reliability	0.88
Item Separation	3.90
Item Reliability	0.94

#### 4.2. Unidimensionality

To examine unidimensionality, Linacre (2015) suggested to examine Unexplained Variance in the 1<sup>st</sup> Contrast. Eigenvalue should not be larger than 3. However, as shown in **Table 4**, CETAS has an eigenvalue of 9.0 which is two times larger than required value. This indicates that CETAS measures multidimensionality. It shows that CETAS did not measure only one dimension. The result is reasonable as CETAS has two main dimensions which are Assessment Conception (AC) and Alternative Assessment Practice (AAP). In AC, there are four sub-dimensions such as 'Improvement on Teaching and Learning', 'Institutional Accountability', 'Irrelevance' and 'Student Accountability'. As for AAP, there are eight sub-dimensions which measure 'Authentic', 'Challenge-based', 'Integrated', 'Performance', 'Personalized', 'Profiling', 'Project-based' and 'Real-time'. Therefore, this study further examines each of these sub-dimensions.

**Table 4.** Standardized Residual Variance

Indices	Empirical	Modeled
Raw variance explained by measures	46.1%	47.1%
Indices	Eigenvalue	Percentage
Unexplained variance in 1 <sup>st</sup> contrast	9.0	7.8%

#### 4.3. Unidimensionality of Assessment Conception

Further analysis indicates that all eigenvalue of the Assessment Conception sub-dimensions is less than 3 as shown in **Table 5**. However, the percentage of raw unexplained variance each sub-dimension has exceeded 15% limit. Therefore, further analysis of local item dependency should be conducted. The correlation between a pair of items should not exceed 0.70. If this correlation occurred, one of the items should be removed as both of the items probably shared the same dimension.

**Table 5.** Standardized Residual Variance (Assessment Conception)

Construct	Raw Variance Explained by Measure		Raw unexplained variance (1 <sup>st</sup> Contrast)	
	Empirical	Modeled	Eigenvalue	Percentage
Improvement on Teaching and Learning	58.1%	58.7%	2.1	22.2%
Student Accountability	40.9%	40.1%	2.0	23.5%
Institutional Accountability	45.9%	46.5%	1.9	20%
Irrelevance	77.1%	74.0%	2.0	11.6%

To identify dependent item, Winstep produces the largest standardized residual correlation table between a pair of items. **Table 6** shows correlation between pairs of Assessment Conception items that have large correlation. As can be seen in **Table 6**, correlation between Item 7 and Item 18 is quite large with a correlation of 0.69. The correlation between Item 1 and Item 3 is also quite large as well with a correlation of 0.68. Though all correlation is less than 0.70, Item 7, Item 8, and Item 18 have appeared more than two times in the **Table 6**. Therefore, Item 7, Item 8 and Item 18 are flagged as possible items to be omitted.

**Table 6.** Largest Standardized Residual Correlation

Items Pair		Correlation
Item 7	Item 18	0.69
Item 1	Item 3	0.68
Item 7	Item 8	0.63
Item 2	Item 3	0.63
Item 8	Item 18	0.55
Item 1	Item 2	0.54
Item 14	Item 15	0.53
Item 8	Item 11	-0.64
Item 10	Item 18	-0.63
Item 7	Item 11	-0.58

Further analysis examines fit statistics of each Conception Assessment items. Fit statistics include the examination of point measure correlation, mean-squared error, and

standardized fit statistics. Point measure correlation should be more than 0.20. Table 1.5 shows Item 8 has a negative point measure correlation. **Table 7** also shows that Item 7 has an unfit value for all fit indices. Point measure correlation value of Item 7 is also small with a value of 0.02. Additionally, Item 7 also appeared in local item dependency table. After considering all fit indices and local item dependency, Item 7 will be omitted from Conception Assessment items.

**Table 7.** Fit Statistics Analysis (Conception Assessment)

Indices	Range	Misfit Item
Point Measure Correlation	0.58 to -0.02	Item 8 (-0.02), Item 7 (0.03)
MNSQ Outfit	0.43 to 4.10	Item 7 (4.10)
ZSTD Outfit	-2.60 to 6.90	Item 7 (6.90), Item 8 (2.90), Item 6 (-2.60)
MNSQ Infit	0.45 to 2.77	Item 7 (2.77)
ZSTD Infit	-2.60 to 5.20	Item 7 (5.20), Item 8 (2.20), Item 6 (-2.60)

#### 4.4. Unidimensionality of Alternative Assessment Practice

The second dimension is Alternative Assessment Practice. As can be seen in **Table 8**, eigenvalue of each sub-dimension is less than 3. However, the percentage of the eigenvalue is more than the limit 15%. Therefore, local dependency of Alternative Assessment Practice item is examined.

**Table 8.** Standardized Residual Variance (Alternative Assessment)

Construct	Raw Variance Explained by Measure		Raw unexplained variance (1 <sup>st</sup> Contrast)	
	Empirical	Modeled	Eigenvalue	Percentage
Authentic	38.7%	38.7%	1.9	23.7%
Challenge-based	41.6%	39.3%	1.9	18.3%
Integrated	39.7%	41.2%	1.4	17.4%
Performance	44.8%	44.2%	1.9	20.7%
Personalized	55.5%	53.6%	2.3	16.9%
Profiling	38.1%	38.7%	2.6	26.7%
Project-based	45.3%	44.6%	1.7	15.4%
Real-time	41.7%	40.7%	1.6	18.4%

Local item dependency as shown in **Table 9** shows that two pairs of item have correlation more than 0.70, which is Item 8 and Item 16, and Item 8 and Item 9. Item 8 obviously has a high correlation between two items, which is Item 16 and Item 9. Thus, Item 8 is considered locally dependent. Therefore, Item 8 will be omitted.

**Table 9.** Largest Standardized Residual Correlation

Items Pair		Correlation
Item 8	Item 16	0.76
Item 8	Item 9	0.75
Item 26	Item 34	0.59
Item 9	Item 16	0.56
Item 14	Item 16	0.55
Item 8	Item 11	0.54
Item 8	Item 15	-0.58
Item 15	Item 25	-0.58
Item 14	Item 34	-0.57
Item 3	Item 13	-0.55

Fit analysis statistics are further conducted to examine any other items that are unfit to measurement. **Table 10** shows fit analysis for alternative assessment practice items. Based on the table, only two items did not fulfil all criteria of fit statistics which are Item 16 and Item 30. Therefore, Item 16 and Item 30 are considered unfit thus they will be omitted from this questionnaire.

#### 4.5. Rating Scale Calibration

Rasch Analysis also allows researcher to calibrate instrument scale. It provides information whether one of the scales should be collapsed or another scale should be included. Conceptions and Alternative Assessment Survey (CETAS) have six scales which are:

1. Strongly Disagree
2. Disagree
3. Slightly Disagree
4. Slightly Agree
5. Agree
6. Strongly Agree

There are few ways to examine the rating scale as shown in **Table 11**. Firstly, it's by examining observed count and observed average. As for observed count, a minimum of 10 observations if required for observed count in each scale with a fair distribution across the rating scales (Linacre, 2012). As for observed average, the indice should steadily and consistently increase. Secondly, by examining structure calibration. The structure calibration is manually calculated between two scales. The difference between two scales should not be less than 1.4 and should not be more than 5 (Linacre, 2012). A value below 1.4 indicates overlapping between categories and the respondents are unable to differentiate the scales. Lastly is by observing probability curve pattern. Each scale should have a distinct peak to indicate the rating scale is well-functioning.

**Table 10.** Fit Statistics Analysis (Alternative Assessment Practice)

Indices	Range	Acceptable Value	Misfit Item
Point Measure Correlation	0.72 to 0.13	Should be larger than 0.20	Item 34 (0.13), Item 16 (0.15), Item 39 (0.19), Item 30 (0.19)
MNSQ Outfit	0.41 to 1.73	0.50 to 1.50	Item 39 (1.73), Item 26 (1.72), Item 34 (1.71), Item 44 (1.70), Item 16 (1.70), Item 30 (1.63), Item 10 (0.41)
ZSTD Outfit	-2.80 to 2.90	-2.00 to +2.00	Item 39 (2.80), Item 26 (2.90), Item 34 (2.30), Item 44 (2.30), Item 16 (2.30), Item 30 (2.20), Item 10 (-2.80)
MNSQ Infit	0.43 to 1.67	0.50 to 1.50	Item 34 (1.60), Item 44 (1.63), Item 16 (1.67), Item 30 (1.65), Item 10 (0.43)
ZSTD Infit	-2.70 to 2.20	-2.00 to +2.00	Item 44 (2.10), Item 16 (2.20), Item 30 (2.10), Item 1 (-2.10), Item 10 (-2.70)

**Table 11.** Indicators of a rating scale

Indicators	Descriptions of a rating scale
Observed count	High and stable observed count. Low values often indicate unnecessary or redundant categories
Observed average	Expected to increase in size as the category increases
Structure calibration	Expected to increase in size as the category increases Expected difference between threshold is $1.4 < x < 5$
Probability curve	Each category is expected to have distinct peak

As can be seen in **Figure 1**, observed average of first scale is -1.04 and the average steadily increases up to 1.69 at the

last scale. However, observed count for scale 2 is decreased. The observed counts for scale 1 and 2 are lowest among all of the counts.

**Table 12** shows structure calibration difference between scales. There are calibration differences that are out of the required range which are between scale 2 and scale 3 and also between scale 3 and scale 4. Additionally, **Figure 2** also shows that scale 2 is overshadowed by scale 1, while scale 3 is overshadowed by category 4. Both scale 2 and scale 3 have no distinct peak compared to other scales. This indicates that scale 2 and scale 3 are not well functioning. The respondents were unable to differentiate these scales.

```

SUMMARY OF CATEGORY STRUCTURE. Model="R"
-----
|CATEGORY  OBSERVED|OBSVD SAMPLE|INFIT  OUTFIT||STRUCTURE|CATEGORY|
|LABEL SCORE COUNT %|AVRGE EXPECT|  MNSQ  MNSQ||CALIBRATN| MEASURE|
|-----+-----+-----+-----+-----|
|  1  1      89  4| -1.04 -1.21|  1.11  1.23||  NONE  |( -2.43)| 1
|  2  2      88  4|  -.55  -.46|  1.01  1.09||   -.80 | -1.34 | 2
|  3  3     182  8|   .14   .11|   .97   .96||   -.89 |  -.67 | 3
|  4  4     677 29|   .53   .57|   .94   .89||   -.97 |   .08 | 4
|  5  5     857 37|  1.06  1.06|  1.11  1.23||    .57 |  1.43 | 5
|  6  6     409 18|  1.69  1.64|   .99   .97||  2.08 |( 3.32)| 6
|-----+-----+-----+-----+-----|
|MISSING    54  2|   .63    |           ||       |       |
-----
    
```

**Figure 1.** Summary of Category Structure

**Table 12.** Calibration Differences

Scale	Structure Calibration	Calibration Differences
1	-	-
2/3	-0.89-(-0.80)	-0.09
3/4	-0.97-(-0.89)	-0.08
4	0.57-(-0.97)	1.54
5	2.08-0.57	1.51

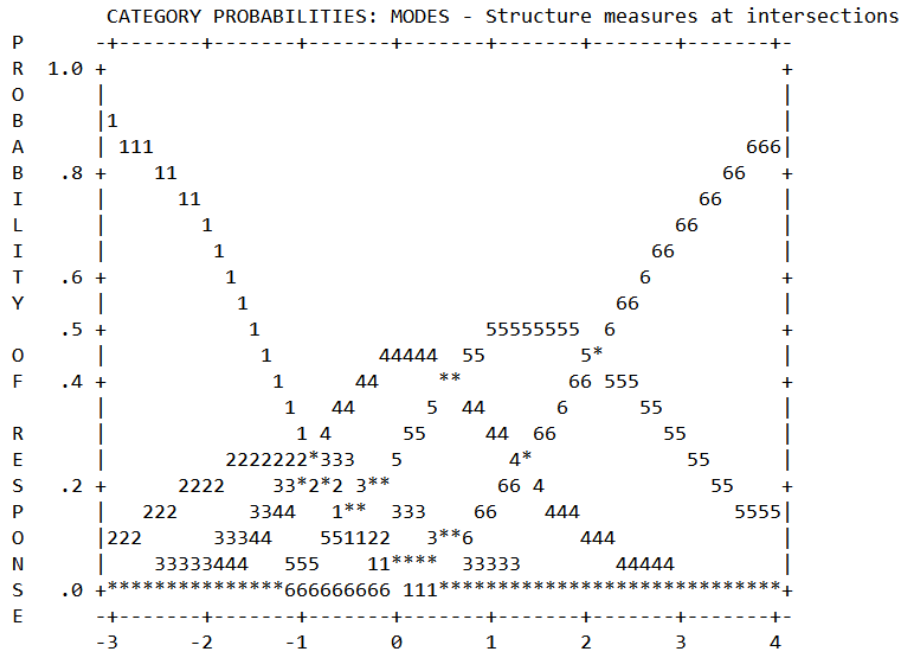


Figure 2. Category Probability

### 5. Discussion

This study developed an instrument to measure lecturers' conception towards assessment and also their alternative assessment practice. Conceptions of Alternative Assessment (CETAS) has been responded by 38 lecturers from Universiti Teknologi Malaysia (UTM). In order for CETAS being useful for operational use, item analysis was conducted to evaluate quality of item using Rasch Analysis. There were four item analyses conducted; (i) examining internal consistency, (ii) examining unidimensionality and local item dependency, (iii) examining fit statistics and (iv) scale calibration.

Based on the value of person and item reliability and separation, items in CETAS are sensitive enough to separate respondents into three levels of ability. One of the characteristics of good items is it can discriminate respondents into at least two different abilities. Unidimensionality and local item dependency complement each other. Violation of local item dependency may affect unidimensionality of an instrument. As for CETAS, overall unidimensionality analysis indicated that there was a sign of multidimensionality. However, it does make sense as CETAS has two different dimensions; conceptions (AC) and practice (AAP). Therefore, unidimensionality analysis was conducted separately for assessment conception and alternative assessment practice. Any items that were deemed inappropriate are deleted to preserve unidimensionality of CETAS. Any items that did not fulfil requirement for local item dependency and fit statistics were deleted. Therefore, total four items were deleted, Item 7 (AC), Item 8 (AC), Item 16 (AAP) and Item 30 (AAP).

Lastly, based on scale calibration analysis, respondents

could not differentiate between scale 3 and scale 4 (disagree). In addition, scale 3 also has no peak, which means the scale is not well functioning. Therefore, based on analysis and expert review on these scales, scale 3 (slightly disagree) was collapsed. For operational use in the future, CETAS will only have five scales. After deletion, CETAS can be used in the future to examine lecturers' conceptions of assessment and their practice of alternative assessment.

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# Pre-service Teachers' Reflection on Reflective Practices: A Malaysian Perspective

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**Abstract** This study aimed to explore the use of reflective thinking practices incorporated into classroom teaching by pre-service teachers (PSTs). Firstly, this study investigated the reflective thinking practices used by PSTs to analyse their teaching strategies and approaches in the classroom. Secondly, this study explored the ways PSTs use reflective thinking to analyse their teaching practice. The qualitative method employing semi-structured interviews was used in this study. A sample of 11 female final year PSTs enrolled in Bachelor of Education programmes in a Malaysian university, who had just completed their 16-week teaching practicum that was selected as the participants of this study. The data were analysed using the interpretive approach in order to allow the PSTs to voice their reflective thinking experiences. Analysis of the data yielded seven categories: Opportunities to reflect, Expression of feelings, Teaching awareness, Lifelong learning, Self-confidence, Self-assessment, and Self-belief. Overall, the findings of this study indicated positive perceptions by the PSTs about using reflective practices to help them teach. However, the findings also showed that the reflection carried out by the PSTs favoured the technical and practical levels rather than being able to critically analyse their own teaching process. The results also indicated that the PSTs were not open to negative feedback given by students, as they were looking more towards the popularity factor and acceptance from students than learning from the experience as a whole. A major implication of the present study was that Malaysian PSTs may not know how to effectively use reflective thinking to help them improve their teaching skills at the same time cultivate critical thinking. They seemed to focus more on being evaluated well by their mentors than the learning that occurred during their lessons.

**Keywords** Reflective Practices, Reflective Thinking, Pre-service Teachers

## 1. Introduction

Developing pre-service teachers' (PSTs) ability to carry out critical and deep thinking has been the essential goal for learning and transformation in the Malaysian education system as stated in the Malaysian Education Blueprint (MEB) (Ministry of Education Malaysia, 2013). Felton and Kuhn (2007) further note that critical thinking, which is the process of analysing and evaluating something in order to form a judgement, requires considerable effort and students will engage in the cognitively complex process only if they reflect on it and perceive it is worth the effort. Hence, the function of reflective thinking is to make meaning and formulate relationships between learning experiences and create continuities which Rodgers, (2002) notes is an important step to the process of critical thinking.

A critical point Dewey (1963) noted is that once students direct their attention to learn and perceive a fact, it is often limited by the context they are in and this is especially true in a classroom setting. The role of the teacher is to step in to stimulate reflection of the fact and to perceive more rather than less. Hence, it is crucial for teachers to have the skills to carry out reflective thinking themselves and eventually become a model demonstrating the process of such thinking. However, this is not the case as research has shown that teachers themselves often do not know how to be reflective or demonstrate reflective thinking (Black, 2005; Choy & Cheah, 2009; Choy & Oo, 2012; DeWitt, Alias & Siraj, 2016).

According to DeWitt et al. (2016) critical thinking skills have been incorporated into the Malaysian school syllabus since 1994 and teachers have been trained in strategies to teach critical thinking during their pre-service courses using the infusion approach where every teacher is required to use teaching-learning methods and techniques which will stimulate, encourage, and develop the thinking abilities of students (Kuldass, Hashim & Ismail, 2015). DeWitt et al (2016) further noted that Malaysian teachers tended to teach facts, implying surface learning rather than incorporate the

use of arguments into their lessons which involved reflective and deep thinking. These teachers also tended to use analogies which can result in lower levels of thinking among students because of insufficient prior knowledge of the subject matter to stimulate critical and deep thinking. In the MEB it was stated that a 2011 research study found that only 50 per cent of the lessons in schools are being delivered effectively where students are sufficiently engaged and actively participate in their lessons. Further to this, much of the lessons in Malaysian classrooms focused on surface-level content understanding instead of deep thinking skills. The same report also stated that this practice among teachers is a challenge for Malaysia as 60 per cent of its current teachers will still be teaching for the next 20 years. In view of these challenges, there is a definite need for effective skills to stimulate thinking in classrooms, as well as determine the use of and the effectiveness of reflective thinking skills incorporated during teacher training in bringing about the interpretation of skills needed to enhance future interactions within the classroom. Hence two research questions underpin this study:

1. What are the reflective thinking practices used by PSTs to analyse their teaching strategies and approaches in the classroom.
2. How do PSTs use reflective thinking to analyse their teaching practice.

## 2. Literature Review

### 2.1. Reflective Thinking

Teaching is complex requiring a degree of self-reflection and ability to apply situation-specific solutions in classroom settings. It is necessary for a teacher to not only have professional knowledge that is gained outside the classroom but also an ability to interpret their everyday experiences from within the classroom (Sparks-Langer & Colton, 1991). Barnhart and van Es (2015) found in their study that teachers who used reflective thinking to interpret the nuances of their students' actions allowed them to respond appropriately to their students' needs as well as use teaching as a learning profession, where they learn from their practice over time. Teachers who were asked to reflect on their teaching found it to be helpful in problem solving and problem resolution (Hayden & Chiu, 2015). With the call of the Malaysian government to develop critical thinking in students as one of the six attributes to be attained, a definition of critical thinking in line with the current skills and needs of these students has to be examined.

Rather than being a solitary undertaking, critical thinking has now been redefined by Kuhn (2016) to have shifted more to a form of social practice where it is embedded into actual and virtual contexts of others and whose reactions need to be analysed, reflected on and are evaluated constantly. Hence, students are constantly challenged to carry out reflective thinking on situations they are in, where individual

competencies are situationally guided to a certain degree requiring continued reflection in order to assess and understand the situation. Teachers who use reflective thinking know something about the effects they have on students. They are alert to the presence of power in their classroom and the possibility for misuse, and knowing their actions can silence or activate students' voices (Brookfield, 1995). Individuals who are reflective about what they are doing also had fewer errors and learned more in their work compared to non-reflectors (Lindh & Thorgren, 2015; Roessger, 2014). Schon (1987) suggested that the capacity to reflect on action so as to engage in a process of continuous learning is one of the characteristics of active learning. The cultivation of reflection in action while doing something and the reflection on action after doing it is an important feature in many learning situations where students are asked appropriate questions by their teachers to ensure they constantly reflect on what they are doing. However, the distinction between the two types of action is far from clear as Schon had highlighted (Clara, 2014). Osterman and Kottkamp (1993) proposed a model for reflective thinking for educators which aims to bring about such behavioural changes to teaching practices through self-awareness. The model proposes that teachers can personalise content to share with learners who become agents for change in their environment. The teachers are constantly reflecting on their practices and acts as facilitators for learning. Sahin and Ovez (2012) also found that the reflective tendencies of teachers changed over time depending on the type of schools and the subjects they were teaching.

### 2.2. Teaching Deep Thinking and Problem Solving Skills

The lack of deep thinking skills will have implications for problem-solving skills. Naggapan (2001) noted that incorporating deep thinking into the curriculum for all students poses challenges as there is adequate research that suggests a need to explicitly infuse this form of thinking into the content being taught. Apart from this, Naggapan also found that in order for the acquisition of deep thinking skills to be successful, factors that involve the teachers also need to be taken into consideration. These factors include but are not limited to teachers' knowledge, skills and attitudes, continuous professional development of teaching skills, framework for teaching thinking, and the terminology and taxonomy needed for teaching thinking.

Naggapan (2001) further noted the role of teachers is to improve the quality of students' thinking and not necessarily teach them how to think. Consideration must also be given to the fact that the creative and critical thinking abilities of individuals may not improve as they mature. According to Ennis (2011), many students are not able to think critically and carry out deep thinking because they do not have the criteria for carrying out these forms of thinking and teachers often do not promote deep thinking to them. Hence, the MEB's call for developing students' critical and creative thinking will require some innovative moves in teaching

approaches and strategies. Ong (2006) suggested that student feedback on their experiences when learning deep thinking skills will be crucial to help teachers reflect on their teaching approaches and strategies.

Ennis (2011) criticised Bloom's (1956) taxonomy for its inability to promote critical, deep or reflective thinking through its different levels because these levels are often confusing and the teachers themselves cannot differentiate between them (Nagappan, 2001). Further to this, Choy, Yim and Tan (2017) in a study of 1070 Malaysian PSTs found that reflective thinking is significantly influenced by self-belief, teaching awareness, and self-assessment ability. However, the same study also found that these teachers were not able to carry out continuous assessment and evaluations of teaching strategies and the influences they have on student learning. This will have implications on the ability of Malaysian PSTs to use effective teaching strategies to stimulate their students' critical and creative thinking suggesting that Malaysian PSTs are reflective only on aspects of their teaching that do not require critical analysis and forethought. Wong, et al (2015) similarly found in their study that Malaysian PSTs do not use critical thinking which questioned the underlying moral and ethical dimension of decisions made during teaching and self-reflection. The thinking used mainly focused on teaching strategies and personal preferences, with some focus on reflecting the underlying assumptions of teaching practices. Hence these PSTs do not have the experience to stimulate and promote the level of critical thinking among their students as aspired in the MEB. It is crucial that reflective thinking, which is thought by many researchers (Choy, Yim & Tan 2017; Lindh & Thorgren, 2015; Barnhart & van Es, 2015; Ennis, 2011) is to promote critical thinking, is studied with greater detail and more in-depth to help facilitate this form of thinking among Malaysian PSTs.

### 3. Methodology

#### 3.1. Data Collection

Final year PSTs enrolled in Bachelor of Education programmes who had just completed their 16-week practicum teaching in a Malaysian university were invited to participate in the study. A final sample of 11 female PSTs was selected to be interviewed based on recommendations from their lecturers that they were able to express and converse well in English. The goal was to have a sample of the student population that meet the specific needs of this study (Cohen, Manion & Morrison, 2000). A list of interview questions is included as appendix 1. All the PSTs were interviewed using a semi-structured approach because as Wragg (1984), p.184 puts it:

'[. . .] a semi-structured interview tends to be one of the most favoured by educational researchers as it allows respondents to express themselves at some length, but offers enough shape to prevent rambling.'

It also reduces incidences of interviewer bias, and increases comparability of responses and ensures data that are complete for each respondent on the topics addressed. Each interview lasted approximately 30 minutes and was recorded. The informed consent of each respondent was obtained and they were told they could leave the study at any time they wished. They were also told that the information provided will be kept confidential and their anonymity maintained. The respondents were not given inducements of any kind to participate.

#### 3.2. Profile of Sample

The 11 PSTs that participated in the interviews were enrolled in the Bachelor of Education programmes in the Teaching English as a Second Language programme. These PSTs were all females in their fourth year of studies and were aged between 22 and 23 years. There are no male representatives in the sample as no male pre-service teacher volunteered to be interviewed.

#### 3.3. Context of the Experience

The 11 respondents had completed their four months teaching practicum and was completing the final semester of their bachelor programme. The practicum course is designed to provide opportunities for PSTs to have hands-on experience in the classroom. Each respondent was assigned a mentor teacher and a supervisor during the practicum and had to write a reflective report of the practicum experience.

#### 3.4. Analysis

The data were analysed using the interpretive approach because this study is about giving voice to PSTs' reflective thinking experiences (Larkin, Watts & Clifton, 2006). The intention is not to oversimplify the voices of individuals by summarising their opinions but rather to develop them at an interpretive level. This approach required firstly, an intensive and detailed analysis of accounts produced by the participants which were captured verbatim and secondly, an in-depth and analytical commentary on their 'sense-making' activities when learning. Therefore the interpretivist knowledge is contestable precisely because it represents an intertwining of facts and values.

### 4. Results and Findings

Analysis of PSTs interviews yielded seven main categories as shown in Table 1: opportunities to reflect, expression of feelings, teaching awareness, lifelong learning, self-confidence, self-assessment and self-belief. The frequency is from positive and negative salient points which made reference to the categories in the interviews. The spaces are left blank if there are no comments belonging to the category.

**Table 1.** Analysis of PSTs interviews

Category	Definition	Frequency	
		Positive	Negative
<b>Opportunities to reflect</b>	Occasions favourable for carrying out reflective thinking	11	
<b>Expression of feelings</b>	Voicing and articulation of feelings toward students and classroom situations	11	11
<b>Teaching awareness</b>	The process of gaining insights into one’s own teaching abilities.	11	
<b>Lifelong learning</b>	Intentions to learn more about teaching and the processes involved.	10	1
<b>Self-confidence</b>	Reflections on one’s own teaching abilities leading to improvements and eventual mastery of the skill.	5	6
<b>Self-assessment</b>	Procedure to systematically reflect, analyse and value one’s professional actions and its result in order to improve it.	5	11
<b>Self-belief</b>	Confidence in one’s own teaching abilities.	11	

**4.1. Opportunities to Reflect**

Eight of the respondents had positive comments about opportunities to reflect on their teaching especially during their practicum as they had to write their reflective journals. However, most of the reflections that were carried out seemed to favour delivery of lesson and effectiveness of their teaching strategies. For instance PST A said,

“For me I try to reflect on my teaching after every class and whether the activities conducted in class were effective for students or not. I will reflect to see if the materials I used were suitable for all levels of students.”

Three of the respondents commented they had to reflect on their teaching practices and were more likely to carry out reflective thinking during practicum as they had to write the reflective journal. They were less positive about carrying out reflective thinking when writing the journal as they felt stressed about having to ensure their teaching was of good quality and wanted to know how they were performing from their mentors. They preferred immediate feedback rather than reflect for themselves. For instance PST C said,

“I usually want to write my reflective journals after I finish teaching so that it is fresh in my mind. I have also started writing a diary so that I can record my thoughts. I feel pressured because I want to know how I did in my teaching and if my students can understand and follow what I did. I want to catch any teaching problems and identify students’ problems. It is better and faster to ask my mentor than analyse my reflective journal.”

**4.2. Expression of feelings**

All the respondents commented that they felt a need to reflect on how to influence the thinking of their students. They perceived that many of their students did not show interest to learn in school because they were not properly influenced by their teachers when they were young. They felt positive about being able to influence their students’ thinking.

For instance PST E commented,

“I teach English and many of my students do not like the subject because they think it is hard. I feel that I need to reflect on how to influence the way they think and help them learn the language better. I want to instil moral values in them so that they can grow up to be well developed people.”

These respondents also expressed feelings of worry about the way they teach. They seemed most worried and reflected mostly about not being effective in class because their lessons may not be differentiated enough to meet the needs of students with different ability levels. For instance PST B commented,

“I worry my students cannot understand me and they get confused about what they are learning. My students are from different ability levels and my lessons may not be differentiated enough to cater to the needs of all of them. I reflect on this constantly.”

**4.3. Teaching awareness**

All the respondents perceived that the reflective thinking process required when writing their journals allowed them to get to know more about their teaching abilities. However, many of the experiences related by the respondents focused on their own performance as teachers rather than the actual learning and incidences that took place in the classroom. All of them mentioned that they were more concerned about how students perceived their teaching rather than students’ perceptions of the materials they were presenting. For example PST H said,

“My main concern in class is about my performance as a teacher. The students do not participate in my class and I am worried that they do not understand what I am teaching them. I do not want them to switch off and not listen to my lesson. I also feel like how I act in class is also very important as this will help keep my students’ interest in class.”

#### 4.4. Lifelong learning

Ten of the respondents perceived they were continuously cultivating and improving their teaching skills. They perceived they continued to learn through meaningful interactions with their students and also through upgrade of their professional qualifications. For instance PST E said,

“For me I feel that learning is a lifelong process and it continues even after you finish university. I have plans to do my master degree after I finish with my current bachelor but not right away. I need to gain some experience first before I start on my next degree.”

It must also be noted that apart from pursuing higher degrees these respondents did not perceive everyday life experiences in classrooms as contributing to lifelong learning. PST G said,

“I want to pursue my master degree like my sister. Formal education will help increase my lifelong learning. When I went for my practicum, I guess was also given lifelong learning experience as I was allowed to do hands-on practicum. I guess the opportunities for learning have been limited in my opinion to formal settings. I do not think I have lifelong learning when I teach my students because it is like practical. Putting theory to action.”

#### 4.5. Self-confidence

Five of the respondents were enthusiastic about reflecting on their teaching in order to improve their teaching skills. However the focus of their reflections was mainly on how to get students to like their teaching and to get students to be more participative in class. For instance PST H said,

“I do reflect on my teaching because I am worried how the students perceive my teaching. I want to influence the way my students think about learning English. I think there must be more to just going to class and listening. It gives me confidence when I can get students to interact with me and not just sit and listen. I do not know what they are thinking about then. Whether they understand me or not.”

Six of the respondents felt they were not as self-confident as they should be, especially during their practicum. They were not confident about establishing rapport with students as they were unsure if they had planned their lessons well. For instance PST J said,

“I am not as self-confident as I should be especially during my practicum as I do not know if I prepared my lessons well. My students sometimes do not interact with me in class and I do not know what they think of my lessons.”

It interesting to note that all the respondents were more interested in their own performance as a teacher than the learning that takes place in the classroom. The reflection of their practice also focused on delivery of lessons rather than the actual learning that was taking place in the classroom.

#### 4.6. Self-assessment

Only five respondents stated that they assessed themselves based on the feedback and comments gathered from students. These respondents also shared that they used videos of themselves teaching and their reflective journals as tools to evaluate their teaching and determine if they were effective in the classroom. For instance PST G said,

“I will record myself in order to watch how I teach so that I can evaluate my teaching skills and strategies. I will also use the reflective journals as a way to evaluate myself as well. I will look to improve my lesson presentation and mistakes I had made from the videos and not repeat the same mistakes again.”

Six respondents commented that while they did write reflective reports, they tended to depend on their friends and mentor teachers to advise them on their teaching. They prefer the opinions of others to help improve their teaching rather than analyse their reflective journals. For instance PST I said,

“Writing the reflective is a must during practicum. I have been advised by my supervisor to make a video of myself teaching to help me evaluate myself. However, I still prefer to ask the opinions of my mentor teachers and friends that I trust to give me feedback about my teaching.”

#### 4.7. Self-belief

All the respondents believed they had good teaching abilities and were willing to learn from the feedback obtained from students. They also believed that their life experiences had contributed to the way they teach and deal with students. Although all of them admitted they had a difficult time dealing with negative feedback from students and had in some moments doubted their ability to teach. For instance PST J said,

“I believe that the way I handle students has come from the way I was influenced by my caretakers and elders in my life. I have always believed that you learn from life experiences. That has built my confidence. However, it is hard when students give me negative feedback and I have a hard time trying to figure out what I had done wrong. That worries me and can also be stressful.”

### 5. Discussion

The discussion will focus on using the results obtained to answer the two research questions.

1. What are the reflective thinking practices used by teachers to analyse their teaching strategies and approaches in the classroom?

On the whole the results showed that PSTs were positive about using reflective practices to help them with their teaching. However, the results also indicate that the reflection carried out by the PSTs was more on the technical

and practical levels rather than critically analysing their teaching processes (Yaacob et al, 2014). The technical level focuses on the teacher and the success and failure of the techniques used, the practical level focuses on students' learning experiences and examination of strategies used and the critical level is where the teacher begins to question how the environmental context influences the way students learn. They were on the whole more concerned about how they were teaching than what their students were learning similar to findings by Nair and Ghanaguru (2017). As far as opportunities to carry out reflective thinking, most of the respondents were positive about this because they had to write their reflective journals as part of the course requirements. However some of them were unsure if they will continue with this practice when they are practicing teachers. This seems to indicate that these PSTs have not grasped the idea that reflective thinking practices are meant to make meaning and create a relationship with their learning experiences and other experiences in the classroom to create continuity (Rodgers, 2002) which can further enhance their teaching skills as well as develop critical thinking skills. Therefore the aim of the Malaysian government to promote critical thinking in students may not be achievable unless teachers are able to think critically themselves and it has to begin with them reflectively thinking about their classroom experiences.

The respondents expressed concerns about their ability to influence and control their students with specific mention of moral values by some of them. This seemed to concern all the PSTs indicating a need to control their students in terms of their behaviour and thinking rather than influence their ability to think and learn on their own. Although studies (Barnhart & van Es, 2015; Yaacob et al.; 2014) have found that teachers reflecting on and assessing their own teaching have helped in problem solving and responding to students appropriately, these PSTs seemed more intent on controlling the classroom and student behaviour. Suggesting that these PSTs are more focused on teacher centred learning as opposed to student centred learning where the teacher is the source of influence and information.

Although there were opportunities for reflective thinking when writing their journals, the reflective process seemed centred around their performance in class rather than the actual learning that takes place in their students. They seem to focus more on students 'accepting' and 'liking' what they taught. Therefore the focus on their own teaching and 'performance' in class can be described as an 'anticipatory emotion' (Hayes, 2003) where there is a mixture of anxiety and excitement about the classroom and the actual teaching situation. Interestingly, only about half of the respondents were confident about dealing with students and the activities that took place in class. Goh and Blake (2015) highlighted this dilemma noting that it stems from PSTs' lack of confidence to control their students often having to resort to discipline and raising their voices resulting in frustrations for both parties. This finding is not surprising given that PSTs are themselves evaluated by their supervisors and mentor

teachers, hence the pressure is on them to give their best in the classroom. However, all this happens at the expense of the actual learning that takes place in the classroom.

## 2. How do PSTs use reflective thinking to analyse their teaching practice?

The respondents did not seem to be open to negative feedback given by students, they were looking more forward to the popularity and acceptance they could gain from students rather than learning from experience as a whole. The respondents were also reluctant to use negative feedback as a tool to help them grow their skills. While all the respondents seemed intent on writing their reflective journals, they did it more as an assignment rather than as a tool to help them analyse their teaching skills. About half of the respondents were also using videos of themselves teaching apart from reflective journals to help them analyse and improve their teaching skills. Although these PSTs perceived videotaping their lesson was helpful, there was no further elaboration on how it helped them with their teaching.

It is also interesting to note that about half of them were more interested in getting their supervisors' and mentors' observation feedback rather than viewing and analysing video tapes of their lessons. This shows a lack of confidence in the self-assessment process, requiring an authority figure to give affirmations, comments and guidance. Goh and Matthews (2011) noted that PSTs need the reinforcement and recognition given by their mentors to affirm their teaching abilities. It is important to note that all the respondents believed they had good teaching ability and were willing to learn from students' feedback. Hence the idea that reflective journals will stimulate self-discovery, teaching awareness and troubleshoot potential problems areas may not be as effective without the proper reinforcements and affirmations from mentors on the use of these journals as a tool for analysis of the teaching process. These journals will then be no more than a part of the coursework to be completed for a grade.

## 6. Limitations

The sample for this study is taken from one university in Malaysia which offers teacher education programmes for its students, the interpretive approach used in this study implies the interpretation of data that is not value free hence the results obtained are free from subjectivity. However, some of the results may be generalizable to some degree otherwise it will be pointless carrying out this study. Hence the results obtained may be applicable to other similar situations.

## 7. Implication and Conclusions

The results of this study seem to indicate that Malaysian PSTs may not know how to use reflective thinking to help them improve their teaching skills. They are more involved

with ensuring that they are evaluated well by their mentors than what their students are learning during their lessons. Their perspective is more on gaining recognition from their mentors that they are carrying out their duties well as teachers than reflecting on their teaching to self-improve. Further to this, reflective thinking aids autonomous learning and through reflection PSTs are supposed to gain further insights into the progress of their own teaching and make adjustments to areas that appear weak. However, it may be challenging for Malaysian PSTs to transition to such autonomous learning as they are more accustomed to being closely guided by their supervisors and mentor teachers, although concerted efforts are being made by universities to encourage more student-centred learning.

The results of this study also indicate that reflective thinking has minimal influence on PSTs. Many of these PSTs are carrying out the process because it is built into the coursework and they have to fulfil the requirements of writing a reflective journal to complete their practicum. They prefer to get direct feedback from their mentors rather than analysing and critiquing their performance through these journals. There has also been no follow-up studies on whether the reflective thinking process introduced during the PSTs practicum is continually used during their actual teaching practice. The results of this study seem to suggest that these PSTs are more focused on the techniques of teaching and seldom reflect and more likely to follow orders which Choy and Oo (2012) defined as the introductory level of reflection.

The PSTs also appeared to be overly worried about making mistakes which suggests that if they actually carried out reflection of what they did in class, it is very minimal and mostly on the surface. Reflection if properly carried out will minimise errors in teaching (Lindh & Thorgren, 2015; Roessger, 2014) as well as help them become active learners (Schon, 1987). This lack of reflective skills can be explained by the interdependent nature (Park, Uchida & Kitayama, 2015) of these PSTs where they may be more focused on

engagement with and acceptance by their social group. Hence, they prefer to get feedback from leaders of this group rather than coming to conclusions and insights about their teaching independently. These PSTs may not develop the necessary thinking skills that will enable them to effectively incorporate critical thinking and active learning into their classrooms.

If Malaysia is to realise the aspirations of the MEB, there will have to be changes and improvements in the teacher education programmes. Goh and Blake (2015) have highlighted the plight of PSTs during their practicum where many of them are not prepared to manage their classrooms or their students as they have to struggle with 'how' and 'what' to teach. Currently there is no definition of what is adequate in terms of the practicum experience other than the number of hours spent in the classroom. If reflective thinking is to play a part in the teaching experience of PSTs, there must also be clearer indicators of it taking place during the whole practicum process. Currently it is necessary for PSTs to write a reflective log of their teaching practicum but other than it being a part of the course requirement, the reflective process is not taken further to be incorporated into the actual teaching practice. Many practicing teachers in schools, still struggle with critical and higher order thinking (Othman & Mohamad, 2014) in addition to having to deal with students from diverse backgrounds having a multitude of social problems (Kuldas et al, 2015). These PSTs can also benefit from having their reflective thinking skills enhanced which have been found to help with problem-solving especially if they are encouraged to be critical rather than just focus on the technical aspects when analysing their teaching (Yaacob et al., 2014).

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## Appendix 1: Interview Questions

<p>Reflective practice</p> <ol style="list-style-type: none"> <li>1. What are the opportunities for you to reflect on your teaching? Do you reflect on the lesson after you teach your class?</li> <li>2. I worry about my students..... (Complete the sentence)</li> <li>3. I want my students to ..... (Complete the sentence)</li> <li>4. What are your concerns about your class? Do you want to just teach and get it over with or do you want to influence the thinking of your students?</li> </ol>
<p>Lifelong learning skills</p> <ol style="list-style-type: none"> <li>1. Do you have any intention to continue with your studies after graduation? What are your views about life-long learning?</li> <li>2. Describe the opportunities that you have been given to cultivate lifelong learning.</li> </ol>
<p>Self-assessment ability</p> <ol style="list-style-type: none"> <li>1. How confident do you feel when you teach?</li> <li>2. Is self-assessment encouraged in your programme of study? Describe the different ways that you could use to evaluate yourself.</li> <li>3. When I get negative feedback, I feel..... (complete the sentence) Why?</li> <li>4. Do you think your students will help you discover more about your teaching? If so how? If not why?</li> </ol>
<p>Self-belief</p> <ol style="list-style-type: none"> <li>1. Do you believe that your life experiences influences the way you teach?</li> <li>2. Do you think your needs come first or your students' needs?</li> <li>3. Do you think you teach well? Why?</li> </ol>
<p>Teaching awareness</p> <ol style="list-style-type: none"> <li>1. Do you have a set of teaching practices that you are comfortable with?</li> <li>2. Do you think these practices are effective? Why and why not?</li> </ol>

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# Development of Thematic-based Motion and Song Learning Videos to Stimulate Work: Art of Kindergarten Teacher's Ability

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**Abstract** The purpose of this development research is to make an early childhood-based song and motion-based learning videos to stimulate the learning skills of senior kindergarten teachers. The research method uses research and development, Borg and Gall models, with 10 development steps being adapted into 8 steps namely; 1) Preliminary Research and Information Collection, 2) Planning, 3) Initial Product Development Format, 4) Early Trial, 5) Product Revision, 6) Initial Trial, 7) Product Revision, 8) Field Test. The research instrument used was a questionnaire which was a validation sheet from media experts and senior learning experts and research respondents, consisting of 30 kindergarten teachers throughout Malang City. The collected data will be processed descriptively quantitatively presented in the form of a percentage, and qualitative from suggestions to product development. The results of this study are learning media products consisting of 1 CD product development movement and song and a teacher's guidebook. These media have also been proven to be valid, practical and effective for early childhood learning and enhancing the learning ability of Kindergarten teachers.

**Keywords** Thematic-based Movements and Songs, Dance Skills, Kindergarten Teachers

because art is one of the media of education (*education through art*).

In practice learning dancing in PAUD also requires teachers to be creative and have a lot of provisions in developing teaching materials. Requiring a lot of references both from print or from the media provided to add insight. Effective learning media are also needed to maximize the learning process in the classroom. The fact is that dance in early childhood at PAUD is still not optimal, which is evidenced by the results of the needed analysis research conducted by previous researcher Wulandari (2017) that teacher competence in implementing learning for children of age is still not as expected, some factors that cause, among others, a lack of mastery of the field of development art of early childhood dancing.. The teacher does not have enough background and knowledge about the art of children dancing, lack of ability and creativity in developing the material of motion and music accompaniment of children's dance, as well as lack of skills in delivering dance material for early childhood. The recommendations from the results of the study state that PAUD teachers, especially Kindergarten in the Kindergarten of Malang City, need learning media for dance that can enrich the development of learning materials.

The use of instructional media as a tool in the teaching and learning process, especially in PAUD can facilitate the task of teachers in delivering messages from learning material, giving rise to children's learning motivation, in this case related to the teacher's professional competence in carrying out their duties. It is also related to the ability of teachers to choose effective media and material to use. The use of learning media in relation to teacher professional competence in this study is intended to mastery and development of material, scientific concepts that support the subjects taught, as well as utilize information technology in the form of thematic and song-based learning videos for early childhood.

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## 1. Introduction

Art is one aspect of early childhood development that needs to be maximized. The aesthetic experience obtained by early childhood through the process of learning dancing can help children to be sensitive to the value of beauty, sensitive to space and sensitive to the surrounding environment. So it can be concluded that actually by learning art children can be stimulated by all aspects of growth and development,

In connection with the material of the process of working dance for early childhood, it should be directed more towards thematic-based dance education, due to theme-based early childhood learning. From the themes in the PAUD learning, it can be used as an idea in creating innovative works to develop the artistic abilities of early childhood. The excavation of 11 themes in early childhood learning is used as a basis for exploration of motion and all supporting elements in dance works. The results of the exploration are manifested in the form of educational dance which is more directed at the ability of children to develop their potential. In the end, the form of thematic-based dance works produced can be used as learning material that can be utilized in any learning in the school and can be combined with other material with the same theme in one learning day. Kindergarten teachers throughout Malang City are expected to have skills in working on thematic-based dance.

In order to make kindergarten teachers be more motivated to learn and add insight into art learning, and to further improve early childhood movement and song skills, the researchers offered the development of thematic-based motion and song learning videos for early childhood using teaching aids in the form of visual information in CD form. This development research is a follow up from previous research on analyzing the competency needs of early childhood teachers in dance learning.

## 2. Literature Review

### 2.1. Thematic-based Motion and Song Learning

Motion and Song are part of the form of dance material that can be given to early childhood. Motion and song learning can be interpreted as a set of materials or learning materials that are planned and carried out in the form of motion and song as a basis for stimulating the development of all aspects of early childhood abilities. In accordance with Sandor's opinion (1975: 4) learning through motion and song performed while playing will help children to develop their intelligence not only in aspects of art development, language and physical course but also in children's emotional and cognitive development. According to Wulandari (2017) that through the application of motion and songs for early childhood through the BCCT method can improve their creativity.

Setyawati (2012) says that motion and song are examples of material for children of play age that are adapted to the children's developmental abilities. Motion is created as an expression of the song, so the motion must be made in half of the overall proportion of the display, and the song is also displayed with the correct vocal technique as half a part of the overall proportion. So the processing of motion does not prioritize high aesthetics, because it will damage the concentration of the child on the song, on the contrary the song must also be trained with correct tone, rhythm and

dynamics techniques, but also should not be too dominant to be strengthened so that the child is barely moving. In essence the motion and song must be made proportionally, so that it is balanced between motion and song. The form of his activities is children singing while dancing.

Based on this opinion, it can be concluded that the activity in motion and song is understood as a form of motion performed by the child adjusting to the poetry and rhythm in the song. The terms of the motion material and songs given to early childhood are simple forms of motion, the tempo / rhythm of movement is not too fast, the theme adapts to the development of the child, the atmosphere is happy and agile. In the implementation of motion and song learning adapted to the basic motor skills of early childhood.

According to Wulandari (2014: 147-148), learning art contains two aspects of competence, namely skills and creativity. Skills competencies focus more on children's exploration experiences to train sensory and motor skills, not to make children be proficient or expert. Creativity competence includes the cognitive, affective, and psychomotor domains that can be seen from products or works and processes in creative self-busyness. Psychomotor skills emphasize the formation of children's awareness to move spontaneously, in moves demanded to be smooth, orderly, flexible and expressive without any burden in performing dance moves.

According to Duhun (in Hanifah, 2012) "dancing is the encouragement of the human soul since children express themselves when they hear or feel the vibration of a rhythm within themselves". The instinct will disappear if it is not fertilized early. In fact, this condition is experienced by most humans. In order for these natural instincts not to disappear, the teacher must be able to facilitate children to dance early so that they want to learn and get to know the traditional arts. According to Wulandari (2014: 157-158), the stages in the learning process of song or dance movements in early childhood are described as follows: (1) Adjusting the psychological condition of the child, then choosing the theme of song movements (2) Choosing the song's moving material with a theme the environment or the theme that is close to the life of the child, (3) Selecting movements that have a low level of difficulty so that the child is able to follow, (4) Selecting a dynamic path medium, soft and fast because dynamic variations will train variations in children's emotions, 5) Making the floor pattern of motion of the song as simple as possible, (6) Educators should master the song movement material before teaching, (7) Giving the forms of movement gradually starting with one type of movement pattern not at once, because one variety of motion requires a motor coordination that requires time to train it. (8) Making alternations in the form of stories that are relevant to the theme of the song / dance movement that will be taught, (9) If the material of the range of motion has been achieved, it is necessary to do repetitions of motion so that the shape becomes optimal. (10) The Educator must be good at

dividing the song's moving material in several meetings that need to be considered as the physical and psychological condition of the child. In principle, do not force the child if the child's condition is no longer possible.

Based on the description of the theory it can be concluded that learning motion and song by following the steps that have been systematically arranged will facilitate learning, while at the same time generating more effective and maximum learning. Therefore it is necessary to have an activity that can train and provide references to early childhood educators in providing stimulation to children through motion and song, as well as in developing material activities. Theme-based song and song learning mean that extracting ideas in the work of motion and songs for early childhood is adjusted to the themes used in early childhood learning. These themes are used as the basis for processing material movements, so that the motion and song material can later also be used as one of the materials that can be combined with other fields of material development in early childhood. The results of the training from community service activities (Wulandari & Kustiawan, 2018) that works of art use themes in early childhood learning can be maximized to achieve child development, and the results can be directly practiced by teachers in their schools.

Based on the K13 theme development guidelines there are 8 themes that can be used or further developed by the teacher, namely: myself, environment, animals, plants, vehicles, the universe, my country, and my culture. These themes can be further developed with sub-themes and sub-sub-themes according to the needs of each class / institution, but in developing this video learning product the themes used are limited to the themes of animals, my homeland, profession, myself, the universe.

## 2.2. Teacher's Competence in Teaching Art for Early Childhood

The ability to realize the professionalism of PAUD

teachers is a response to the increasing demands of the social environment of the people who want an increase in the quality of education services, including early childhood. The formulation of four teacher competencies which are the general and basic framework which is further elaborated in the competence of PAUD teachers can be used as an indicator to assess the extent to which PAUD teachers have the ability to understand and actualize the dimensions of their abilities. This is in accordance with the opinion of Pantic (2010) which states that there are 4 components that underlie teacher competence, namely: 1) understanding the values of child development; 2) understanding of the education system and contribution to its development; 3) knowledge of students, pedagogy, and curriculum; and 4) self-evaluation and professional development. Whereas Ilanlou & Zand (2003) explained that professional teachers must have 3 competencies, namely: cognitive, emotional and practical competencies. Cognitive competence is related to teacher cognition, student cognition, and cognition of the teaching-learning process. Emotional competence is a competency that is based on interests, values, and attitudes. Practical competence refers to the competence of teachers in relation to students, classrooms, schools and society. This development product aims to improve the practical competence of PAUD teachers.

The actualization of this competency will be the main standard for assessing the extent and depth of PAUD teacher professionalism. In this case it also relates to the competence of PAUD teachers in teaching dance for early childhood. In the appendix of Minister of National Education Regulation Number 16 of 2007, on 4 May 2007, the standard academic qualifications and PAUD teacher competencies are fully developed from the four main competencies, namely pedagogic, personality, social and professional competencies, which are integrated in PAUD teacher performance in teaching all fields, in this case also in dance learning. Specifically related to dance learning, a teacher is required to have teacher competencies which include:

**Table 1.** Teacher's Competencies of Dance in Early Childhood Education

Competence	Competency Indicators for Early Childhood Teachers	Teacher's Competency Indicators in Dance Learning
<b>Pedagogic Competence</b>	1. Using learning technology	The selection of dance art learning media for early childhood and the use of media in the form of videos, images, or dance property, etc.
	2. Mastering the basic concepts of mathematics, science, language, social knowledge, religion, art, physical education, health and nutrition as a means of development for each scope of development	Mastering the basic concepts of art knowledge as a means of developing each development environment,  Culture-based material development for early childhood
<b>Professional Competence</b>	3. Understanding the abilities of children in each scope of development	Understanding the level of mastery of dance material for early childhood
	4. Processing the material scope of development creatively in accordance with the level of development of students	Having skills in teaching dance for early childhood

(adaptation of the Minister of National Education Regulation Number 16 of 2007 dated May 4, 2007 concerning PAUD Teacher Competence)

In this study more specifically to the competence of PAUD teachers in teaching the field of dance to children, in relation to the development of learning materials that can be stimulated through increasing the ability to create art. One of the efforts taken is through the use of motion media CDs and songs as a reference for the development of material and the teacher's ability to work. In accordance with the results of Wulan and Kustiawan's research (2018) that the problem of learning dance in the field is the lack of fulfillment of pedagogical, personality and professional competencies possessed by kindergarten teachers in Malang City in dance art learning, while efforts to improve teacher competence in art learning dance are by increasing the knowledge and skills of teachers in learning the art of early childhood dance through the provision of dance learning videos for early childhood.

Therefore this study seeks to provide an alternative example of the form of development of thematic-based motion and song material that is in accordance with the PAUD learning curriculum.

### **2.3. Thematic-based Motion and Song Videos Stimulate Kindergarten Teachers' Artwork Ability**

The ability of teachers to work in art still requires a lot of references, and providing a lot of media or reference sources is very helpful for teachers in stimulating their abilities. This is consistent with the results of a previous study by Wulandari and Kustiawan (2008) which stated that to improve the art competencies of Kindergarten teachers in Malang City, requires the addition of frequency of training or workshops, and the need to provide dance learning videos for early childhood. This is also confirmed by the results of community service, namely in the form of training in the creation of thematic-based dance given to early childhood education teachers, showing that the ability of teachers to work can be improved by providing direct practice experience and providing appropriate examples or form of movement with themes in art learning. The creation process that is experienced by the teacher reaches the stage of appearance and reporting of work, so that the teacher understands each step of exploration and artistic creation that is adapted for early childhood (Kustiawan & Wulandari, 2008).

## **3. Methodology / Materials**

This study uses a research and development model (Research and Development) designed by Borg & Gall (in Setyosari, 2010: 204) to produce products in the form of thematic-based learning videos and songs for early childhood. The Borg & Gall model has 10 steps, but the researchers modified it into 7 steps, because it was adjusted to the conditions encountered in the development process, so that the development step ended in product validation. The

steps are described as follows: (1) Conducting research and gathering information (literature review, class observations, preparation of the main problem report). Conducting a needed analysis, which researchers have done in 2017 research on the need to use learning media to improve the competence of PAUD teachers in learning motion and song, (2) Planning in the form of drafting products for motion and song-based song learning videos for early childhood, (3) Developing initial product forms in the form of thematic motion and song learning videos for early childhood, (4) Expert testing of products carried out by early childhood art learning experts, learning media experts on developed media products, (5) Initial product revisions based on input and suggestions from experts, (6) Obtaining validity data by distributing questionnaires to 5 teachers from PAUD institutions in Kedungkandang Subdistrict, (7) Conducting revisions based on the suggestions presented, (8) Field testing by conducting FGD inviting 30 PAUD teachers -Kota Malang to obtain data on the level of validity and the media developed and implemented n revisions based on suggestions from the FGD results.

Product testing was carried out by 2 art learning material experts, 2 learning media experts and respondent tests to obtain validity level data and product development. Field testing was conducted by holding a Forum Group Discussion (FGD) which invited 30 kindergarten teachers throughout Malang City. The research instrument used was a questionnaire. Questionnaires were used to collect quantitative data, namely the assessment of responses from learning media experts and early childhood art learning experts, as well as respondents from the study. Qualitative data in the form of expert advice on product design, FGD results with respondents. The indicators used for validation in media experts include: (1) The suitability of the media to stimulate the ability of TK teachers to work, (2) Quality and media display. The indicators used for the validation of material experts include: (1) The ability of the media to embed concepts and deliver material based on the themes of early childhood learning, (2) Conformity of material for early childhood, (3) Conformity of material with the aim of stimulating abilities working kindergarten teacher. The indicators used to obtain product validation data from respondents include: (1) The quality of the media in terms of video, material, and packaging, (2) The influence of the media to stimulate the teacher's work ability. Data analysis techniques used in this research and development are qualitative and quantitative data processing techniques in the form of percentages. Qualitative data is in the form of advice and input from experts who are used to make revisions to product design, as well as from product user respondents, namely kindergarten teachers. Quantitative data in the form of a percentage of the results of data collection on small group test data trial of large groups and assessment guidelines. Data analysis for effectiveness uses the t test, and looks at the effectiveness of motion videos and songs to stimulate the skills of kindergarten teachers.

## 4. Results and Findings

### 4.1. Product Description Development Results

Development Products are in the form of early childhood-based motion learning and song-based videos and teacher instructional guidebooks, which aim to stimulate the ability to work in kindergarten teacher art and add references in an effort to improve the competence of early childhood art teachers. Motion and song learning videos use five themes that exist in Kindergarten learning, including: animal themes, professions, myself, the universe, my homeland. This learning video consists of 1 CD that has been packaged as attractive as possible, containing the moving material of the song based on predetermined themes and a motion tutorial that is described in more detail. Learning videos for the development of thematic motion and early childhood songs is based on the title; (1) My Geese, (2) Police, (3) This Is My Body, (4) Unlimited Goose, (5) Indonesian Children Cheerful.

The product is equipped with a teacher instructional guidebook to make it easier for teachers to apply motion and song material in more detailed stages. The guidebook contains song poetry material, song notation, and movement descriptions that have been completed with motion counts, motion descriptions and motion pictures.

### 4.2. Result and Analysis

This media has passed from 2 media expert, 2 material

expert, and 35 Kindergarten Teacher Respondents in Malang. These are the results of level validity of result:

**Table 2.** Analysis of Level Media Validity

Subject	Percentage	Notes	Meaning
Materialialistic Expert	88%	Extremely Validity	Used without minor revision
Media Expert	83%	Suffficient Validity	Used with minor revision
5 Teachers (Small Group Experiment)	98%	Extremely Validity	Used without revision
30 Teachers (Large Group Experiment)	87,3%	Extremely Validity	Used without revision
<b>AVERAGE</b>	<b>90.1%</b>	<b>Extremely Validity</b>	<b>Used without revision</b>

The advice given from the results of the validation test is the addition of detailed images in the teacher's instructional guidebook in addition to the description of the motion that has been provided, displaying all the themes on the cover of the development video, thus representing the contents of the material. Multiply product development so that it can be used massively by kindergarten teachers, as well as training to utilize development products.

The effectiveness test of the media in the form of motion learning videos and thematic-based songs to stimulate the art work ability of kindergarten teachers, was carried out on the data from the pretest and posttest results of 30 kindergarten teachers in all the cities of Malang obtained the results described in the following table;

**Table 3.** Pretest and Posttest Observation Results

	Assessed Aspects (Score)					Total score
	Understanding the work concept of the motion art of early childhood	Practical skills in making work techniques	Motion form creativity	Original work	Educational work value	
<b>Pretest Average</b>	3,04	2,73	3,43	3,65	2,86	15,73
<b>Posttest Average</b>	3,74	3,43	3,83	3,95	3,56	18,30

Based on table 3, it shows that the results of the score on the ability to work in kindergarten teacher dance, which includes aspects of understanding the concept of working early childhood motion art, practical skills making techniques, creativity in motion, original work, and educational values of works that produced before getting treatment, obtained an average yield of 15.73, and after getting the treatment of 18.30 shows a positive difference. Then tested the hypothesis by comparing the results of the pretest and posttest with the correlation formula as follows;

**Table 4.** Results of the Pretest and Posttest Hypotheses

	$X_1$	$Y_1$	$(X_1 - \bar{X})$ (x)	$(Y_1 - \bar{Y})$ (y)	$(x^2)$	$(y^2)$	$(xy)$
<b>Total</b>	362	421	0,09	0,02	103,33	31,99	43,07
<b>Average</b>	15,73	18,30			4,50	1,40	1,89

Based on the calculation data using the t test in table.4 data analysis results of the pretest and posttest, obtained the results of t count = 5.19 with a significance level of 5% (for education) that is 0.413, r value of 0.75, and t table value of 2, 08. Therefore, getting the value of t count > t table which means  $H_0$  is rejected and  $H_a$  is accepted. Then it can be concluded that the motion video and thematic-based songs proved effective to improve the results of the kindergarten art teacher's work. Thematically based motion and song videos can thus be declared valid and effective to stimulate the ability to create art in kindergarten teachers.

#### 4.3. Revised Product Review

This research and development has produced a thematic-based learning video with a learning theme for early childhood. Motion learning videos and thematic-based songs in it contain material in the form of videos, sound of motion material and songs along with detailed motion tutorials. This is in accordance with the opinion of Winarno (2009: 8) about the media in the form of learning videos.

These media have been adjusted to the needs of the 2013 curriculum learning, with a theme limited to 5 themes, namely the theme of animals, my homeland, profession, myself, and the universe, so that the material can be integrated with everyday learning. Hopefully these media can be utilized maximally in learning, so that motion and song material do not only function as supplementary material for extracurricular activities or annual incidental activities.

Learning of motion and song by following the steps that have been systematically arranged will facilitate learning and can produce more effective and maximum learning (Wulan, 2014). Based on this theory, there are needs to be an effort that can train and provide references for early childhood educators in providing stimulation to children through motion and song, as well as in developing material activities. Therefore the development of thematic-based motion and song learning videos was carried out to provide a reference

for material motion development and this thematic-based song is carried out to provide a reference for the development of motion material and stimulate the ability to work in kindergarten teacher's arts.

The development of research is a solution of teacher problems in the field about the need for a lack of reference to art learning media for early childhood, in other words as a form of follow-up from previous studies, Wulan (2017) that the problem of dance learning in the field didn't fulfill pedagogical competence, the personality and professionalism of kindergarten teachers throughout Malang in learning dance, while the efforts that should be made to improve teacher competency in dance learning are to increase the knowledge and skills of teachers in the art learning of early childhood dance through the provision of dance learning videos for children early age.

The product of development research is an effort to stimulate an increase in the ability to create art for kindergarten teachers as well as an element of teacher professional competence in the field of dance. This is included in the pedagogical standard of competence, namely the ability to choose and utilize dance learning media in the form of videos and cultural-based art material development for early childhood as well as skills in teaching dance for early childhood, according to the results of previous research by Wulan (2017) and Regulation of the Minister of National Education Number 16 of 2007 dated May 4, 2007 concerning PAUD Teacher Competence.

The video learning media also fulfill the criteria: (1) valid, which means that it matches the goals of early childhood learning, and field needs, namely the need for references or media to stimulate the kindergarten teacher's artistic ability to work, (2) practical means that the media is familiar and capable of developing a learning atmosphere that is fun for students and teachers and easy to use by teachers (3) effective means that the media are able to embed concepts that are appropriate to the theme of early childhood learning, and able to increase teachers' knowledge or insights about the appropriate material for motion art and songs with early childhood. This criterion is in accordance with the utilization theory, principles and values of media use expressed by Zaman (2014) and Sadiman (2012). Effective use of media to clarify the presentation of learning messages is to be conveyed to early childhood.

The video learning media have been validated by materialistic experts, media experts. Data processed from the validation questionnaire of material and media experts stated that this product is feasible to use but requires a small revision.

After going through the process mentioned, it was found that motion products and songs for thematic-based on learning were simple and in accordance with the characteristics of early childhood. The theory of the motion characteristics of kindergarten children that the characteristics of the age of kindergarten are more simple, meaningful and themed, the movement of children mimics

the daily movements of parents and also those around them, and children also mimic the movements of animals (Kamtini and Tanjung, 2005). In addition, song lyrics on the 5 songs in the learning video are easily memorized and sung by children. As expressed by AT. Mahmud, (in Rachmawati & Kurniati, 2010: 23) music is a creative activity. A creative child will show curiosity, willingness to try, and broad imagination.

The results of experts' review of the product review development design of motion and thematic-based songs are as follows: adjusting the appearance of the cover with 5 themes which are the basis for the development of motion and song and the addition of detailed motion pictures in the guidebook. The advantages of learning video media are as follows: (1) The media is thematic and in accordance with the K13 curriculum so that it is needed in the present, (2) This media is very valid and can be easily used, (3) This media is practical and facilitates the teacher in developing learning materials, (4) Learning of art and song material can be implemented in an integrated manner with other learning materials, (4) Media CDs are equipped with tutorials on the stages of material giving details for each movement, (5) These media are interesting and able to increase teacher motivation creating art, (6) These media are durable and can be used many times.

## 5. Conclusions

Theme-based motion and song development research can motivate and stimulate kindergarten teachers to create art in an effort to improve competence. Motion-based learning videos and theme-based songs can also be used as a reference for teachers to add insight into art learning, especially motion and song material adapted to the overall learning theme. This statement is supported by the results of the recommendations in the FGD that the teachers were enthusiastic to get training activities as an indirect form of the results of this research development. In addition, from the results of the effectiveness testing of product development, it has proven to be effective in stimulating the ability of the Kindergarten teachers to create art.

As for some suggestions given by researchers to related parties, including: (1) For teachers, researchers suggest that teachers use these media for embedding the concept according to the 5 themes that underlie the development of learning videos, because these media are proven to be valid, practical and effective for early childhood learning and enhance the ability to create art for kindergarten teachers. Teachers are also advised to be creative in creating motion and song material by studying references that have been provided in development products, (2) For other researchers, the researcher suggests that other relevant research such as interactive development results be based on existing weaknesses and opportunities to do continued research such as measuring the effect of the implementation of the media on children's skills, (3) For the Research Service, the

researcher suggested that in the future more intensive training in motion and song material should be developed as a follow-up to the results of the research.

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# Students' Civic Disposition through Learning Civics and Pedagogical Competences of High School Teachers

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**Abstract** This paper contains research on the influence of Civics teaching and pedagogical competence of teachers to the development of students' civic dispositions. The main problem in this research is: Do Civics learning and pedagogical competence of teachers influence the development of civic dispositions of students in SMA Negeri 1 Kawangkoan? The data were obtained through a questionnaire distributed to 60 students. This research also involves data collection and analysis of quantitative data. The study found that: First, Civics Learning has positive influence on Civic disposition of Students in SMAN 1 Kawangkoan which means that through civics learning students could develop their Civic Dispositions. Second, teachers' pedagogic competence has positive effect on Civic disposition of students SMAN 1 Kawangkoan. It means that the better the pedagogical competence of teachers is, the higher the students' Civic dispositions are. Third, Civics Learning and pedagogical competence of teachers jointly have positive effect on Civic dispositions Students SMAN 1 Kawangkoan. It means that through Civics teaching materials studied by students and pedagogical competence of teachers, Civic disposition of students is higher. Thus, this study recommends further research on other civic competences.

**Keywords** Civic Disposition, Learning Civics, Pedagogical Competence, Teachers

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## 1. Introduction

The problem on the national character in Indonesia has become the public attention since it is presumed that various problems which the Indonesian people face nowadays are rooted in this matter. Realizing the urgency of this problem, the government has reinforced the necessity of the character-building education since the past few years. The

Ministry of Education and Culture as the representative of the government has established various efforts through socialization, training and even the integration of the national character value (18 values) into the subjects taught in Elementary School, Junior High School and Senior High School.

The results of research from Hurtado & DeAngelo (2012) show that the peer environment is a powerful, yet underutilized, tool for learning in college. Informal college experiences verify this, in those students who report discussing course content with peers outside of class demonstrates more changes in habits of mind activities than students who do not.

We studied students' self-reported understanding of global, national, and local issues and problems, which we term "civic awareness," and also a scale that measures students' complex thinking for a diverse democracy, which focuses on knowledge and abilities. We report both outcomes here as two different measures to study student assessment of their own abilities and understanding of contemporary problems (Hurtado 2009) in (Hurtado & DeAngelo, 2012). The purpose of Civic according to Malin, Ballard, & Damon (2015) is Civic purpose as a sustained intention to contribute to the world beyond the self through civic or political action, integrating the components of motivation, civic activity, and future-oriented civic intention.

The integration of the values of national character in each subject is necessary due to the awareness that the problems on national character turn into an urgency at this educational level. The young generation are expected to contribute their active participation in every aspect of life, and they will take part in the development of Indonesia when Indonesia celebrates its centennial Independence Day in 2045. However, the efforts of the government to instill the necessity of character building to improve the values of national character which seem to be decadent have not been so fruitful.

The problems lingering in the education aspect in Indonesia seem to be the urgent matters to solve. These

problems are rooted in qualified human resources who become the teachers and the overall education system. The low competence of those teachers is assumed to be the main cause of the low quality of education. This vicious cycle leads to the low quality of human resources (students) who have graduated from the schools. (Sagala, 2009:21) explains that teacher can be simply defined as a person who delivers knowledge to students. The duty in transferring knowledge increases the image; in addition, teachers are inevitably important for the society. Therefore, there will be no doubt among the society regarding of the urgency of teachers for students. The society put their trust on teachers to teach students to be well-mannered, well-educated, intelligent and have good personality. (Sagala, 2009:iii) further explains that education refers to collaborative efforts which run within certain life pattern and can be classified into mechanic system and organic system. The mechanic system perceives education as the process which involves input-process-output and has direct and linier causal relationship. It implies that intervention aiming at achieving certain output can be designed to manipulate input. The education process contains various inputs such as students, teachers, curriculum, teaching materials, learning process, classes, building, equipment and environment. Thus, the mechanic system argues that the quality of output can be enhanced by increasing or decreasing the quality of input.

To improve the quality of teachers, the government has initiated certification program and competence test for teachers since past few years. Law No 14/2005 about "Teachers and Lecturers" and Regulation of The Ministry of National Education No 16/2007 about "The Standard of Academic Qualification and Teacher Competences" have clearly mentioned that teachers must have four (4) competences, which are pedagogical competence, personality competence, social competence, and professional competence. The main objective of this program is to test competences for teachers who teach at the schools in order to be professional teachers. However, the lingering problems in education sector in Indonesia do not only concern about the low teacher competence but also the inadequate skill of teachers in the good class management. Teachers are still unable to well manage teaching activities which include students, curriculum, teaching material, classes, school environment and others.

Civic Education is one of the subjects taught in Elementary School, Junior High School and Senior High School. This subject directly or indirectly becomes the black sheep for the emergence of problems in Indonesia such as corruption, collusion, nepotism, mafia justice and others. Teachers of Civics thus become the integral part of the existing problems. The facts prove that teachers who teach Civic Education at schools have not attained the desired competences. Many of them do not understand how to teach Civic Education and manage the learning process either. These facts do not fulfill the expectation. Law no 14/2005 on "Teachers and Lecturers" Article 1 Point 1 explains that

"teachers are professional educators whose main duties are to educate, teach, guide, assist, train, assess, and evaluate students who involve in early age education through formal, elementary, and secondary education." According to Malin et al., (2015), key contributors to the development of civic purpose were: identity salience, beliefs and values, and invitation from one or more adults.

Based on the explanation above, the researcher puts the interest in the Students' Civic Disposition through Civics Learning and Teachers' Pedagogical Competence in High School. After identifying the problems, the researcher formulates research problems as follows: (1) What is the influence of Civics Learning on the improvement of students' civic disposition in SMA Negeri 1 Kawangkoan; (2) What is the influence of teachers' Pedagogical competence on the improvement of students' civic disposition in SMA Negeri 1 Kawangkoan; (3) Do Civics Learning and Teachers' Pedagogical Competence have significant influence on the improvement of Students' Civic Disposition?. The main objectives of this research are (1) to elaborate the influence of Civics Learning on the improvement of students' civic disposition in SMA Negeri 1 Kawangkoan; (2) to elaborate the influence of teachers' pedagogical competence on the improvement of students' civic disposition in SMA Negeri 1 Kawangkoan; (3) to figure out the significant influence of Civics Learning and Teachers' Pedagogical Competence on the improvement of Students' Civic Disposition.

## 2. Literature Review

### 2.1. The Development of Civics in Indonesia

Wahab & Sapriya (2011:290) explained that the historical records of Indonesia have shown that traditional formal education had been prepared as the efforts to educate the citizen within the framework of national goals. The government had prepared to integrate social sciences into the curriculum. The terms used for civics along with the development and political course which Indonesia has undergone indicate the effort from the government.

According to the Department of Education and Culture (1962) as having been quoted by Budimansyah (2010:113-114), the development of Civics in Indonesia began when Civics was integrated into the curriculum in High School in 1962. This subject contained the material about the Indonesian government based on the 1945 Constitution. Moreover, Somantri (1976:7) explained that previously Civics contained the learning experiences which were compiled and selected from various subjects such as history, geography, economics, politics, the presidents' speeches, human rights declaration and knowledge about The United Nations. The term 'Civics' was not formally found in either 1957 Curriculum or 1946 Curriculum. The state structure and legal structure which discussed the concept of citizenship particularly on the legal status of

citizens and the citizenship requirements (Somantri, 2001). In 1946 Curriculum, a subject on general knowledge which also explained the government system was included. In 1968 and 1969 curriculums, the term 'civics' and 'citizenship education' were interchangeably used. In the 1968 curriculum for elementary school, the term 'citizenship education' was the name of subject taught in which the history of Indonesia, the geography of Indonesia and civics (translated as knowledge on citizenship) were included. In the 1968 curriculum for Junior High School, citizenship education was the subject which discussed the history of Indonesia and constitutions including the 1945 Constitution. In the 1968 curriculum for Senior High School, citizenship education mainly discussed the 1945 Constitution. In the 1969 curriculum for Teacher Education School, citizenship education mainly concerned for the history of Indonesia, constitution, society and human rights (Department of Education and Culture (Dept. P&K 1968a; 1968b; 1968c; 1969).

The amendment of 1968 School Curriculum into 1975 Curriculum was signified by the integration of some subjects into one subject. As a result, the subjects related to Pancasila (the Five Principles) and the 1945 Constitution were no longer assimilated into history, geography, and economics. The discussion of Pancasila (the Five Principles) and the 1945 Constitution becomes the subject of Moral Education. History, Geography, and Economics that were integrated into Social Sciences which were well known also as social studies. These changes were still valid as the 1984 Curriculum was established as the curriculum which had been adjusted. Due to changes within the aspects of life in Indonesia, Moral Education was revised. Based on various consideration, the revision of this subject was finalized with the implementation of the 1994 Curriculum. Moral Education was revised into Pancasila and Civic Education referring to Law of the Indonesian Republic No 2/1989 on National Education System (Wahab & Sapriya, 2011:297-298). With the implementation of Law on National Education System No.20/2003, Pancasila and Civic Education was revised into Civics.

## 2.2. Civics Learning in High School

It can not be denied that the first and foremost goal from Civics is to be good and smart citizens. Winataputra (2001) explains that in Indonesia, Civics in the term of citizenship education is substantially and pedagogically designed to achieve goal to be good and smart citizens in all education levels. Winataputra & Budimansyah (2007:73), explain that Civics has been the inherited part from the instruments and the practice of national education in five aspects:

First, as the subject taught in schools. Second, as the subject taught in universities. Third, as the branch of knowledge in social science within the framework of teacher education program. Fourth, as the program of political education in the form of Upgrading Course on the Directives

for the Realization and implementation of Pancasila (P4) or other programs which are managed by the government as the crash program. Fifth, as the conceptual framework in individual's point of view and scholars' opinion. This eventually is developed as the underlying fundamental and point of view related to civics in the first, second, third, and fourth status.

Nu'man Somantri (2001) quoted by Wahab & Sapriya (2011:312) delineates that the objectives of Civics should be further explored in 7 curricula covering (1) Science which includes facts, concepts and generalization; (2) Intellectual skill, from simple to complex skills, from investigation to credible conclusion, from critical thinking to creative thinking; (3) Attitude which includes virtues, awareness, and feeling; (4) Social skill.

According to Wahab & Sapriya (2011:315), in the curriculum development system for education nowadays, the main objective of Civics refers to the standard for Civics content as explained in the appendix of Regulation of the Ministry of National Education No 22/2006. The objective of Civics is applicable in Elementary School, Junior and Senior High School. The main goal is oriented to the development of students' competence/skill which must be adjusted to the mental and intellectual, emotional and social development. Therefore, the objectives of Civics mainly focus on shaping students to acquire following skills:

1. To have critical, rational and creative thinking in giving response on the citizenship issues.
2. To take active participation, to be responsible and to take smart action on the activities in society and nation. Further, students must have anti-corruption attitude.
3. To have positive and democratic development based on the characters of Indonesian people to establish harmonious relationship with other nations.
4. To have indirect and direct interaction with other nations in the international scope by utilizing information technology and communication.

Civics has the vision 'to design a subject as the effort to shape nation and character building and the empowerment of people'. The attempt for shaping nation and character building is the characteristic and the noble idea of Civic Education. Meanwhile, the mission of Civic Education is 'to be good citizens. It means that the citizens are able to perform their rights and obligation based on political, legal and moral consciences'.

Learning can be defined as a system or process to educate students/learned which has been systematically designed, implemented and evaluated, so the students are able to achieve learning objectives in the efficient and effective ways (Komalasari, 2011:3). Based on the definition of learning, the explanation on the learning components will be elaborated as follows:

## 2.3. Teachers' Pedagogical Competence

Competence constitutes knowledge, skills, basic virtues

and attitude reflected in thinking pattern and action (Mulyasa, 2002:37-38). Mc.Ashan explains that competence is defined as skills, knowledge, and capability which someone has acquired and has embedded as one unity; thus, a person is able to conduct cognitive, affective, and psychomotor attitudes (Mulyasa, 2002:38). Department of National Education (2004) defines competence as knowledge, skills, attitude, and virtues embodied in way of thinking and behaviour. To sum up from various definitions above, competence refers to students' capability to perform various conducts which reflect three aspects (cognitive, affective, and psychomotor ). A consistent and sustainable way of thinking and behavioural pattern leads a person to acquire his/her competence. It implies that a person has skills, knowledge, and basic virtues to conduct action.

Saud (2009:44-45) explains that there are 3 terms in English Language which contain the definition of competence.

1. "competence (n) is being competent, able(to do the work)"
2. "competent (adj.) refers to (persons) having ability, power, authority, skill, knowledge, etc. (to do what is needed)"
3. "competency is rational performance which satisfactorily meets the objectives for a desired condition"

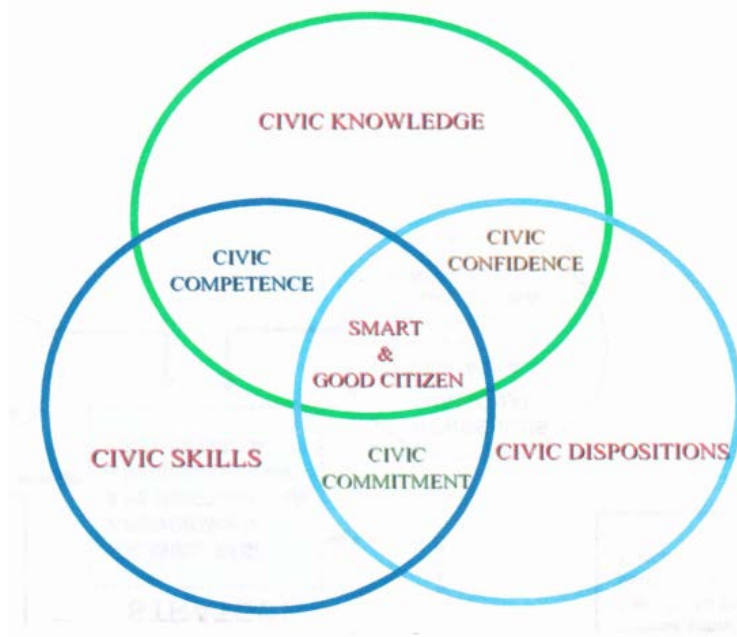
The first definition explains that competence refers to skills or capability to do work. The second definition further explicates that competence generally refers to characteristics

of competent people which consist of having ability, power, authority, skill, knowledge, and etc to do what is needed. The third definition explains that competence is rational performance which satisfactorily meets the objectives for a desired condition

Law No 14/2005 about 'Teachers and Lecturers' and Regulation of The Ministry of National Education No 16/2007 about 'The Standard of Academic Qualification and Teacher Competences have stipulated that a teacher must acquire 4 competences; those are pedagogic competence, personality competence, social competence, and professional competence. Pedagogical Competence is the ability to manage learning process for students. Personality Competence refers to the ability to have excellent, virtuous, and wise personalities. Teachers must have authority and become the good role model for students. Professional Competence is the ability to master the subjects taught comprehensively. Social Competence is the ability of teachers to establish effective and efficient communication and interaction with students, other teachers, students' parents and society.

#### 2.4. Students'/Citizens' Competence

Thomas Lickona introduces the objectives of education in the effort to be smart and good citizens. Those objectives must be achieved through following processes: (1) Civic Knowledge; (2) Civic Disposition, dan (3) Civic Skill. Below is Diagram Venn which explains the correlation of each competence.



**Figure 1.** CCE's Seven Core Elements of Civic Education (CCE; 1996; Winataputra, 2001)

Branson (1998) has classified civic competence into 3 categories: (1) Civic knowledge which is related to knowledge which citizens should know; (2) Civic skill, relevant intellectual and participatory ability of citizens; (3) Civic disposition which signifies that public and private characters are important for maintaining and developing constitutional democracy.

Civic knowledge refers to substantial material which every citizen must know about their rights and obligations. This knowledge provides basic explanation on the political system and structure, and ideal social system and government which should be well-implemented in the life of people. It also contains universal values in democratic society and efforts to achieve mutual development and harmonious relationship with the global society.

Civic skill is developed from civic knowledge which primarily aims at attaining useful and meaningful knowledge to solve problems in the life of society and nation. Civil skills consist of intellectual skills and participation skills.

Civic disposition implies that public and private characters are important for maintaining and developing constitutional democracy. As civic skills, civic disposition also grows gradually due to what a person has learned and experienced at home, school, community and civil society organizations. These experiences are expected to sharpen the awareness that democracy requires independent government to be responsible for all individuals. Private characters such as moral responsibility, self-discipline and respect for human dignity must be developed. Public character is also important. Awareness of the citizens, hospitality, obedience of rule of law, critical thinking and willingness to listen, negotiate and compromise are important dispositions to undergo the desired democracy (Branson, 1998).

### 3. Methodology

The research location is SMA Negeri 1 Kawangkoan-Minahasa, and the research population is all students. The samples of this research are the students of class XI A and XI B. This research uses quantitative

approach because all research data are in the form of numbers and the researcher performs statistical analysis. Research methodology is a survey method in which the research attempts to interpret numbers to describe inclinations, behaviors, or opinions of certain population by analyzing population samples. Data collecting techniques used in this research are questionnaire, interview and literature review. Data which have been collected by using instruments having met validity requirement and ideal reliability are processed and analyzed. In processing and analyzing data, the researcher uses computer assistance to operate SPSS (Statistical Product and Services Solution) version 19.

### 4. Results and Findings

#### a. *The influence of Civics Learning on the Development of Students' Civic Disposition*

The result of the research shows that Civics Learning variable has significant influence on the development of students' Civic disposition. This result supports the notion of Department of National Education (2003:7) which delineates that "Civic Education is a subject focusing on self-improvement from various aspects such as religion, socio culture, language, age, and tribes to be smart, skillful, and have strong character embedded in Pancasila and the 1945 Constitution". Komalasari (2011:88) argues that the core essence of Civic Education is value-based education. Thus, Civic education relies heavily on the development of values, morality, and behavior of students. Supporting the previous notions, Budimansyah and Suryadi (2008:68) denote that Civic Education is one of subjects which carries national mission to educate the Indonesia people by upholding 'value-based education'. Therefore, this subject must be well-designed. Configuration or systematic framework of Civic Education is established based on following paradigms: First, Civic Education is designed as a course which aims at developing individual potency to be noble, smart, participatory, and responsible Indonesian citizens.

**Table 1.** The Summary of Hypotheses Test Result

No	Hypotheses	Statistical Test	Result	Conclusion
1	Civics Learning ( $X_1$ ) has significant influence on Students' Civic Dispositions ( $Y$ )	$H_0 : \beta_1 \leq 0$ $H_1 : \beta_1 > 0$	Ho is rejected	Having positive and significant influence
2	Teachers' Pedagogical Competences ( $X_2$ ) has significant influence on Students' Civic Dispositions ( $Y$ )	$H_0 : \beta_2 \leq 0$ $H_1 : \beta_2 > 0$	Ho is rejected	Having positive and significant influence
3	Civics Learning ( $X_1$ ) and Teachers' Pedagogical Competences ( $X_2$ ) have significant influence on Students' Civic Dispositions ( $Y$ )	$H_0 : \beta_3 \leq 0$ $H_1 : \beta_3 > 0$	Ho is rejected	Having positive and significant influence

Second, Civic Education is theoretically designed as a learning subject which explores cognitive, affective and psychomotor dimensions. These dimensions are confluent; in other words, they are integrated into the substances, ideas, values, concepts, and morality embodied in Pancasila, democratic citizenship, and national defense. Third, Civic Education is programmatically designed as a learning subject which emphasizes content embedding values and learning experiences. These two goals must be embedded in various behavior in daily life of the Indonesian citizens. These also serve as the guidance for the citizens in undergoing the life in society, within the nation and with other nations. It can be said that these values are the further embodiment of idea, values, concepts and morality existing in Pancasila, democratic citizenship, and national defense. (Miles-Touya & Rossi, 2016) findings are in line with the proposals of civic virtue theorists or grass movements who suggest that citizenship education should be included in the compulsory school curricula since, if not, families or local communities will only transmit their particular view of the world.

To sum up those opinions. Civics Learning primarily focuses on developing students' civic competences which eventually give influence on the development of students' Civic disposition. Branson, (1998) has classified civic competence into 3 categories: (1) Civic knowledge which is related to knowledge which citizens should know; (2) Civic skill, relevant intellectual and participatory ability of citizens; (3) Civic disposition which signifies that public and private characters are important for maintaining and developing constitutional democracy.

Civic knowledge refers to substantial material which every citizen must know about their rights and obligations. This knowledge provides basic explanation on the political system and structure, and ideal social system and government which should be well-implemented in the life of people. It also contains universal values in democratic society and efforts to achieve mutual development and harmonious relationship with the global society.

Civic skill is developed from civic knowledge which primarily aims at attaining useful and meaningful knowledge to solve problems in the life of society and nation. Civil skills consist of intellectual skills and participation skills.

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#### ***b. The influence of Teachers' Pedagogical Competences on the Development of Students' Civic Disposition***

Law No 14/2005 about "Teachers and Lecturers" and Regulation of The Ministry of National Education No 16/2007 about "The Standard of Academic Qualification and Teacher Competences" have stipulated that a teacher must acquire 4 competences; those are pedagogical competence, personality competence, social competence, and professional competence. **Pedagogical Competence** is the ability to manage learning process for students. **Personality Competence** refers to the ability to have excellent, virtuous, and wise personalities. Teachers must have authority and become the good role model for students. **Professional Competence** is the ability to master the subjects taught comprehensively. **Social Competence** is the ability of teachers to establish effective and efficient communication and interaction with students, other teachers, students' parents and society.

Civic disposition implies that public and private characters are important for maintaining and developing constitutional democracy. As civic skills, civic disposition also grows gradually due to what a person has learned and experienced at home, school, community and civil society organizations. These experiences are expected to sharpen the awareness that democracy requires independent government to be responsible for all individuals. Private characters such as moral responsibility, self-discipline and respect for human dignity must be developed. Public character is also important. Awareness of the citizens, hospitality, obedience of rule of law, critical thinking and willingness to listen, negotiate and compromise are important dispositions to undergo the desired democracy (Branson, 1998).

#### ***c. The Influence of Civics Learning and Teachers' Pedagogical Competences on the development of Students' Civic Dispositions***

Based on the result of hypotheses test, it can be summed up that civics learning and teachers' pedagogical competence have influence on the students' Civic Dispositions. A well-designed Civics learning has a competence which improves students' Civic dispositions which refer to the refinement of students' private and public characters. According to National Standards for Civics and Government as quoted by Branson (1998), private and public characters constitute:

- 1. An independent citizen.** This character covers self-awareness to be a responsible individual who is obedient to rules. This obedience is not performed due to external force or supervision. This character also covers taking responsibility for consequences due to any actions taken and fulfilling moral and legal obligation as the democratic citizen,
- 2. Fulfilling responsibility as a citizen in economic and political aspects.** This responsibility covers taking care of ourselves, earning money for family and taking care of family, educating and nurturing children. It also includes keeping up with public issues, voting, paying

tax, becoming witness in court, taking part in community activities, and sharpening their leadership skill.

3. **Giving respect to the dignity of each individual.** Showing respect to others can be seen from following activities; listening to their opinion, showing politeness, upholding the rights and needs of other citizens, and obeying the principles of the majority and giving respect to the opinion of the minority.
4. **Participating in citizenship activities wisely and effectively.** It implies that a person must keep up with the newest information before voting or taking part in public debate. A citizen must follow the discussion by maintaining a good attitude and serious attention. Further, a citizen must be able to evaluate when she/he has to put their personal interest aside in order to achieve public goals. He/she also evaluates when declining certain citizenship activities due to obligation or constitutional principles. This character refers to the citizen dispositions which support their participation on public activities.

## 5. Conclusions

Based on the result and discussion, the researcher comes to some concluding remarks as follows; First, Civics Learning has positive influence to Civic disposition of students in SMA Negeri 1 Kawangkoan. It means that Civics Learnings enables students to develop their Civic Disposition. Second, teachers' pedagogical competence has positive influence to Civic disposition of students in SMA Negeri 1 Kawangkoan. It means that better teachers' pedagogical competence will result in better Civic Disposition of students. Third, Civics Learnings and teachers' pedagogical competence have positive influence to Civic disposition of students in SMA Negeri 1 Kawangkoan. It means that the materials of civics learning and good teachers' pedagogical competence lead to better Civic Disposition of students.

*dan Aplikasi, Kualitatif, dan R & D. Bandung: Alfabeta.*

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# Instructional Leadership Practice and Professional Learning Community in the Southern Zone of Malaysia

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**Abstract** This article investigates the level of instructional leadership (IL) of principals and professional learning community (PLC) among teachers in the southern zone of Malaysia which is Johor, Negeri Sembilan and Melaka to analyze the relationship between these two elements. This research also studies which of the IL dimensions can best measure the practice of PLC. This research applied survey research design using IL and PLC questionnaire (KIProQ). The alpha Cronbach value for the pilot study of KIProQ for IL is .962 while for PLC is .930. This study involved 390 teachers that had been chosen using proportional cluster random sampling method. The statistical analysis in this study uses the software IBM SPSS Statistic version 22. The research result found that the principals in the southern zone of Malaysia have practiced IL at medium high level with all three dimensions recorded a mean score value of between 3.796 and 3.965. It was also found that the PLC practice among teachers was at medium high level with the mean score values of all five dimensions being between 3.685 and 4.082. This study also found that the relationship between IL and PLC is statistically significant and positive ( $r=.658$ ,  $p<.01$ ) and the relationship is at medium level. A beta correlation coefficient value analysis had shown that two of the three dimensions in IL were identified as the best predictor for the practice of PLC which is the dimension promoting school climate ( $\beta=.518$ ,  $t=7.164$  and  $p=.000$ ) and the dimension managing instructional programme ( $\beta=.188$ ,  $t=2.595$  and  $p=.010$ ). In summary, the practice of IL and PLC has been implemented by the principals and teachers in the southern zone of Malaysia in driving the school towards achieving the stated vision and mission. IL practice is also proven to influence the effectiveness of the PLC practice among teachers and consequently fulfill the effort to make PLC as a culture that must be instilled in schools.

**Keywords** Instructional Leadership, Professional Learning Community, Southern Zone of Malaysia

## 1. Introduction

The correlation between school leadership and professional learning community (PLC) practiced among teachers emerged when many researchers had agreed that the school leaders play a major role in creating and maintaining PLC in schools (Gartner, 2010; Geijsel, Slegers, Stoel, & Krüger, 2009; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). Literature had proven that the role of leaders in creating and supporting the sustainability of PLC is vital. Louis and Kruse (1994) had successfully identified two ways on how leadership can influence or affect the PLC culture. The first one is by putting leadership at a visible condition and always ready to share the leadership and the second one is by encouraging or promoting supports in the classroom. The importance of leaders in encouraging PLC culture is also noted in a brief statement by Youngs and King (2002) which stated that the success of leaders in supporting PLC culture depends on the extent of similarity between the roles and responsibilities they practice and the responsibilities that they had defined. Therefore, this clearly shows that what has been practiced by the school leaders in their work environment that has a direct effect on the effectiveness of PLC.

The relationship between leadership and PLC is also proven when Clear (2005) had particularly defined PLC as a collegial group consisting of school leaders and teachers who always work together and learn together with the aim to improve the students' academic achievement. The researcher had also highlighted that teachers who felt encouraged by the school leaders in practicing PLC will be more committed and efficient in their lifelong learning process and their practice in the classroom, compared to those who did not get any support from the school leaders. This shows that PLC is a powerful tool in developing teachers' professionalism.

Furthermore, according to Scoggins (2008) leadership style practiced by school leaders can have a positive or negative impact on PLC development in a school. He also found that the improvement of teacher leadership capabilities

caused by the leadership style of their school leaders has also affected the development of PLC in the school. As a result, this study has succeeded in adding literary materials related to educational leadership by stating that a school leader's leadership style is closely related to PLC culture. The findings of this study have also provided its own specialized basic knowledge to improve the quality of PLC implementation in schools. Furthermore, many past researchers such as Blankstein (2004); Huffman and Hipp (2003); and Reeves (2006) suggested that school leaders play a big and important role in helping their schools to cultivate PLC.

McLaughlin and Talbert (2001) also pointed out that it was difficult for them to predict the success of PLC implementation in schools if they did not get support from school leaders. This support comes in how they manage school resources, support or impede social interactions, respond to the various educational policies that are available, and most importantly, bring in as many resources available to schools to fulfill various demands in PLC cultivation. Besides, school leaders also help create a learning culture by emphasizing the importance of teacher learning as well as critical dialogue and reflection as they influence the social and physical climate of the school (Griffith, 1999).

School leaders also provide the core elements needed to maintain PLC sustainability through a number of ways such as their words and actions, how they build their teacher schedules and their ability to distribute teacher workloads so that teachers' duties and responsibilities can be shared fairly and equally. While the social interaction of school leaders can be seen to facilitate in developing trust, collaboration and dissemination of knowledge and expertise among teachers. School leaders can also help teachers to face various demands from the new educational policies or the many and rapid changes that are seen to be extremely disturbing the continuity of the school's improvement process (DeMatthews, 2014).

Based on the discussion above, it can be concluded that leadership plays an important role in ensuring the sustainability of PLC culture in a school. Support in either humanity or resources is crucial to ensure that learning culture among teachers can be continued so that all knowledge and expertise can be shared and spread widely. Ultimately, this will improve the teacher's quality and students' academic achievement.

## 2. Research Objectives

The objective of this research is to identify the level of practice for the principals' IL and PLC in three states of the Southern Zone of Malaysia which are Johor, Negeri Sembilan and Melaka and the relationship between the two practices. To be more precise, this study has four objectives to be fulfilled to reach the aims of the study which are as follow:

- i. To identify the level of principals' IL in the southern zone of Malaysia.
- ii. To identify the level of PLC among teachers in the southern zone of Malaysia.
- iii. To analyze the relationship between IL and PLC.
- iv. To determine the dimension of IL that can be the best predictor for the PLC practice.

## 3. Research Design

This research applies quantitative method using survey to study the principals' practice level of IL and the teachers' practice level of PLC in the Southern Zone of Malaysia. The quantitative design is chosen because of its ability to analyze numerical data in a research in which the data has been collected and analyzed to clarify and forecast a phenomenon (Chua, 2006; Gay, Mills, & Airasian, 2012; Muijs, 2011).

Surveys through questionnaire had been popular in various fields, especially in science social researches (Chua, 2006) and education (McMillan, 2013). According to Gay et al., (2012), survey research is suitable for researches that include an evaluation on perceptions, attitudes, trust, practice, interest or characteristics of a group of respondents. This survey method is chosen for its ability to give measurable explanation through numeric for the PLC variable, it is more economically efficient and also accurate in presenting information regarding the research population (Muijs, 2011).

### 3.1. Research Sample and Population

The research population focused on teachers who serve at national schools in Johor, Negeri Sembilan and Melaka. Based on the draft obtained by the Department of State Education for the three states on the 31<sup>st</sup> of December 2016, the total number of teachers is 30,830 people. To determine the sample size for this study, several basic considerations had been taken. According to Cohen et al. (2013), a research which applies random sampling technique requires a big sample size so that the sample can illustrate the represented population accurately. Besides, the research design also affects the sample size. For quantitative researches, the sample size required is huge especially if inferential statistics are implemented in the research (Cohen et al., 2013).

Based on the Sample Size Table by Krejcie and Morgan, for a population of 30,830 people, the number of sample needed is only 379 people (Krejcie & Morgan, 1970; Sekaran, 2003). However, in this research, the researcher added the sample size up to 390 people. This value is obtained after the original value has been rounded off. Adding the number of samples is encouraged and suggested by Babbie (2014), Cohen et al. (2013), Creswell (2014) and Slavin (2007) in which they believe that the bigger the sample size is the better it avoids errors in sampling, increases reliability and makes up for the probability of the questionnaire not being returned.

### 3.2. Research Instrument

This study uses a questionnaire of IL and PLC (KIProQ) which comprises 75 items to study the principals' practice level of IL and the teachers' practice level of PLC in Johor, Negeri Sembilan and Melaka. The alpha Cronbach value for the pilot study of KIProQ is 0.962 for IL and 0.930 for PLC. KIProQ was constructed by the researcher based on the dimensions used in building the two best questionnaires in the field of IL and PLC which are "Principal Instructional Management Rating Scale" (PIMRS) by Hallinger (1990) and "School Professional Staff as Learning Communities Questionnaire" (SPSLCQ) by Hord (1997a). The researcher only applies the dimensions in the questionnaire and all items in this study's instrument are constructed by the researcher himself to suit Malaysian education system.

### 3.3. Descriptive Statistical Analysis

In this research, descriptive analysis based on mean score value is used to identify the level of practice of IL and PLC. To measure the level of mean score, Table of Mean Score Interpretation constructed by Nunnally and Berstein (1994) is used in this study. The Table is as shown in Table 1.

**Table 1.** Table of Mean Score Interpretation (Nunnally & Berstein, 1994)

Mean Scale	Level
4.01 – 5.00	High
3.01 – 4.00	Medium High
2.01 – 3.00	Medium Low
1.00 – 2.00	Low

### 3.4. Inferential Statistical Analysis

Inferential statistics explain the relationship between variables and the characteristics of samples chosen from a research population (Chua, 2006b). According to Sekaran (2003), the data analysis method for inferential statistics is used to get an inference from statistics of a sample to the whole population. In this study, inferential statistics which are Pearson-correlation and multiple regression were used to achieve the third and fourth objectives.

#### 3.4.1. Pearson-Correlation Test

The third objective is to analyze the relationship between two variables which are IL and PLC. To achieve this objective, Pearson-Correlation Test (Pearson Product-moment) with numerical scales being used (Chua, 2006b; McMillan, 2013). According to Babbie (2012) and Shaughnessy, Zechmeister, and Zechmeister (2012), Pearson-Correlation Test is suitable to be used for two variables with interval scale. The strength of a correlation is represented by correlation coefficient ( $r$ ), a value that shows the strength of a relationship between two variables (independent and dependent). Chua (2006b) stated that the correlation coefficient ( $r$ ) is in between +1.00 to -1.00 as

shown in Table 2.

**Table 2.** Correlation Coefficient and Correlation Strength (Chua, 2006b)

Correlation Coefficient Size ( $r$ )	Correlation Strength
.91 to 1.00 or -.91 to -1.00	Very Strong
.71 to .90 or -.71 to -.90	Strong
.51 to .70 or -.51 to -.70	Medium
.31 to .50 or -.31 to -.50	Weak
.01 to .30 or -.01 to -.30	Very Weak
.00	No Correlation

#### 3.4.2. Multiple Regression Test

Multiple regression test is used to identify changes in two or more factors (independent variables) that contribute to changes in a dependent variable (Chua, 2006b). Howitt and Cramer (2011) stated that multiple regression tests are the statistical tests used to find the best predictors (independent variables) by showing the value of relationships and contributions ( $r^2$ ) between the studied variables simultaneously. Through multiple regression analysis, the effectiveness of independent variables (predictors) will be shown when it is simultaneously tested with the assumption that they have equal interest in dependent variables (Field, 2013). According to Chua (2006b), there are three types of procedures in conducting multiple regression: first, backward settlement procedure (full mode), second, forward settlement procedure and third, stepwise settlement procedure (by level or step by step).

For the purpose of this study, the third procedure, which is stepwise (stepwise) settlement procedure was used in achieving the fourth objective of the study. This procedure has several advantages over the first two procedures. According to Diekhoff (1992), this procedure is more economical than two other procedures because through this procedure only a significant predictor variable will be included in the regression. The second advantage is that this procedure avoids the occurrence of multicollinearity problems that occurred due to the strong correlation between the predictor variables. This strong correlation will cause the regression analysis to run poorly (Diekhoff, 1992). This problem can be solved by not including the problematic variable in the regression.

To interpret the findings from multiple regression, the value of  $r^2$  (also known as coefficient of determination) will be used to measure the percentage of changes in the dependent variable (criterion) which was caused by the changes in predictor variables (independent) (Bryman & Cramer, 2001; Creswell, 2012; Fraenkel, Wallen, & Hyun, 2014; Miller, 2005). The  $r^2$  value is between 0 and 1 which can also be converted to a percentage of 0 to 100 percent. For example, if the  $r^2$  reading for multiple regression analysis test between the first predictor variables (defining goals - the first dimensions of IL) with the dependent variable (criterion) is .695, this means that the first predictor variable can

influence up to 69.5 percent variance towards the dependent variable (criterion), which is the PLC practice in school.

## 4. Research Findings

### 4.1. Principals' IL Practice Level in the Southern Zone of Malaysia

After analyzing each item in the IL functions, a full analysis based on 3 dimensions and 10 functions can be summarized as shown in Table 3. This analysis is explained by using the values of mean and standard deviation as well as the interpretation of the practice level. Referring to the table, it was found that the level of IL practice was at medium high (M = 3.8850, SP = .59626). In terms of the comparison between the dimensions, it was found that the practice of defining the school goal showed a mean (M = 3.9646, SP = .6976) which was higher than the overall mean value (M = 3.8550), while the dimension of organizing instructional program (M = 3.8043, SP = .6105) and promoting school climate (M = 3.7961, SP = .6005) showed lower mean.

An analysis had also been performed for each function to determine the level of practice of those functions that represent the three dimensions of IL. The dimensions of defining the school goals consisting of two functions indicate that the principals practice the task of framing the school

goals (M = 3.9026, SP = .7275) and communicating school goals (M = 4.0267, SP = .7330) at moderate high and high levels. For the dimension of managing instructional programs which have three functions, the principal is able to carry out all the functions at medium high level which are supervising and making instructional evaluations (M = 3.8621, SP = .6554), coordinating the curriculum (M = 3.9041, SP = .6588) and monitoring students' development (M = 3.6467, SP = .6665).

The third dimension is to encourage the school climate and only one function is practiced by the principals at high level which is to encourage professional development (M = 4.0451, SP = .6356) among teachers. While the other four functions show that the principals practice functions such as protecting instructional period (M = 3.7282, SP = .6447), always seen (M = 3.6892, SP = .7107), providing incentives for teachers (M = 3.6328, SP = .7656) and incentives for students' learning (M = 3.8851, SP = .7146) at medium high level.

Overall, the principals in the Southern Zone of Malaysia show medium high level of IL practice based on the three dimensions and the 10 functions found in the leadership. The dimension with the highest implementation stage is defining school goals, followed by the management of instructional programmes and promoting school climate. Therefore, it can be concluded that the principals in the Southern Zone of Malaysia have practiced IL in leading the teachers to enhance academic excellence and student development.

**Table 3.** Analysis for the Principals' IL Practice Level

Dimension and function	Mean (M)	Standard Deviation (SD)	Practice Level
<b>Defining school goals</b>	3.9646	.6976	Medium High
Framing school goals	3.9026	.7275	Medium High
Communicating school goals	4.0267	.7330	High
<b>Managing instructional programmes</b>	3.8043	.6105	Medium High
Supervising and evaluating instructional	3.8621	.6554	Medium High
Coordinating the curriculum	3.9041	.6588	Medium High
Monitoring students' development	3.6467	.6665	Medium High
<b>Promoting school climate</b>	3.7961	.6005	Medium High
Protecting instructional period	3.7282	.6447	Medium High
Always seen	3.6892	.7107	Medium High
Providing incentives for teachers	3.6328	.7656	Medium High
Encouraging professional development	4.0451	.6356	High
Providing incentives for students' learning	3.8851	.7146	Medium High
<b>Overall mean</b>	<b>3.8550</b>	<b>.5963</b>	<b>Medium High</b>

#### 4.2. Teachers' Practice Level of PLC in the Southern Zone of Malaysia

The overall analysis of PLC implementation among teachers in the Southern Zone of Malaysia is based on the five dimensions of PLC as shown in Table 4. This analysis is explained using mean and standard deviation as well as the interpretation of the practice level. Based on the table, it is clear that PLC practice among teachers in the Southern Zone of Malaysia is at medium high level ( $M = 3.8456$ ,  $SP = .47534$ ). The dimension of sharing the vision and missions is the only dimension that is practiced at high level ( $M = 4.0821$ ,  $SP = .5444$ ) and it exceeded the overall mean value. Meanwhile, the other four dimensions are below the overall mean value and have a medium level of practice. The dimensions are collective learning and learning application ( $M = 3.8564$ ,  $SP = .5237$ ), followed by dimension of leadership sharing and supportive leadership ( $M = 3.8323$ ,  $SP = .6301$ ), and the dimension of organization support ( $M = 3.7723$ ,  $SP = .6284$ ). Whereas the dimension with the lowest mean score is the sharing of personal practices ( $M = 3.6851$ ,  $SP = .5625$ ).

Overall, teachers in the Southern Zone of Malaysia have practiced PLC at medium high to high levels and the dimension of sharing vision and mission is the highest

performing dimensions. Meanwhile, other dimensions such as leadership sharing and supportive leadership, collective learning and learning application, sharing of personal practices and organization support are still practiced but at medium high levels. Hence, it can be concluded that the teachers in the Southern Zone of Malaysia have embraced PLC practices in their daily work with the aim of improving self-quality from various aspects, particularly in teaching, to contribute to the quality of learning and academic achievement of students.

#### 4.3. Analyzing the Relationship between IL and PLC

To study the relationship between the principals' IL practice and the teachers' implementation of PLC in the Southern Zone of Malaysia, a Pearson correlation test (Pearson Product-moment) was conducted as the data for both variables are ordinal. This test is also used to test the first hypothesis which is:

$H_01$ : There is no significant relationship between IL and the PLC.

The correlation strength between the relationships of both variables is based on correlation coefficient and correlation strength (Refer Table 2). The result of Pearson correlation analysis is shown in Table 5.

**Table 4.** Analysis of PLC Practice Level

Dimensions	Mean (M)	Standard Deviation (SD)	Practice Level
Sharing of vision and mission	4.0821	.5444	High
Leadership sharing and supportive leadership	3.8323	.6301	Medium High
Collective learning and learning application	3.8564	.5237	Medium High
Sharing of personal practices	3.6851	.5625	Medium High
Organization support	3.7723	.6284	Medium High
<b>Overall mean</b>	<b>3.8456</b>	<b>.4753</b>	<b>Medium high</b>

**Table 5.** Correlation of IL and PLC

Dimension	PLC		
	r	r <sup>2</sup>	Sig**
Defining school goals	.549	.301	.000
Managing instructional programmes	.633	.401	.000
Promoting school climate	.679	.461	.000
IL	.658	.433	.000

Note: \*\*correlation is significant at  $p < .01$

Based on the results of the analysis, it is found that the relationship between IL and PLC is statistically significant and positive ( $r = .658$ ,  $p < .01$ ). However, the relationship exists at medium level. The value of the variance ( $r^2 = .433$ ) indicates that 43.3 percent of the overall change in the implementation of PLC practice among teachers is due to the principal's IL factor. Meanwhile 56.7 percent of further changes in PLC implementation may be due to other factors that were not studied in this research.

Based on these findings, the Ho1 hypothesis is rejected as there is a significant relationship, but at medium level between the principals' practice of IL and the teachers' practice of the PLC in the Southern Zone of Malaysia. This study has also analyzed the relationship between the three dimensions of IL and the PLC practice. The findings show that there are statistically significant and positive relationships between the three dimensions and the PLC practice. All dimensions that represent IL show a medium relationship, in which they are the dimensions of promoting the school climate ( $r = .679$ ,  $p < .01$ ), followed by the dimension of managing instructional programmes ( $r = .633$ ,  $p < .01$ ) and dimension of defining school goals ( $r = .549$ ,  $p < .01$ ).

In conclusion, based on the perception of teachers in the Southern Zone of Malaysia, it is found that there is a statistically and positively significant relationship between IL and PLC, and their correlation strength is moderate. This finding clearly demonstrates that the principals' IL is able to influence the implementation of PLC among teachers. The implication is that the higher the level of IL practice of the principals is, the higher the PLC practice is among the teachers in the Southern Zone of Malaysia which are Johor, Negeri Sembilan and Melaka.

#### **4.4. Identifying the IL dimension that can be the Best Predictor for the Practice of PLC**

Multiple regression analysis was used to identify what is the dimension of IL (independent variables) that can be the best predictor of the implementation of PLC (dependent variable) among teachers in the Southern Zone of Malaysia. In addition, multiple regression analysis was also conducted to test the second hypothesis of the study which is:

Ho2: No dimension of IL is the best predictor of the professional learning community practice.

Hypothesis Ho2 is explained in detail below:

Ho2a: There is no dimension of defining school goals as the best predictor of the PLC practice.

Ho2b: There is no dimension of managing instructional programmes as the best predictor of the PLC practice.

Ho2c: There is no dimension of promoting the school climate as the best predictor of the PLC practice.

Table 6 shows that among the three dimensions of IL, only two dimensions have correlation and contribute significantly (47%) statistically ( $p < .05$ ) towards the teachers' PLC practice in the Southern Zone of Malaysia.

The two dimensions are promoting school climate (the third dimension) and managing instructional programmes (the second dimension). However, based on Ho2a, Ho2b, and Ho2c that have been constructed, the results of this study have rejected the assumptions of the researcher in Ho2b, and Ho2c which stated that managing instructional programmes and promoting the school climate are not the best predictor for PLC practice. This means that only Ho2a is accepted, where there is no dimension of defining school goals as the best predictor in the practice of PLC.

The best and highest predictor of teachers' PLC practice in the Southern Zone of Malaysia is the dimension of promoting school climate ( $\beta = .518$ ,  $t = 7.164$  and  $p = .000$ ). Significant t-test at  $p < .05$  and R square value ( $R^2 = .461$ ) shows that the dimension of promoting school climate has 46.1 percent of contribution in PLC implementation. This situation explains that when the IL score of principals for the dimension promoted the school climate increase in one unit, then the level of PLC practice among teachers increased by .518 units. This finding demonstrates that the dimension of promoting the school climate from the principals' IL is the best predictor which contributed 46.1 percent to the practice of the PLC among teachers in the Southern Zone of Malaysia.

The second predictor which had contributed as much as .9 percent to PLC practice is the dimension of managing instructional programmes ( $\beta = .188$ ,  $t = 2.595$  and  $p = .010$ ). The t-test result was also significant at  $p < .05$  and the value of R squared ( $R^2 = .470$ ). This means that when the principals' IL score for the dimension of managing instructional programmes increases by one unit, the teacher's PLC practice also increases by .188 units.

**Table 6.** Analysis Multiple Regression (*Stepwise*): IL Dimension Contribution to Changes in the Practice of PLC

Dimension of IL	B	Beta ( $\beta$ )	t value	Sig. t	R <sup>2</sup>	Contribution (%)
Promoting school climate	.410	.518	7.164	.000	.461	46.1
Managing instructional programme	.146	.188	2.595	.010	.470	.9
Constant	1.733		14.964	.000		
R		.686				
R <sup>2</sup>		.471				
Adjusted R <sup>2</sup>		.470				
Standard Error		.347				

**Table 7.** Analysis of Multiple Regression (*Stepwise*): Variance Analysis

Source	Squared Total	Degree of Freedom	Squared Mean	F Value	Significant Level (p)
Regression	41.353	2	20.676	171.933	.000
Residual	46.540	387	.120		
Total	87.893	389			

Note: \*significant at p<.05

The F-test result in Table 7 shows that there is a relationship between the two dimensions in the independent variable (IL) and the teachers' PLC practice ( $F(2, 387) = 171.933$ ) at the significant level  $p < .05$ . The result of the multiple regression analysis carried out giving the R square value ( $R^2 = .470$ ) showed a change in the combination of two dimensions of IL which are promoting school climate and managing instructional programmes where they contributed 47 percent to changes in teachers' PLC practice in the Southern Zone of Malaysia. This means that there is a 53 percent change in the teachers' PLC practice that is unpredictable due to other variables (other factors) that are not studied in this study.

Generally, the overall contribution of two independent variables (promoting school climate and managing instructional programmes) which are significant towards the teachers' PLC practice in the Southern Zone of Malaysia can be formed through the regression equation as shown in the following:

$$Y = .518X_1 + .188X_2 +$$

Where;

Y = Teachers' PLC practice

X<sub>1</sub> = Promoting school climate

X<sub>2</sub> = Managing instructional programmes

Based on the above regression equation, it can be

concluded that the dimensions of promoting school climate and managing instructional programs have significant correlations, give contributions and are the predictors for teachers' PLC practice in the Southern Zone of Malaysia. It is found that the key predictor of the teachers' PLC practice is promoting the school climate, followed by managing instructional programmes. This means that only Ho<sub>2a</sub> is accepted because there is no dimension of defining school goals as the best predictor of the practice of PLC.

## 5. Conclusions

In general, the principals' practice of IL and the teachers' practice of PLC in the Southern Zone of Malaysia is at medium high level. The findings also show that there is a statistically and positively significant relationship between the IL and PLC, and this proves that the principals' IL practice can influence their teacher's practice of PLC. In order to identify the best predictor in encouraging the practice of PLC, the findings show that only two dimensions of IL are the best predictors of the PLC practice, which are promoting school climate and managing instructional programmes. In conclusion, the efforts of the principals and teachers in carrying out their respective duties should be acknowledged and recognized as they had done their best to cultivate quality work culture in their environment, solely to enhance students' academic and subsequently to achieve the dreams of ministries to produce educated individuals that would bring harmony to the country.

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# The Effectiveness of Programmable Logic Controller Teaching Aids for Control System Module in Vocational College

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**Abstract** Teaching aids are important in the process of teaching and learning. The use of teaching aids in teaching and learning process is necessary for teachers to ensure the delivery of information related to the subjects taught is more visible and systematic, so it can be followed by students. This study aims to develop a programmable logic controller learning kit as a teaching aid to enhance the understanding of students in the control system module in a vocational college. This study implemented a quasi-experimental approach, involving two groups of fourth year students in vocational colleges that are enrolled in the control system module. A total of 60 respondents were randomly selected in cluster - 30 respondents from each vocational college. A pre-test and a post-test were conducted to assess the students' level of understanding on programmable logic controller topic. The pre-test and post-test have three parts which cover objective questions and subjective questions to ensure the similarity on the level of knowledge among respondents. The pre and post-test have the same question, but they were differentiated by the position of the question. A post-test will be given after the treatment and from the results, and the difference between the impact of the effective use of conventional method and the use of developed kit was analysed. Then, the questionnaires were distributed to 30 respondents to assess the effectiveness of the kit. The questionnaire covers three main aspects to be assessed. This learning kit can help teachers at vocational colleges to increase understanding and the knowledge of students on programmable logic controller topic in control system module. At the end of this study, the results have shown a positive effect on students' understanding of programmable logic controller topic. In addition, it can improve students' achievement in control system module in a vocational college.

**Keywords** Teaching Aids, Trainer Kit, Programmable Logic Controller

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## 1. Introduction

Teaching aids are important in a learning process. The use of teaching aids can help to distribute information to students related to the subjects taught more clearly and systematically. Therefore, the use of teaching aids in the process of the learning could be a way to improve students' achievement in a classroom. Based on previous studies, the use of teaching aids in classroom has a positive impact in the learning process (Suparta, 2014; Mohd Nor & Sharif, 2014; Prayoga, 2013; Ahmad & Tamuri, 2010; Madar et al., 2009; Buntat & Mohamad, 2010). In addition, the teaching aids can help to attract students' interest and attention and to deliver the content more effectively (Febriyanto, 2015; Kurniawan, Samani & Soeryanto, 2013; Prayoga, 2013; Mohd Isa, 2012; Ahmad & Tamuri, 2010; Madar et al., 2009). The use of teaching aids can also assist the students to understand the subject quickly (Alias, Ahmad & Soowan, 2017; Abdullah, Zakaria & Suaji, 2016; Abidin & Jamaat, 2016; Prayoga, 2013; Mohd Isa, 2012). Teachers are able to explain things more accurately with assistance from teaching aids, compared to just by using word of mouth. In addition, the use of the teaching aids can lead to stimulation of various senses and with the proper and planned delivery, it will make a lesson more meaningful and effective (Mat Saat & Abbas, 2016; Musa & Muhammad, 2014; Ng, 2004). Teaching aids can be a way to ease teachers' burden when it comes to teaching because the tool can benefit the learning and also the teaching (Abidin & Jamaat, 2016). These benefits that are being mentioned indicate the need for the researchers to produce this current study – to develop a learning kit.

Teaching aids possibly improve students' achievement in learning process. In a classroom, supporting materials such as teaching aids can guide teachers to provide a deeper

understanding to students who have less knowledge in academics (Hastuti, Effendi & Hijriani, 2017; Mat Saat & Abbas, 2016; Ab Halim & Lai, 2011; Ahmad & Tamuri, 2010). However, at this moment, the use of teaching aids by the teacher in the classroom is still limited and low (Febriyanto, 2015; Suparta, 2014; Ambotang et. al, 2011; Ahmad & Tamuri, 2010). There are also some teachers who do not use teaching aids while teaching (Abdullah, Zakaria & Suaji, 2016; Nan & Ziqiang, 2012; Jasmi et al., 2011). A study conducted by Salleh (2007) mentions that students are interested to learn through the use of teaching aids compared to using conventional method. According to Abdullah, Zakaria and Suaji, (2016), most teachers in vocational colleges do not include teaching aids for the learning process. The delivery in classroom only follows syllabus in the Standard Curriculum for Vocational College (KSKV) without the use of teaching aids to support the learning. This situation might be happening due to time constraint, lack of resource or expertise to develop it (Abdullah, Zakaria & Suaji, 2016). In addition, many teachers simply use blackboard and only power point slides since the supplied teaching aids are not user friendly (Wan Harun et al., 2015). Consequently, teachers might have less confidence to carry out the teaching and learning in classroom because the learning process could be disrupted without the sufficient use of supporting materials. (Hamdan & Ayop, 2010). Apart from that, learning objectives cannot be achieved due to less effective teaching and learning in the classroom.

Most subjects in vocational colleges require sophisticated teaching aids along with the circulation of times because the curriculum at vocational colleges requires students to use this facility. Vocational college students are exposed to various skills that enable them to improve their skills at an early stage to qualify them for Malaysia Vocational Diploma (KPM, 2013). To ensure that, this effort is realized in which teachers play an important role to shape the process of the learning in the classroom. In addition, teachers are also encouraged to ensure the learning process in the classroom is carried out more effectively. Therefore, to ensure this process runs smoothly, teachers should provide a facilitator or diversified teaching methods, so they can maximize the learning in classroom. For vocational college students, learning theory is insufficient and the learning needs to be infused with practical learning to make sure that students understand the learning better. Therefore, classroom learning requires the support of real media material (Hastuti, Effendi & Hijriani, 2017; Mat Saat & Abbas, 2016; Pathmantara, Wibawa & Rahyu, 2015; Mohd Isa, 2012; Ahmad & Tamuri, 2010).

Therefore, the idea of development of programmable logic controller learning kit as a teaching aid is expected to help teachers to diversify teaching methods in the classroom as well as to attract the interest of students in learning thereby providing an understanding and improving student achievement on the programmable logic controller topic.

## 2. Literature Review

### 2.1. Constructivism Learning Theory

Constructivism Learning Theory is one of the processes in which the experience is related to the existing knowledge of the students. This theory involves the suppression of student activities. According to Martha (2006), the application of this approach will expose students to complex activities such as creating relationships, reflecting, asking and answering questions, describing the content of the lesson, discussing, solving problems, constructing ideas, analyzing and synthesizing ideas. According to Brainer (1999), students build their knowledge by testing ideas and approaches based on existing knowledge and experience, and then apply it in new situations as well as integrate new knowledge acquired by existing intellectual construction. The basic principle in this constructivist learning is the knowledge built by the students themselves which each student has their ideas and knowledge base, knowledge construction process that involve the social aspect, and a teacher as a facilitator in the construction of students' knowledge (Zakaria, 2015). Constructivism is an approach that focuses on how people learn (Mc Brien & Brandt, 1997). According to Brooks and Brooks (1993), this theory states that students construct the meaning about their world as well as process new experiences to what they understand before. According to Yang (2001), there are two main branches of the constructivism theory which are cognitive and social aspects. Constructivism is a cognitive theory that believes in exploration i.e. curiosity of knowledge, while social constructivism applies in situations where the knowledge and experience shared. Therefore, many researchers (Zakaria, 2015; Sutisna, 2013; Halim & Lai, 2013; Amin, Fadila, & Zulkifli, 2010 and Munip, 2012) have recommended this theory of constructivism in teaching and learning process as the ability to increase readiness of the students themselves.

Many studies have been conducted related to teaching aids based on the theory of constructivism. The studies conducted are mostly to find out the effectiveness and the suitability of learning through instructional design methods based on constructivism. According to a study conducted by Hashim and Razali Jantan (2003), the use of teaching aids when teaching the students can give them an emphasis to be more active and to incorporate new knowledge acquired by the existing experience in their minds and to apply what is understood in various situations. In addition, a research conducted by Ambatong et al., (2011), teaching aids development will be able to stimulate students' interest and it is appropriate to the concept of constructivist theory of knowledge which states that the knowledge cannot exist outside the mind of students but it is built within the actual experience by students. Teaching aids are built to meet the quality standards of the aspects of learning theory such as constructivism theory as well as to fulfil something in a learning process (Bajraktarevic et al., 2003). Nik Azis (1999)

said the use of constructivism learning can help students in process of receiving new information and knowledge which students can remember something that means something to them.

According to Ibrahim (2008), constructivism learning in teaching aids can help students to solve problems more quickly because the process is emphasized on the aspect of thinking and discussion in a group that are able to create a two-way communication between students and teachers, and students and students. In addition, Ibrahim and Redwan (2010) suggested the use of constructivist learning theory in teaching aids has the advantage to produce a meaningful learning. Therefore, the application of the theory of constructivism in the learning process such as the use of teaching aids, can benefit the students positively and give a good impact to the development of students. Eventually, that will help students to possess a deeper memory and a clearer understanding of the learning content in a classroom.

### 3. Methodology

This study used quantitative approach to look at the effects of using programmable logic controller learning kit on the achievement of the students in the control system module. The study applied quasi-experimental framework and adopted a non-equivalent control group design such as Table 1. The experimental design was selected to evaluate the effectiveness of treatment groups and control groups of non-random responders (Campbell & Stanley, 1963 This design was chosen because the researchers could not predict whether respondents are in treatment or control group.

**Table 1.** Pre and post test designs

Group	Pre Test	Treatment	Post Test
Experiment	T1	X	T2
Control	T2		T2

This design was chosen because the researchers wanted to see the effects of two types of teaching methods towards the students. The experimental group used programmable logic controller learning kit, while the controlled group was taught by using a conventional method. By using this design, the impact of the use of programmable logic controller kit and effects of the conventional method will be determined by comparing the scores of pre and post-test (T1, T2).

#### 3.1. Respondents

The sample was selected in order to find out students' achievement data scores after pre-test and post-test. The sample was not a probability sample because the sample selected was an existing sample. According to Creswell (2012), the minimum sample size that can be received is 10 percent, but if it is from a small population, a sample of 15 people in a group will be sufficient for an experimental

study.

Table 2 shows the total sample population for the two groups, the controlled group and the treatment group. The total sample for this study was 60 which was divided into treatment group (30 students) and control group (30 students).

**Table 2.** Fourth year student group

	Control Group	Experiment Group
Population	130 orang	130 orang
Sample	30 orang	30 orang

#### 3.2. Instruments

According to Abdul Ghafar (1999), an instrument is a measurement tool to measure the behavior or the behavior of human beings or objects that are not humane. The instrument used is important to determine the type of data collected and it will influence the type of analysis of the researcher (Mohd Majid Konting, 1990). Two important criteria in establishing validity and reliability of the instrument are related to the instruments used. The instruments will be used in this study are a questionnaire and pre-test and post-test questions.

A pre-test questionnaire was given before the experiment was conducted. Pre-test included 3 sections of questions on the programmable logic controller topic. It was provided for the students to test their prior knowledge about the topic. The use of objective and subjective questions is to facilitate students in answering questions that have been documented. The developed test has three difficulty levels, namely low, medium, and high. Every question has a mark that was set. The objective questions aimed to reduce stress and time of respondents to answer the question (Ab. Halim & Lai, 2011). The time given to answer was one hour.

A post-test was carried out in a given period after the experiment. There were similar questions in both pre and post-test, however the questions were arranged differently. Post-test was carried out shortly after treatment was given. The treatment group is the group that used the programmable logic controller learning kit. The period between pre and post-test was three months. The difference between pre and post-test scores will determine the effectiveness of the programmable logic controller learning kit. This is to measure the level of students' achievement in the control system module.

**Table 3.** List of contents of student questionnaire

Item	Perkara	Scale
B1	Functionality aspect	Likert-5
B2	Design aspect	Likert-5
B3	Suitability aspect	Likert-5

Another instrument used in this study was a questionnaire form which was divided into three parts related to functionality, design aspects of teaching aids, and

adaptability based on Table 3. The purpose of this questionnaire is to get feedback from students on kit developed. The use of this questionnaire can improve the accuracy and correctness of the development of programmable logic controller kit, either it could be appropriate for use in the process of the learning.

## 4. Results and Findings

Data collected through the pre-test, post-test, and a questionnaire will determine the effectiveness of developed learning kit. After conducting a research, collecting data is needed for the purpose of analysis. For this study, the data were analyzed by using descriptive statistics, percentage, Likert scale, mean and t-test. A comparative analysis was carried out between the control group and the treatment to see whether there are differences in effectiveness between the two methods of teaching or not.

### 4.1. Score Mean for Treatment and Control Groups

To determine whether students from the two groups, the control and treatment groups, are at the same level in terms of their knowledge related to the programmable logic controller topic, a pre-test was used. From Table 4, the mean value of the control group was 35.27 and the treatment group is 37.57. To analyse the significant differences that exist between the two groups, the researchers used t test of independent samples. Table 4 shows that the Sig. (2-tailed) between the two groups was not significant, namely 0.333 and 0.334, higher than  $<0.05$ . Thus, we can conclude that the two groups did not have much difference in terms of their performance in the pre-test.

These results indicate that samples used in this study have an equivalent level of performance for both groups (control and treatment). This is because retrieval vocational college students have been through the same stages of learning everywhere throughout Malaysia Vocational College, through their PT3 results. Furthermore, the programmable logic controller topic is a difficult topic in control system

module, so the knowledge samples for both groups are similar and are based upon their existing knowledge in vocational college. To conclude, both groups have the same academic level.

After treatment, both groups took a post-test. As noted earlier, a similar test will be administered as a post-test to evaluate the effectiveness of the learning kit that was developed. Through Table 4, the mean value of the control group is 42.37 and for the treatment group is 55.77. The treatment group achieved higher scores than the control group. To see some significant differences that exist between the two groups, the researchers used the t test of independent samples. Table 4 shows the Sig. (2-tailed) between the two groups is significant, namely 0.000 which is less  $<0.05$ . It can be concluded that there is a significant difference in students' post-test results for the control and treatment groups.

The treatment group has a higher mean value than the control group for the post-test. This situation illustrates the use of teaching aids that could be effective in improving students' achievement in the post-test compared to those who were exposed to traditional methods. The use of teaching aids is an effective method to teach the control system modules because these modules are mostly using the actual equipment. Students can understand better when the learning involves real equipment. This is supported by a study conducted by Hastuti, Effendi and Hijriani, (2017); Mat Saat and Abbas, (2016); Pathmantara, Wibawa and Rahyu, (2015); Mohd Isa, (2012); Ahmad and Tamuri, (2010), which mentioned that an instruction in the classroom requires the support of real media material. The use of teaching aids is able to increase students' understanding of a topic and is able to raise the level of students' achievement. The finding is supported by Hastuti, Effendi and Hijriani, (2017); Mat Saat and Abbas, (2016); Halim and Lai, (2013); Ahmad and Tamuri, (2010) which stated that with the help of supporting materials such as teaching aids, to some extent, can help teachers to provide a deeper understanding to students who have less knowledge in terms of academic achievement.

**Table 4.** Score on pre and post exam

Stage	Group	N	Mean	Std. Deviation	Std. Error Mean	T	df	Sig. (2-tailed)
Pre	Control	30	35.27	10.954	2.000	-0.977	58	0.333
	Experiment	30	37.57	6.806	1.243	-0.977	48.486	0.334
Post	Control	30	42.37	7.337	1.339	-6.330	58	0.000
	Experiment	30	55.77	8.978	1.639	-6.330	55.787	0.000

### 4.2. The Difference between the Control Group and the Treatment Group

This test consists of two main parts, namely the control group and the treatment group. A t test for repeated measurements was applied to see how they performed in pre and post-test.

Table 6 shows the difference in the mean values for the control group, 7.100. In addition, the findings of paired samples t test reflect that the control group has a significant value at the level of 0.00, which is less than <0.05. It can be concluded, that there is a difference in the results for students

in the control group for their pre and post-test.

This data shows an increase in post-test, even by using traditional methods. This is due to the teacher who used all the information and facts contained in the module to explain the concepts and facts about the programmable logic controller. However, the pattern of service teacher plays an important role to ensure that the students understand the lesson that was conveyed. This assertion is supported by Abdullah and Ahmad (2017) that every teacher should have a facilitator or facilitators to diversify teaching methods, so they can maximize their learning in the classroom to achieve learning objectives.

**Table 5.** Paired sample statistics

Group	Test	N	Mean	Std. Deviation	Std. Error Mean
Control	Pre	30	35.27	10.954	2.000
	Post	30	42.37	7.337	1.339

**Table 6.** The difference between control group

Group	Test	Mean	Std. Deviation	Std. Error Mean	95% Interval difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Control	Pre Post	-7.100	9.144	1.669	-10.514	-3.686	-4.253	29	0.000

### 4.3. The Difference between the Experiment Groups

**Table 7.** Paired sample statistics

Group	Test	N	Mean	Std. Deviation	Std. Error Mean
Experiment	Pre	30	37.57	6.806	1.243
	Post	30	55.77	8.978	1.639

**Table 8.** The difference between control group

Group	Test	Mean	Std. Deviation	Std. Error Mean	95% Interval difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Experiment	Pre Post	-18.200	11.294	2.062	-22.417	-13.983	-8.827	29	0.000

Table 8 shows the difference mean for the treatment group i.e. 18,200. In addition, the findings of paired samples t test show that the treatment group has a significant value at 0.00 level which is less than  $<0.05$ . It can be concluded, that there is a difference in the results among students in the treatment group pre and post-test.

Teaching and learning session with assistance from teaching aids increased students' understanding. The importance of systematic teaching using teaching aids has been declared by (Mat Saat & Abbas, 2016). By using teaching aids, students can learn in stages according to their abilities, for example from easy to difficult.

Overall, the findings obtained for this study matched the findings obtained by Abdullah, Abidin, and Mohamad (2013) in his study of teaching aids as teaching and learning methods for magnetic control topics. In that study, students that were treated with the use of the teaching aids showed a significant difference in scores between students who were taught using traditional methods. This shows that the use of teaching aids in learning and teaching is definitely effective.

#### 4.4. Questionnaire

30 students from the treatment group were given questionnaire in the last week of using the kit. The students were told to answer questions carefully. The students were asked to answer all the questions by following given scale of 1 to 5. Scale 1 means students strongly disagree with the statement and the scale of 5 means that students strongly agree with the statement.

According to Table 9, it was found that the highest variable mean is 5.00 which represents almost all items except item 9 in functionality aspect, with the interpretation of the mean being high. 30 respondents gave "strongly agree" answer for functional reliability items. The lowest mean is 4.37 that represents item 9. Although the mean values are low but the interpretation of the mean is classified as a high-level interpretation min. There are 11 respondents who gave "strongly agree" answer and a total of 19 respondents responded "agree" answer.

**Table 9.** Functionality

No Item functionality	N	Min	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
Power supply unit can work when the supply is switched on.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
PLC unit can work when the supply is switched on.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Push-button functions when pressed.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Lighting can work when turned on and off.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Detectors (sensors) can function when detecting a moving facing material.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
The motor can rotate.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Touch can work when turned on.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Traffic lights can work in sequence.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
Conveyors can rotate well.	30	4.37	0 (0.0)	0 (0.0)	0 (0.0)	19 (63.3)	11 (36.7)
This kit can be powered by either	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
The circuit is built to work with the software CX-Programmer	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)

According to Table 10, it was found that the highest variable mean is 5.00 which represents the first item, sixth, seventh, eighth and tenth, with a mean interpretation being high. There are 30 respondents who strongly agreed on this item.

The lowest mean is 4.67, which represents the ninth item. Although the mean values are low but the interpretation of the mean is classified as a high-level interpretation min. There are 20 respondents who gave answer “strongly agree” and a total of 10 respondents also agreed.

**Table 10.** Design

No Item Design	N	Min	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
This design has the size that fits a student internship.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
The design of the components and kits are labeled clearly	30	4.87	0 (0.0)	0 (0.0)	0 (0.0)	4 (13.3)	26 (86.7)
This design has a regular component layout.	30	4.97	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	29 (96.7)
This design is stable and strong.	30	4.90	0 (0.0)	0 (0.0)	1 (3.3)	1 (3.3)	28 (93.3)
This design has good insulation properties.	30	4.87	0 (0.0)	0 (0.0)	0 (0.0)	4 (13.3)	26 (86.7)
This design is easy to store.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
The design features a framework that can be used by teachers and students.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
This design is easy to carry.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
This design uses a durable building material.	30	4.67	0 (0.0)	0 (0.0)	0 (0.0)	10 (33.3)	20 (66.7)
This design has safety features such as warning signs and warnings.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)

**Table 11.** Suitability

No Item suitability	N	Min	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %
This kit can help as teaching aids in the classroom.	30	4.87	0 (0.0)	0 (0.0)	0 (0.0)	4 (13.3)	26 (86.7)
This kit can help as teaching aids in practice.	30	4.93	0 (0.0)	0 (0.0)	0 (0.0)	2 (6.7)	28 (93.3)
This kit was developed relevant to students taking modules DEA3323	30	4.77	0 (0.0)	0 (0.0)	0 (0.0)	7 (23.3)	23 (76.7)
These kits can help improve my understanding of the control system.	30	5.00	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (100.0)
This kit can help attract me to follow the teaching and learning process	30	4.90	0 (0.0)	0 (0.0)	0 (0.0)	3 (10.0)	27 (90.0)
This kit can save time during the internship process that is carried out	30	4.97	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	29 (96.7)
This kit is easy to operate.	30	4.27	0 (0.0)	0 (0.0)	1 (3.3)	20 (66.7)	9 (30.0)
These kits help me in my understanding of the control system.	30	4.87	0 (0.0)	0 (0.0)	0 (0.0)	4 (0.0)	26 (86.7)
This kit is easier to understand if used together with a set of practical and manual use.	30	4.97	0 (0.0)	0 (0.0)	0 (0.0)	1 (3.3)	29 (96.7)

According to Table 11, it was found that the highest variable mean is 5.00 which represents fourth item, with the interpretation of the mean being high. There are 30 respondents who gave answer “strongly agree” on this item. The lowest mean is 4.27 which represents the seventh item. Although the mean values are low but the interpretation of the mean is classified as a high-level interpretation min. There are 9 respondents who gave answer “strongly agree” and some 20 respondents responded “agree”. In addition, a total of 1 respondent gave “neutral” response.

## 5. Discussion and Conclusions

The conclusion that can be drawn from this study is the use of teaching aids can improve students’ achievement. Thus, the initial hypothesis in this study was rejected. The use of the proven teaching aids can be efficient and have a significant impact to teaching and learning process. Students are taught by using teaching aids, so they can be enthusiastic and keen to learn programmable logic controller topic, compared to students who are taught using conventional methods. Students can focus more and pay full attention when teaching aids are introduced into teaching and learning environment. Using teaching aids in teaching is one of the proven methods of teaching to increase students’ achievement. The diversity of approaches adopted by teachers such as teaching aids consumption is encouraged so that students will be more interested in control system module and eventually remove their negative response to the control system module

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# Challenges of Self-directed Clinical Skill Learning: Experience among Undergraduate Nursing Students in Malaysia

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**Abstract Purpose:** This study aimed to explain the challenges experienced in self-directed clinical skill learning specifically in clinical skill laboratory among undergraduate nursing students in Malaysia. **Methodology:** A qualitative study using in-depth interview was conducted with 16 students attending Bachelor of Nursing in one of the public universities in Malaysia. The interview was open-ended to explore the overall perspective of the participants concerning their view about the problems and challenges they experienced on the self-directed clinical skill learning. **Main Findings:** Three major themes have been found on self-directed clinical skill learning which are 'lack of self-management', 'lack of desire for learning' and 'lack of self-control of learning'. The subthemes for 'lack of self-management' are poor time management, lack of communication with educator and lack of assessment of learning needs. The subthemes for 'lack of desire for learning' are not open to new ideas, lack of internal motivation, educator-dependent for seeking new knowledge and low quality of supporting learning materials. Lastly, the subtheme for 'lack of control of learning' is not realizing the importance of self-evaluation among undergraduate nursing students. **Applications:** Our findings informed academicians on various problems and challenges that occur in self-directed learning activities in clinical skill laboratory. These findings would assist them in preparing appropriate learning environment and clinical skill activities, which would improve the efficiency of knowledge and skill transfer and also enhance students' academic performance. **Novelty/Originality:** Previous studies have identified many challenging factors affecting clinical skill learning among nursing students such as clinical learning environment (e.g. physical, psychosocial, organizational) and students' learning process based on broad spectrum of perspective

without highlighting student-centred point of view. Thus, in our study, we have attempted to explore how nursing students describe the challenging experience of undertaking the process of learning clinical skills from the perspective of a self-directed learner.

**Keywords** Nursing Education, Clinical Skill Learning, Self-directed Learning, Nursing Student, Qualitative, Interview

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## 1. Introduction

The incorporation of self-directed learning approaches within nursing programme in university has benefited students in promoting lifelong learning. Self-directed learning is defined as, "... a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975). Research in self-directed learning in nursing education was becoming popular based on Fisher's Self-Directed Learning Readiness Scale for Nursing Education (SDLRNE), constituting three important components which are self-management of learning, self-control of learning and desire of learning (Fisher & King, 2010; Fisher, King, & Tague, 2001).

Clinical learning experience among students is shaped from multiple elements of academic programme, is commonly valued by the nursing profession because it combines theoretical and practical learning experience which

allows the student to combine their sensory, motor and cognitive learning processes. Nursing students skill performance is influenced by the factors surrounded the clinical learning area for example the physical, psychosocial and organizational (Haraldseid, Friberg, & Aase, 2015; Khoza, 2015). Students have devoted time and energy in essence of learning safe nursing practice for instance handling sterile procedure and preventing medication errors (Sulosaari et al., 2015) nevertheless quality of patient care is still can be compromised (Baraz, Memarian, & Vanaki, 2015). Since nursing education is becoming more complex in terms of clinical skill acquisition, nowadays there are emerging learning approaches that are becoming popular which include self-directed learning. Based on these reasons, nursing training has shifted from routine practice of tasks in the hospital, to evidence-based practice in university such as practicing in clinical skill laboratory (Ewertsson, Allvin, Holmström, & Blomberg, 2015). At present, the nursing curriculum throughout Malaysia's universities and colleges is accredited by the Nursing Board Malaysia (2015).

In provision of self-directing clinical skill learning, the organizational factors are important to provide imperative learning environment such as curriculum design and learning resources. Besides, the amount of subject and time allocated to practice in nursing curriculum have influenced the perceptions of nursing students towards learning clinical skill (O'Mara, McDonald, Gillespie, Brown, & Miles, 2014). Learning clinical skill can be intimidating with a large number of students (Arkan, Ordin, & Dilek, 2018) sharing the same learning place. The need of adequate resource is important to prepare the environment as realistic as real clinical area. Besides, the authenticity of learning environment is pivotal as it affects experience in acquiring skill competency (Haraldseid et al., 2015; Houghton, Casey, Shaw, & Murphy, 2012; McCallum, 2007). It is understood that nursing students are confused with the learning expectation of the program since they have to link the theory learned in the classroom into the role that they practice in clinical area (Arkan et al., 2018; Serçekus & Bas, 2016). Hence, without authenticity of learning environment, knowledge transfer is halted and the theory-practice gap cannot be minimized. From the perspective of self-directed learner, any deficiencies in learning environment can disrupt the desire to learn, demotivate learning process and limit the ability of students to control their learning.

Besides, challenges due to relationship with lecturer, clinical instructor and nurses are interpersonal (Bryan, Weaver, Anderson-johnson, & Lindo, 2013; Lawal, Weaver, Bryan, & Lindo, 2016), as the connection they share in provision of developing clinical skill. To be self-directed learner, interpersonal criteria are important. Studies have shown that relationship between nurse educators and nursing students has an effect on the clinical skill performance (Bryan et al., 2013; Serçekus & Bas, 2016), especially it affects the management of learning and desire to learn the clinical skill. Assessment on the learning environment

among students is a need before a student can embark on subsequent self-directed learning process. The literature shows that nurse educators' credibility and attitude are jeopardized by ignoring their roles such as lack of preparation on program expectation (O'Mara et al., 2014; Yousefy, Shayan, & Mosavi, 2012), selective in teaching role (Yousefy et al., 2012), and improper communication with the students (Jamshidi, Molazem, Sharif, Torabizadeh, & Kalyani, 2016). As a result of this, the students are also significantly affected by uncertainties on the teaching styles. It can be worsening to the extent that some would not receive proper answer and be ignored (Arkan et al., 2018; Khoza, 2015; O'Mara et al., 2014; Serçekus & Bas, 2016). Thus, from the point of view of self-directed learning, learning goals can be accomplished by collaboration with nurse educator through proper activity planning and use of available resources.

Challenges in self-directed clinical skill learning also are contributed by the students themselves. Students are lack of readiness to learn clinical skill because they are unprepared in knowledge, practice (Arpanantikul & Pratoomwan, 2017) and communication skill (Jamshidi et al., 2016). Students did not memorize, were unable to apply skills and focused too much on a specific procedures only, which are among the factors contributing to the problem (Arpanantikul & Pratoomwan, 2017). Additionally, students' motivation as a building block of learning experience is intimidated much by lack of faculty relationship (O'Mara et al., 2014), lack of support (Arkan et al., 2018), stress of new experience (Arpanantikul & Pratoomwan, 2017) and inferiority complex (Jamshidi et al., 2016). As a result, students exhibit loss of interest in learning such as fear to ask question, loss of self-confidence (Arkan et al., 2018; O'Mara et al., 2014) and making poor judgment (Arpanantikul & Pratoomwan, 2017). When there is less supervision from the educator, students may not pay full attention and as a result, it leads to anxiety during clinical evaluation (Arkan et al., 2018). This further reduces the self-directedness of learning.

Even though nursing programme guideline by the Ministry of Health is compulsory to follow, but until now, little has been known about the challenges nursing students faced in self-directed clinical skill learning in Malaysia. In order to provide optimal guidance on efficient learning implementation, experience among nursing students in self-directed clinical skill learning should be addressed and taken into consideration. Accordingly, in this study, we aimed to explain the challenges from the point of view of self-directed learning approach experienced by undergraduate nursing students in Malaysia.

## 2. Methodology

### 2.1. Research Design

This study implements a qualitative study design to enable

participants to freely express their thoughts on self-directed clinical skill learning problem. In-depth interview is one of the approaches in qualitative design which permits interviewer to investigate sensitive and complex questions, further helps participants to respond easily. By being physically present, the interviewer can decrease the number of "don't know" and "no answer" responses by probing for additional responses. Besides, interviewers can clarify questions to participants when needed. This interview is open-ended to explore the overall perspective of the participants concerning their view about the problems or challenges they experienced on the self-directed clinical skill learning. Two postgraduate students have participated in pilot study in order for the researcher to be familiar with the flow of the interview.

## 2.2. Participant

A total of 16 students attending Bachelor of Nursing in one of public universities in Malaysia were recruited onto the study. The inclusion criteria comprised: 1) undergraduate nursing student of the university, 2) completing at least one semester for clinical skill practice, and 3) "active" student status in the university database. The students are comprised of all volunteers, which represent each student batch (4 students x 4 batches in total) in the program.

## 2.3. Data Collection

Data were collected using in-depth interview. This study employed semi-structured interview guide which can be used to unearth rich descriptive data especially information on the nursing students' clinical skill learning experience. An interview guide was created to help the researcher to determine the order of questions related to self-directed clinical skill learning. The interviews were audio-recorded. All interview sessions with the students were made by the first author of the study.

The audio recorded interviews were transcribed verbatim. The transcription of the interviews was analysed by using thematic analysis. Data were analysed by using NVivo 12. We first coded the transcribed data and evaluated its inter-rater reliability by executing the 'Coding Comparison' function of the software, in which it generates Cohen's Kappa coefficient value. A value of 0.80 was considered as perfect agreement and hence was finalized as challenging factors that influenced self-directed clinical skill learning among undergraduate nursing students.

## 2.4. Data Analysis

Thematic analysis was utilized in this study, known as an important approach to identify and recognize the challenges experienced by the nursing students in self-directed clinical skill learning. Moreover, it is a method for a researcher to inspect qualitative data followed by identifying and reporting patterns of the qualitative data (Braun & Clarke, 2006). The

popular six steps of analysing this qualitative data is started with being familiar with the data, followed by coding, searching for the themes, reviewing the themes, defining the themes and reporting.

## 2.5. Rigour of Data

To ensure trustworthiness during the analysis as recommended by Lincoln & Guba (1985), we analysed and repetitively discussed the coding and their interpretation. For data validation, the manuscripts were reviewed and processes involved in coding were justified. Extracted codes were reviewed by the second coder who was familiar with the analysing processes of qualitative research and the accuracy of the data coding process was evaluated. Besides, by providing sufficient time for the researcher to collect data and involving expert in reviewing the analysis and interpretation, it will improve credibility of the study. Limiting potential bias was made by bracketing in which reflexivity was made before the study began. Besides, the researcher also took notes on the participants' responses during interviews to help to confirm the objectivity and conformability of the study. The findings of this study were generated based on students' own ideas and experience.

## 3. Result

The themes emerged from undergraduate nursing students' experiences of clinical skill learning from the perspective of self-directed learning were identified and interpreted as 'lack of self-management', 'lack-of desire for learning' and 'lack of self-control of learning'. All these three (3) themes are related to each other and by looking at the pattern of the data it helps us to reach an understanding of the challenges experienced by the nursing students in self-directing their clinical skill learning particularly in clinical skill laboratory.

### 3.1. Lack of Self-management Skill

Self-management skill has been noticed as the capacity of the student in implementing set goals and how the students can effectively manage the resources relevant for their learning. There are three subthemes being addressed related to self-directed clinical skill learning among undergraduate nursing students: 1) poor time-management, 2) lack of communication in learning and 3) lack of assessment in learning needs.

#### 3.1.1. Poor Time Management

A good time management required a student to plan and consciously control the activities in order to increase the efficiency and productivity in any life events. A student from Year 2 addressed one of the weaknesses in self-management of time that is prioritizing learning activities. She insisted difficulty to practice skill procedure in the skill laboratory due to the load of assignments as saying:

... we need to do a lot of hands-on practice but because of lack of time [and] so many assignments, so we don't have much time to do the hands-on [practice]... (ID#15, Y2S1)

Likewise, a student reported could not manage to perform skill practice due to the need to involve in cocurricular activities in the campus:

... when I was in Year 2, it is a busy year and I was not able to practice in skill lab, I have to handle many programmes. (ID#16, Y4)

Besides, the lack of time management is influenced by the lack of awareness among nursing students to address the academic timetable designed for them. A respondent said:

...because we used [Self-directed Learning] slot for doing assignment. (ID#1, Y3)

### 3.1.2. Lack of Communication with Educator

A good management of learning required a good collaboration and communication with the educators. However, clinical skill learning activities were poorly accepted by the student when there is a lack of understanding in communication. A response from a student has shown that the students were poorly prepared on how to deal with unexpected clinical skill assessment by saying:

...we do the procedure but the lecturer expects us to do different things. Like I just said, we learn from others and are assessed by others. (ID#15, Y2S1)

### 3.1.3. Lack of Assessment of Learning Needs

The nature of the clinical skill procedures involves complex and long procedures such as sterility-related procedures. A procedure can be managed well if the students can plan and prepare the learning effectively. One student has commented that the magnitude of learning is becoming more complicated throughout the year of study as said:

At first time, learning the procedure during my first ... is simple so we don't need a lot of practice. But for this semester... the procedure is quite complicated and there are a few factors that we need to take care of, like the sterility, the technique ... (ID#15, Y2S1)

Students can be self-directed in learning if they make assessment on the strengths and weaknesses of their learning environment especially the learning resources. Apart of these interview findings, students were aware of the difficulties such as crowded learning session and limited equipment, but they were found to be lack of efforts to plan for fulfilling their learning needs. The examples of the responses were:

...It's quite hard for us, we have 70 students so every student wants to practice, it's impossible. (ID#14, Y2S1)

... when we want to practice skin traction, plaster...is very limited, we [are]... competing [each other] to do that thing... those who [came] late didn't get the

[chance to] experience. (ID#13, Y2S1)

## 3.2. Lack of Desire to Learn

'Desire to learn' associates motivation level of the students with their capability of appropriately seeking new information, in consideration of improved learning needs. There are four subthemes that can be identified to inform the characteristics of this theme which are a) not open to new ideas, b) lack of internal motivation, c) educator-dependent for seeking new information and d) low quality of education material.

### 3.2.1. Not Open to New Ideas

Many lecturers and clinical instructors have different clinical backgrounds in their careers such as clinical specialties they had been worked with before. This diversity can help the institution to encourage a teaching and learning atmosphere that promotes enquiry in which subsequently new ideas can emerge. However, in this study the students found it was an intimidation rather than opportunity for getting new idea to be more self-directed learner.

...there have been issues whereby the procedures are not being agreed by both sides. That's why some procedures, ok let's say for the injection of Hep B and also BCGs, some say we need to use dry swab, some say wet swab, so it needs to be agreed by both sides... (ID#5, Y4)

In addition, a part of faculty-based procedure checklist provided, the faculty also subscribed to academic material from international vendor to help the student to learn. However, one student issued there were too many versions of procedure checklists provided which make it difficult to adapt for Malaysian context.

It is not from the faculty version and sometimes it is different because the *Clinical Skill* [web program] is based on American, Europe, so sometimes there are different guidelines but same procedure. (ID#13, Y2S1)

### 3.2.2. Lack of Internal Motivation

A nursing student must have the ability to regulate and adapt to the demands of learning situation in order to achieve learning goals and values. In the process, the student would realize what is happening on their learning and how to adjust with their own behaviour with the learning environment. Anxiety is one of the major findings among nursing students during clinical skill learning. Generally, the reason for such behaviour to happen is because of being afraid to do wrong.

... I really think whenever we get [to be] assessed, we will not be doing okay... we feel like very scared so we tend to do a lot of mistakes. (ID#8, Y2S2)

Loss of focus and getting confused is another contributor for low motivation in learning a skill. A student expressed that the problem occurred due to the opportunity to observe and learn during demonstration of the procedure that is

restricted.

But when there are many, crowded people I would ... lose focus. (ID#13, Y2S1)

### 3.2.3. Educator-dependent for Seeking New Information

One of the criteria of proactive learner is taking responsibility for their learning activities, with or without the help of others. Students whose lack of readiness in self-directed learning tend to be teacher-centred. In this study, it is noticed that students rely much on their educator to drive learning activities.

The lecturer also has their tight schedule, they only ask us to go to the skill laboratory and the clinical instructors only monitor us, so usually the clinical instructors will give their feedback. (#15, Y2S1)

### 3.2.4. Low Quality of Supporting Learning Material

The procedure checklist provides step by step process for a student in completing the clinical skill procedure through a safe practice. However, in this study the content of the procedure checklist is found to be inaccurate and incomplete, thus affecting the progress of learning among students.

Sometimes as I know, the information from the book is a little bit older ... sometimes few things weren't in the book or sometimes there is even a wrong fact from the book... (ID#11, Y2S2)

On a parallel, it has been informed that log book system was found to be lacked in terms of accessibility. Since it is stored in the clinical skill laboratory, the accessibility to utilize the book is limited, thus self-monitoring of learning is difficult to be performed.

Usually log book, they store in skill laboratory, so basically when we want to use the book so we need to ask from the person at skill laboratory to give us the book... (ID#7, Y2S2)

### 3.3. Lack of Self-control of Learning

The third theme of this study is the lack of self-control of learning among undergraduate nursing students. Self-control addresses the process by which a student determines its own self-determination and forms its own learning objectives, takes responsibilities, acknowledges his own capacities and makes his own decisions. The finding of the interview has found that the students do not realize the importance of self-evaluation in their clinical skill learning, which reflects the low degree of self-directed learning.

#### 3.3.1. Not Realizing the Importance of self-evaluation

Log book is utilized to record the procedures being practiced in clinical skill laboratory. A student admitted has forgotten to utilize the log book since she was in Year 2, as admitted:

Honestly, right now, no. Because last time I remember I only use the log book until second year. But when entering third year, I'm not sure. I even don't know

where the book is... (ID#7, Y4)

Besides, one has confessed that students have taken for granted to get educator verification even without practicing the procedure.

...some of my friends sometimes don't really do the procedures correctly. But they will say to the lecturer that they have done it and the lecturers or clinical instructor just gave the signature to them. (ID#8, Y2S2)

The students had more worries about how to fulfil the signature than how much they can learn. Inversely, there are also students who make the skill practice for the sake of learning but weren't interested in fulfilling the logbook due to the uneventful process.

This did not affect the performance because our practice wasn't based on what is in the log book. Some of the students practice but they did not get the signature for the log book. (ID#14, Y2S1)

In addition to that, one has confessed that students have taken for granted to get educator verification even without practicing the procedure.

...some of my friends sometimes don't really do the procedures correctly. But they will say to the lecturer that they [have] done it and the lecturers or clinical instructor just gave the signature to them. (ID#8, Y2S2)

## 4. Discussion / Analysis

### 4.1. Self-management of Learning

Since the demand for healthcare is increasing, the proliferation of new nursing schools also propagates more new nurse graduates. The growth number of students is seen not proportional to the increases of resources for clinical skill learning such as physical infrastructures and clinical teaching equipment (Asirifi et al., 2017). Big number of students can disturb the clinical skill learning process. The pressures originated from learning environment are numerous, which is not only caused by a large number of students competing each other to practice, but also struggles with time limitation to complete procedure practices, subsequently has affected students' self-management of learning. It is necessary to effectively tailor the needs of the students' learning with the learning resources they have. O'Mara et al. (2014) has described time limitation problem by referring to the design of the curriculum along with the amounts of courses, types of clinical experience and competing demands from concurrent courses. In relation of the interview, skill for assessing learning situation and managing time is important for students to develop. A student with high level of self-directed learning attitude would have responded with the readiness to prioritize self-identified goals, thus to remove the limitations found in learning (Rensburg & Botma, 2015).

A self-directed learner should possess consciousness with responsibility in learning, show curiosity, appear organized in managing time effectively and anticipate in problem solving (Rensburg & Botma, 2015).

Besides, it is understood that the students always misjudged on what the educators really expected on them for assessment is different with what is being understood by them, as this issue has been found similar with few other studies (Haraldseid et al., 2015; O'Mara et al., 2014), which has led students' practical capability that is jeopardized because of inconsistent information they receive. Arkan et al., (2018) noticed this issue as communication method problem. Moreover, being overly critical or unpredicted in giving feedback is a big challenge (O'Mara et al., 2014). Interpersonal communication skill is acknowledged as how students can shape their interaction skill with others in view of promoting their own learning. It is argued that the ability to interact with others is an important part of nursing students' lifelong learning ability (Su-Fen, Chien-Lin, Lin, & Jane, 2010). Douglass & Morris (2014) suggested the most effective way to empower students' self-directed learning be by identifying their learning goals and their subsequent implementation strategies.

Moreover, resource support is a factor that can help to improve mental images because authenticity of learning environment is a determining component in practice (Haraldseid et al., 2015). In a parallel, for some students a complex procedure may take a little longer for them to master (Gonzalez & Kardong-Edgren, 2017) compared to others. It is advised that overlearning or additional training time be recommended as it will link to better retention of knowledge and skill. Overall, the interview reported students had few challenges in self-management of learning clinical skill.

#### 4.2. Desire of Learning

Different experience background among educator has affected the magnitude of learning among students. The students have difficulties in accepting several opinions on clinical skill procedures due to different experience possessed by every educator. It is opposed the character of a self-directed learner who accepts the freedom to learn what has been considered important for themselves. Likewise, self-directed learning also required openness to learning opportunities (Rensburg & Botma, 2015). The lack of openness to accept new ideas from the educators might be a result of learning culture among students who often regard the lack of readiness for creativity and desire for learning.

Then, motivation is the driving force underlying the change of behaviour. Fear and anxiety can have impact on psychosocial condition that may cause the students to be less involved in learning activities (Baraz et al., 2015). Inner motivation is driven by one's needs, values and feelings, which refers to do something because it is inherently interesting or enjoyable (Ryan & Deci, 2000). Students are

more likely to work towards goals they set for themselves if the behaviour change is driven by inner motivation, whereas external motivation is driven by other people, reward or penalties. Psychological empowerment can be enhanced as it has been identified as primary predictor for learning (Safari, Haghigib, Rastegara, & Jamshidi, 2011). Encouraging students to be participated in development of course requirement can improve internal motivation to learn (Douglass & Morris, 2014; Herman, 2012). Therefore, desire of learning is in-line with the move towards sustained self-directedness of learning, which improves the clinical skill performance of a nursing student.

#### 4.3. Self-control of Learning

Not many of studies have discussed the usage of supported documents (e.g. procedure logbook and procedure checklist) to generate more evidence to use recording of learning experience (Joshi, Gupta, & Singh, 2015). In fact, most of the nursing schools use this document to monitor the students' performance and adherence to the learning activities. The document used as part of monitoring program for self-evaluation is important for self-control of learning, and unfortunately has not been perceived as effective and efficient. As a consequence, the students have weak control over their learning through self-evaluation activities. Due to lack of user-friendliness and poor implementation, students missed many important skill activities and opportunities to self-assess their performance for future improvement. One of the solutions for this is to provide easily accessible program or application for the student to use anywhere and anytime. It must also consider to expedite the verification process without taking too much time, improve effectiveness of each practical session and lastly increase satisfaction on self-assessment of learning.

### 5. Conclusions

This research explored challenges of self-directed clinical skills learning among Malaysian undergraduate nursing students. Some of the findings are supportive of the literature while few are deemed to be a new finding based on Malaysian context of nursing education. In order to visualize clear pathway of self-directed clinical skill learning, the students must consider the essential components as a self-directed learner by instilling the good self-management of learning, enjoy and have desire to learn and collaborative in clinical skill learning, and be conscious with learning needs through self-control of learning.

### 6. Limitation and Study Forward

Since sampling of the research consists of one university, the researcher only involves experiences of students who learn in this clinical learning setting. Factors affecting

clinical skills learning might differ in other locations and different settings of the universities.

For future work, the suggestion that can be considered may include doing more qualitative studies towards several public and private universities. Other than face-to-face in-depth interview, the researchers are encouraged to do focus group discussion, document analysis and observation studies with regards to the nursing students' self-direction of clinical skill learning.

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# The Effect of Using Learning Portal on Primary School Students in the Subject of Design and Technology

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**Abstract** Design and Technology (DST) were introduced at the Primary School as more emphasis is being placed on technical and vocational skills nowadays. However, the use of conventional teaching methods and the lack of teaching aids have triggered students' low achievement in the DST subject. This study was conducted to identify the effect of using DST learning portal on students' achievement compared with using conventional teaching method. A DST learning portal was developed and used as an independent variable in this study. A total of 32 year 4 students from a Primary School were selected as respondents by purposive sampling method. This study is quasi-experimental research which uses pre and post-test as an instrument to identify the achievement of students before and after using different learning methods in the DST subject. In addition, questionnaire and observation checklist were used to collect students' perceptions about the usability of DST learning portal. The data were analysed descriptively by using quantitative approach. The results of the independent t-test showed that there was no significant difference in pre-test achievement between treatment group ( $M = 23.8$ ,  $SD = 12.6$ ) and control group ( $M = 25.0$ ,  $SD = 14.1$ );  $t(30) = 0.64$ ,  $p = 0.79$ , while Mann Whitney U test results showed that the post-test achievement of treatment group was higher than the control group after using DST learning portal ( $U = 7.500$ ,  $p = .000$ ). The level of usability of the learning portal was very high according to the score obtained from the questionnaire (88.15%) and the checklist (84%). These findings show that the DST learning portal has a very high level of usability and the use of portal can significantly improve students' achievement in DST subject.

**Keywords** Design and Technology, Learning Portal, Usability, Students' Achievement

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## 1. Introduction

Aligning with implementation of the Malaysia Primary School Standard Curriculum, Design and Technology Subject (DST) was used as a substitute for the Living Skills subject. This subject focuses on preparing 4, 5 and 6 year pupils in primary schools with basic knowledge and skills that enable them to gain knowledge, master the basis of practical skills, design skills and apply the technology towards producing critical, creative and innovative students. (Bahagian Pembangunan Kurikulum, 2013).

The 21st century learning concepts are emphasized throughout the new curriculum implementation. In this context, teachers need to apply various types of teaching methods to ensure students learn in an effective way. However, there are still some teachers who practice conventional teaching methods by using chalk and talk strategy (Abu Bakar, 2008). This statement is also supported by Sutaji (2015) which emphasizes that there are still many educators who are more likely to use conventional teaching methods in teaching and learning process.

Additionally, the use of conventional teaching methods makes it difficult for students to concentrate and feel motivated in learning process involving teacher-centered methods. This is supported by the study of Jumiran (2014) which found that conventional teaching methods have led to lower student motivation in Mathematics learning and this also affects the level of student achievement. The study of Tukiran, Ariffin and Mohd Rozi (2012) supports this statement by emphasizing that learning activities involving conventional methods cause students to feel bored and trigger the student's low achievement.

In the context of education, motivation is important as it determines the effectiveness of teaching and learning. Therefore, motivation is often related to students' achievement. The conventional teaching method will cause the students to lose interest towards a subject and subsequently fail to master the subject. The study of Ibrahim (2015) supports the statement by proving the use of the chalk and talk method had caused most of the students to be unmotivated to learn and to have low achievement in the Malay Language subject. According to Kassim and Zakaria (2013), teacher-centered approaches can limit the potential development of students and disrupt students' learning performance.

Additionally, the hand tools in the DST workshop in school are unable to accommodate the needs of the students. Indeed, teachers can use it in the teaching and learning process to replace stimulate active learning environment among students. However, Supramaniyam (2015) highlighted that the DST workshop at school is lack of hand tools. As all of us know that, DST is an active-oriented subject of hands-on learning and closely related to human life. Insufficient supply of hand tools in school may cause students to be unable to understand and master the skills in this subject.

In addition, failure in providing hand tools and conventional teaching methods has led to the low academic achievements among students. This is because they are hard to understand the concept or master the skills just by imagination without any demonstration or practical session. (Ashwin, 2004). This scenario coincides with Madar (2009) who points out that students are having problems understanding the concept or mastering a skill due to the absence of appropriate equipment. This statement was also supported by Razali (2001) where the absence of appropriate hand tools is the cause of students facing serious problems in understanding the concept and mastering the skills.

Conventional teaching method is no longer in line with the agenda of education in this era of globalization. Tukiran,

Ariffin and Mohd Rozi (2012) emphasize that the use of conventional teaching methods will cause students to feel bored and unmotivated in learning. The use of learning portal is an alternative way to overcome the problem. Learning portal can help provide learning materials which combine different types of media such as text, animation, graphics, audio and video to maintain students' attention and improve their achievement. The use of learning portals not only allows teachers to deliver knowledge effectively, but also stimulates active learning environment among students.

The use of learning portal may ease teachers to design learning content and conduct learning activities effectively. It was found that the level of achievement in DST among Year 4 students in a primary school was low due to the use of conventional teaching methods without any teaching aids. Therefore, it is desirable that a study be conducted to identify the effectiveness of using learning portals to raise the students' achievement in the DST subject among year 4 students. Thus, this study was conducted to develop a learning portal, then study the effect of its use on student achievement in DST and to identify student perceptions on the usefulness of the learning portal.

## 2. Methodology

In this study, quasi-experimental design is used and it involves a control group and a treatment group. Comparisons were made first based on the pre-test achievements between treatment group and control group. After that, the treatment group used DST learning portal as an intervention whereas the control group doesn't receive any intervention. The achievement of both groups was compared after eight weeks of learning to see the effect of using the learning portal on students' achievement. Thus, two different learning methods were used as the independent variables in this study while the student's achievement in Design and Technology subject was determined as the dependent variable. The design of this study is shown in figure 1 as follow.

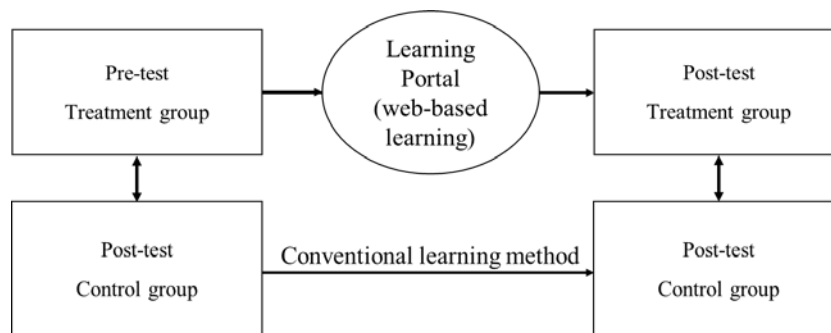


Figure 1. Quasi-experimental design in this study

## 2.1. Population and Sampling Method

This study involved 32 Year 4 students from a National Primary School in Batu Pahat district, Johore State. Purposive sampling method is used to determine the sample of the study. Researchers chose a class of 32 pupils which had low achievement in Design and Technology subject as the sample of this study. Among them, 16 students were grouped as treatment groups and 16 students were grouped as control groups. In the sampling process, the researcher ensured that the academic achievement between the treatment group and the control group was equivalent to avoid any bias in this study.

## 2.2. Research Instruments

This study uses pre and post-test, checklist and questionnaire to collect data and analyse data. Pre and post tests were used to compare the students' achievement in Design and Technology (DST) before and after the use of learning portals. Besides, researchers used questionnaire to collect data on the usability of the DST learning portal in this study, as perceived by treatment group students. Meanwhile, the observation checklist is used to support students' perception of the usability of DST learning portal.

For the pre and post-test, a total of 15 items were developed by the researchers. Only 10 items where the difficulty index was between 0.21 and 0.80 and the discrimination index above 0.21 was accepted as pre and post-test items in this study. The questionnaire in this study was adapted from Qureshi and Irfan (2009) on the evaluation of the usability of learning portals. A total of 20 items were developed to assess the usability of learning portals in teaching and learning for Year 4 Design and Technology. To maintain the validity and reliability of this study, pilot studies were conducted to identify the reliability of the questionnaire. The Alpha Cronbach value gained is 0.717. Based on the interpretation of the Alpha Cronbach value by Bond and Fox (2007), this finding showed that the items in the questionnaire are good and acceptable to use in real studies.

Other than questionnaire, researchers used a checklist to record the behaviour or actions of students indicating the usability of the learning portal. According to Idris (2013), a

checklist is a tool used by the researchers to record the frequency of behaviours, words or actions of the student. In this study, the checklist has been used along the learning process of the treatment group to serve as a support for the data gained from the questionnaire on the usability of the learning portal.

## 2.3. Data Analysis

In this study, researchers used an independent t-test and Mann Whitney U test to identify whether there was a significant difference between treatment group and control group in students' achievement before and after using learning portals. Besides, frequency and percentage score were used to analyse the data on the usability of the learning portal as perceived by students.

## 3. Results

The total number of respondents in this study was 32 people. To avoid any bias in this study, the number of respondents distributed in both groups was the same, where control groups and treatment groups had 16 respondents respectively. Both control and treatment groups have the equivalent number of male and female students, namely 7 male students and 9 female students, as shown in Table 1.

**Table 1.** Respondent demographics

Group	Male	Female	Percentage
Treatment Group	7	9	50
Control Group	7	9	50

Independent t-test was conducted to study the differences in the pre-test achievement between the treatment group and the control group before using different learning methods. The study found that there was no significant difference in pre-test achievement between the Treatment Group ( $M = 23.8$ ,  $SD = 12.6$ ) and Control Group ( $M = 25.0$ ,  $SD = 14.1$ );  $t(30) = 0.64$ ,  $p = 0.79$ . In conclusion, there was no significant difference in pre-test achievement between the treatment group and the control group before using the Design and Technology (DST) learning portal. The result was shown in Table 2 as follow.

**Table 2.** Independent t-test result for pre-test achievement between two groups

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference
Pre-test	Equal variances assumed	.228	.636	-.264	30	.793	-1.250

Mann Whitney U test has been conducted to identify the differences in the post-test score between the treatment group and the control group after using the learning portal. From the results obtained, it can be concluded that the post-test score in the treatment group is higher than the control group ( $U = 7.500, p = .000$ ). In conclusion, there was a significant difference in the post-test score between the treatment group and the control group. The treatment group gained a higher achievement than the control group after using the Design and Technology learning portal. The result of Mann Whitney U test was shown as in Table 3.

Regarding the usability of DST learning portal, most respondents agreed with 20 items in the questionnaire with a percentage score of 88.15%. Only 16 students from the treatment group using the Design and Technology (DST)

learning portal were involved to give their perception on the usability of the DST learning portal. Table 4 shows the usability of learning portals according to students' perception.

**Table 3.** Mann-Whitney U test result for post-test achievement between two groups

	Post-test
Mann-Whitney U	7.500
Wilcoxon W	143.500
Z	-4.609
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Groups

**Table 4.** Usability of learning portals according to students' perception

Item	Statement	Yes		No	
		f	%	f	%
1.	Instructions in this portal are easy to understand.	15	93.8	1	6.3
2.	The text in this portal is easy to read.	15	93.8	1	6.3
3.	I like the colourful text in the portal.	13	81.3	3	18.8
4.	I like the colourful background in the portal.	10	62.5	6	37.5
5.	The pictures in this portal caught my attention.	14	87.5	2	12.5
6.	Learning is fun with the presence of background music.	12	75.0	4	25.0
7.	The videos in this portal are very interesting.	14	87.5	2	12.5
8.	The videos in this portal help me in learning.	16	100	0	0
9.	The notes provided are easy to understand.	14	87.5	2	12.5
10.	The notes provided help me to revise what I've learned.	15	93.8	1	6.3
11.	The navigation buttons are user-friendly.	13	81.3	3	18.8
12.	This portal is easy to access.	14	87.5	2	12.5
13.	This portal caught my attention.	16	100	0	0
14.	This portal motivates me in learning DST.	16	100	0	0
15.	This portal makes it easy for me to master the learning.	15	93.8	1	6.3
16.	The quizzes help to improve my knowledge retention.	15	93.8	1	6.3
17.	The formative assessments help reinforce learning.	16	100	0	0
18.	I like to learn by using this learning portal.	16	100	0	0
19.	I am interested in using learning portals for other subjects.	12	75.0	4	25.0
20.	I choose the learning portal as a learning method compared to a regular learning method.	11	68.8	5	31.3

N = 20, percentage score = 88.15%.

In addition, the percentage score obtained through the checklist about the usability of the learning portal was 84%. The findings of the data analysis from the questionnaire and the checklist showed a score of 88.15% and 84% respectively. The results showed a very high degree of usability for DST learning portal according to students' perception.

#### 4. Findings and Discussions

Before using the Design and Technology (DST) learning portal, the students' achievement in the DST subject was low where the mean score in treatment group was 23.8 marks, while the control group was 25.0 marks. These two groups used conventional learning methods before this study was conducted. This proves that the use of conventional learning methods without using appropriate teaching aids will result in a low level of students' achievement.

There was a significant difference in the achievement of students between the treatment group and the control group after using the learning portal. The academic achievement of the two groups at the beginning of this study was the same before the independent variables were manipulated. The difference in post-test achievement proved that the use of DST learning portal in teaching and learning has improved the treatment group's achievement from 23.75 (pre-test mean score) to 68.13 (post-test mean score).

At the end of this study, the achievement of students using the DST learning portal was higher than the control group students who followed conventional learning. This is in line with Sardi @ Mohd Yusop's (2009) study that proved that the use of the My-Arab Portal has increased the level of student achievement as well as supported the acquisition of students effectively in the context of reviewing, understanding of new knowledge, training and stimulating memory. The effective use of learning portals incorporating technology and multimedia is also supported in the study of Sutaji (2015) which emphasizes that the teaching and learning process which is assisted by the use of technology and interactive multimedia materials can help convert abstract theories or information into dynamic and interactive learning patterns.

Indeed, the use of learning portals can improve students' performance effectively compared to conventional learning methods. This statement is supported by Hussin, Rasul & Abd Rauf (2013) who agreed that the use of learning portals can help students to master a concept more effectively. Additionally, Mohd Najib, Abu Bakar and Othman (2017) point out that the use of learning portals in the teaching and learning process can provide a conducive learning environment and at the same time give a positive impact in creating quality learning. In conclusion, educators should take steps in practising the use of learning portals to improve the effectiveness of teaching and learning, as well as attract students' interest and concentration through intense planning.

In order to design and develop an effective learning portal, the usability of the learning portal shall be subject to the prior consideration. This is to prevent any disturbance or technical errors that may interrupt the teaching and learning process. In this study, researchers developed a DST learning portal and used it as intervention learning method for treatment group. Students' perceptions about the usability of DST learning portal were then collected through questionnaire and checklist, then analysed by using the percentage score obtained.

The findings showed that major respondents agreed with 20 items on the usability of learning portal with a percentage of 88.15%. Among the 20 items, 100% respondents agreed on the 8th, 13th, 14th, 17th and 18th item. All the respondents agreed that "the videos in this portal help me in learning," "formative assessments helped reinforce learning," "this portal caught my attention", "this portal motivates me in learning DST" and "I like to learn by using this learning portal.". The perception of students pointed out that the videos and the formative assessments provided on each topic can help them to reinforce the knowledge they learnt. Videos that combine multimedia elements such as text, animations, graphics and audio were used in the learning portal as the main inputs where students will acquire all the knowledge through it. Zainul, Abdul Malek and Basharudin (2017) have proven that using videos in teaching and learning can have a positive impact on students' academic achievement in their study. In addition, the formative assessments in the learning portal play an important role as reinforcement learning, as well as an assessment tool on students' mastery of knowledge. Othman (2016) describes the importance of the use of learning assessments in the teaching and learning process as it played a role in reinforcing students' learning and improving the effectiveness of teaching and learning process towards achieving learning objectives.

In addition, all of the respondents agreed with statements such as "this portal caught my attention", "this portal motivates me in learning DST" and "I like to learn by using this learning portal". These statements prove that learning portal that developed based on the ARCS model is attractive and can motivate students in learning DST effectively. Previous studies have shown that the use of the learning portal can boost students' motivation in learning. Che Wan (2007) in his study proves that the use of the learning portal in teaching and learning has improved students' motivation in learning. The findings of Mohd Sadri (2010) also support these statements by proving the use of interactive learning portals had successfully maintained students' concentration in the learning session.

However, among the 20 items in the questionnaire, the 4th item showed the lowest percentage score where only 62.5% (10) respondents agreed that "I like the colourful background in the portal". In the DST learning portal, each section and each page had a very colourful background. According to Yoes (2014), plenty of colours will influence the

concentration and understanding of the students in the learning process. Based on these findings, it can be concluded that the colourful background of the learning portal is less favourable to the user. This is because the colourful background makes the students' concentration distract away from the learning content, and even worse, they will only focus on the colourful background. Therefore, educators should use colours precisely in the design and development of materials to avoid distracting the concentration of the students.

## 5. Conclusions

It can be concluded that the use of the Design and Technology (DST) learning portal could significantly improve the achievement of Year 4 students in DST. Before the study was conducted, the achievement of both the treatment group and the control group was equivalent. However, after researchers manipulate the independent variables, there is a significant difference in achievement between the treatment group and the control group, in which the treatment group achieves higher scores than the control group. In addition, the majority of respondents from the treatment group agreed that the usability of the learning portal in this study was very high. This is because the use of multimedia, interactive activities, as well as portal designs that align with the learning objectives, had given a positive impact on creating effective learning among students. Thus, it can be concluded that the learning portal used in this study has a very high level of usability and can significantly improve the achievement of Year 4 students in DST.

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# Vocabulary Learning Strategies: Learning Engineering Terminology among Engineering Majors for Industry 4.0 Readiness

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**Abstract** It is imperative in the era of industry 4.0 for scholars including engineers and practitioners to communicate effectively through mastering technical vocabulary in their specializations. The use of strategies in learning vocabulary has been proven to have a significant impact on the process of learning vocabulary. Nevertheless, it was found that advance learning is insufficient, and the digitization era requires more words to be mastered to have clear communication. Hence, this research aims to discover the strategies used among engineering majors in learning engineering terminology. This research employed mixed methods consisting of both quantitative and qualitative approaches. The instruments of this research are, a vocabulary learning strategies questionnaire and semi-structured interviews. The questionnaires were administered to 150 students majoring in engineering from five engineering clusters. This research found that engineering students employed determination and metacognitive strategies most frequently. The most frequently used strategy was found to be listening and watching English media while the least frequently used strategy was keeping a vocabulary notebook. Findings show that future communication should focus on interactivity of the media used to increase the proficiency of technical vocabulary and the Malaysian government can drive industry 4.0 through strategies identified in this study.

**Keywords** Engineering Terminology, Explicit Learning Theory, Industrial Revolution 4.0, Technical Vocabulary, Vocabulary Learning Strategies

Benitez, Ayala, & Frank, 2018). While the benefits of industrial revolution 4.0 (IR 4.0) have been outlined by scholars, the readiness for firms and countries worldwide remains empirically limited (Dalenogare et al., 2018). In addition, firms face a shortage of engineers that are reliable, with integrity and able to lead firms to industry 4.0 adoption (Muhuri, Shukla, & Abraham, 2019). This poses a challenge for scholars including engineers and policymakers to increase their knowledge and technical vocabulary to be relevant and in line with industrial revolution 4.0. In Malaysia, the education board believes that proficiency of students to achieve advanced technical vocabulary in any specialization lies in English for Specific Purposes (ESP) courses that are starting to rise as the needs of language courses especially English language courses that are related to future professions are starting to be the center of attention. Students across all majors in University of Malaya need to take English courses that are related to their respective fields of study after they have finished the English proficiency courses which are usually taken in their first year of study (Ng, 2001). Designing of these courses started with a project named University of Malaya English for Special Purposes Project (UMESPP) and the research was said to be the pioneer of the productions of materials for teaching reading comprehension in the academic field (Omar, 2017). University students are now expected to be able to read and comprehend the reading materials that are related to their fields of study (Boonkongsaen & Intaraprasert, 2014a). Musikhin (2016) supported the claim by stating that the language is now needed to be related to professional areas or fields, especially for scientists and engineers. After the introduction of UMESPP, most of Malaysian universities adopt a similar approach to strengthen the understanding of students in respective studies. This is more relevant nowadays with Malaysian government embedding industry 4.0 framework in its policy (MITI, 2018).

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## 1. Introduction

Industry 4.0 has become one of the most discussed topics in the literature and among policymakers (Dalenogare,

Yet, most students experience the problem of using English in communication that is needed in both government and private sector (Omar, 2017) to capitalize on the knowledge of industry 4.0, especially engineering undergraduates (Panyawong-Ngam, Tangthong, & Anunvrapong, 2015; Young et al., 2018). One of the most fundamental employability skills in employment is communication which concerns both oral and written communication (Anastasiu et al., 2017). Zafarani and Kabgani (2014) claimed that students are prone to have difficulties in understanding the reading materials despite reading them word by word. This claim suggested that mastery of language is needed especially in the vocabulary area as vocabulary is related to reading comprehension. The relationship between vocabulary knowledge and reading comprehension has been proved by several types of research (Goodwin et al., 2018; Harmon & Wood, 2018; Newton, 2018; Sparapani, Carlisle, & Connor, 2018). Technical vocabulary is defined as vocabulary that has higher frequency words in specific fields such as engineering, science and medical (Harmon & Wood, 2018). These words have their own specific meanings that are designed specifically for certain fields (Hiebert, Scott, Castaneda, & Spichtig, 2019). Tsou and Chen (2014) stated that students tend to be frustrated and demotivated in reading authentic materials or texts that have words that they do not have the knowledge such as technical words.

Nation (2001) suggested the use of vocabulary learning strategies in learning vocabulary as they may help in facilitating the process of vocabulary acquisition. This is supported by Moody et al. (2018) which claimed that explicit instruction on learning strategies is necessary to engage with learning vocabulary. Boonkongsan and Intaraprasert (2014a) stated that different students or learners may use different strategies in learning vocabulary. According to Schmitt (1997), there are two broad types of vocabulary learning strategies which are discovery strategies and consolidation strategies. The taxonomy of language learning strategies which is developed based on Oxford (1990) has five classifications which are determination, social, memory, cognitive and metacognitive strategies.

## 2. Literature Review

Arani (2006) did a study with the aim to investigate the learning strategies among students in the medical field of study in learning English medical terminologies. This study explored the learning of medical terminologies by 89 Iranian students majoring in medicine to second-year classes at Kashan University of Medical Sciences, Iran. This study employed Medical Terminology mid-term examination administered by an English teacher in the faculty of medicine as the instrument along with a vocabulary learning strategies questionnaire which was developed by Schmitt (1997). The result found that students

in typical use repetition strategies including verbal and written repetitions which belong to the cognitive strategies and bilingual dictionary strategies which are one of the strategies under determination strategies most frequently compared to other strategies. In comparison to the vocabulary learning strategies used between students of the high and low level of medical terminology proficiency, high-level learners use vocabulary section in the textbook most frequently to acquire medical vocabulary while interacting with foreign medical staffs was the least preferred strategy. The low-level students, however, chose both written and verbal repetition strategies as the most frequently used strategies while interacting with foreign medical staffs was the least preferred strategies which is similar to the high-level students. The study also found that the students that are the most proficient in medical terminology based on the examination scores use more strategies in learning medical terminology compared to the less proficient students.

Lee (2007) conducted research to identify the perceived use of English vocabulary learning strategies of Korean university students. Four hundred and sixty-six students from two Korean universities in Seoul that were taking English courses participated in the research as samples. The majority of the participating students were found to be female students. In regard to their field of study, sixty percent of the students were majoring in English while the rest are students from other fields of studies such as engineering and business. The instruments that were employed in this research were Vocabulary Learning Strategy Survey and the Vocabulary Levels Test which were adapted from Schmitt (1997) which was used in measuring the students' vocabulary size. The findings of this research reported that the students employed cognitive and memory strategies more frequently than metacognitive and social strategies and social strategies were found to be the least preferred strategies in learning English vocabulary. In comparison to the vocabulary learning strategies used between male and female students, it was found that there was no significant difference in the strategies used and they employed the same strategies almost in the similar frequency. The most frequently used vocabulary learning strategy reported to be using a bilingual dictionary while the least frequently used strategies were found to be practicing word using flashcards strategy. Lee (2007) also stated that the students in the high vocabulary size group use memory strategies significantly more often than the students in the low vocabulary size group.

A study investigating on vocabulary learning strategies (VLS) used among foreign language learners was done by Cengizhan (2011). The research employed a questionnaire which was designed based on data obtained from the literature review. The questionnaire was divided into three parts. Part A collects on the students' demographic information, Part B concerns vocabulary learning strategies used among the students which involve 41 statements and

Part C asks the students on other vocabulary learning strategies that they use other than the ones that are included in Part B. The questionnaire was later distributed to the students on the tenth and eleventh class at Erdine Anatolian Teach Training High School. The result of this study revealed that metacognitive strategies were the most frequently used strategies among the students while cognitive strategies were found to be the least frequently used strategies. The results also showed that the most frequently used strategies among male students were metacognitive strategies while female students employed determination strategies most frequently in learning vocabulary. In comparison to the difference in the most frequently used strategies between students from tenth and eleventh class, there was no difference found as students from both classes preferred to use metacognitive strategies most frequently in learning vocabulary. Cengizhan (2011) concluded that metacognitive was the most frequently used strategies which include listening to songs, watching movies and testing oneself with word test while cognitive strategies which include using flashcards, keeping vocabulary notebook and preparing word lists were the least frequently used strategies among foreign language learners.

Yunus, Sulaiman, and Embi (2013) conducted a study on the use of vocabulary learning strategies among Malaysia gifted students in learning English vocabulary. This research was conducted in favor of only few studies that have been conducted on investigating on gifted students as language learners as they have unique and different ways of thinking and learning. This research involved 104 gifted students that were currently enrolled in a special program called PERMATApintar Education Program. The instruments employed in this study were the Strategy Inventory Language Learning (SILL) questionnaire by Oxford (1990). The findings of the study reported that the students use indirect strategies more than direct strategies based on Oxford (1990)'s classification of strategies. Memory, cognitive and compensation strategies belong to direct strategies whereas metacognitive, affective and social strategies are in indirect strategies category. The most frequently used language learning strategies were metacognitive strategies while affective strategies that deal with feelings and emotions were found to be the least frequently strategies in learning the English language among the gifted students. The results also showed that female students are higher strategy users compared to male students. The male students used social strategies the most often while female students used metacognitive strategies the most frequently. This study concluded that Malaysian gifted students overall are high language learning strategies users.

Boonkongsan and Intaraprasert (2014b) did a study to examine the vocabulary learning strategies employed by Thai-tertiary level students. This study compared the vocabulary learning strategies to the genders of the students and their levels of vocabulary proficiency. This research

employed two instruments which are vocabulary learning strategies questionnaire and vocabulary proficiency test. Both the questionnaire and the test were administered to 905 university students from 11 institutions in Northeast of Thailand. The students were later divided into three groups according to their vocabulary proficiency test scores by using the 'Third Technique' that groups the students into top scoring, middle scoring and bottom scoring groups. Boonkongsan and Intaraprasert (2014b) reported that female students have a higher mean score in using vocabulary learning strategies compared to male students which indicate that female students used vocabulary learning strategies more frequently than male students. This research also revealed that the female students used 12 vocabulary learning strategies more frequently than male students and only one vocabulary learning strategy that was found to be used more frequently by male students compared to female students. In respect to their vocabulary proficiency test results, this research found that students with high vocabulary proficiency used vocabulary learning strategies more often in comparison to students with moderate and low proficiency levels based on the mean scores. However, there was no significant difference found in the use of vocabulary learning strategies between students in moderate and low proficiency groups. This research concluded that the use of vocabulary learning strategies is significantly higher among female students compared to male students and high proficiency students use vocabulary learning strategies more often than students with moderate and low vocabulary proficiency level.

Ahmad, Yunusb, and Hasana (2016) conducted a study investigating on English language learning strategies employed by Malay part-time learners in learning the English language as a second language of Universiti Teknologi Mara (UiTM) with the goal of improving the learners' English proficiency level. The instruments which are two questionnaires and a semi-structured interview were administered to 120 Malay part-time learners from four UiTM branches. The first questionnaire was SILL adapted from Oxford (1990) whereas the second questionnaire collected data on the learners' background information. The result of this study reported that the respondents are medium strategy users or only sometimes use strategies. Metacognitive strategies were found to be the most frequently used strategies among part-time learners while the students least preferred to use memory strategies in learning the English language. This study concluded that learners are aware of the strategies that can be used in learning the English language. However, awareness is not enough if the strategies are not ensured to be mobilized by the learners.

Leilei (2016) did an empirical study on vocabulary learning strategies possessed by non-English major sophomores in learning English language in Chinese context. This study employed a questionnaire and an interview as the instruments in which the questionnaire

collected quantitative data while the interview obtained qualitative data. The questionnaire was distributed to 100 students majoring in Chinese language and Biology and 20 students out of 100 were selected as participants in the interview. The results of this study reported that selective attention from metacognitive strategies was found to be the most popular and most frequently used strategies. This finding suggested that the students are all positive in identifying important to-be-learned words, thus arousing their consciousness to learn these words. Concerning the most popular belief that words should be learned through the application, the students reported to dislike the use of application strategies. This study found out that most of the students enjoy learning English, although only some of the students like learning English vocabulary. Leilei (2016) stated that one student claimed that even though she spent one and half hours per day to learn English vocabulary, she could not remember all the newly learned words indicating that different strategies work differently on different individuals.

Vela and Rushidi (2016) investigated the way of keeping vocabulary notebooks is one of the strategies under metacognitive strategies on students' vocabulary acquisition. This research was conducted on previous researches that claimed keeping a vocabulary notebook is an effective tool in facilitating vocabulary learning. This research used 90 intermediate students that were taking English classes from the South East European University Language Centre. The students were divided into three groups; one experimental group and two control groups. The experimental group was asked to keep a vocabulary notebook over a ten-week period of learning the same course material and syllabus. The instruments employed in this study include a pre-test, a post-test and a questionnaire. The pre-test and post-test were used to measure the vocabulary proficiency before and after the treatment period while the questionnaire was used to investigate the students' attitude of keeping vocabulary notebook in learning vocabulary. The findings showed that the treatment group outperformed both control groups. Vela and Rushidi (2016) implied that a vocabulary notebook did have a positive effect on vocabulary acquisition. The students who were having vocabulary notebooks with them during the period of ten weeks in learning gave positive feedbacks of the treatment. They claimed that they enjoyed creating vocabulary notebooks and learning words through repetition as it helped them learn better. However, only a minority of the students stated that they would continue to keep the notebooks in the future indicating that this is not the most preferred strategies among the students. Vela and Rushidi (2016) added that this may be due to the notebooks themselves not being enough to promote learners' autonomy.

Puangsang (2017) conducted research with the aim to investigate the vocabulary learning strategies employed among vocational students in learning English vocabulary. This research employed two main instruments which are vocabulary learning strategies questionnaire and semi-structured interview. There are 39 questions in the

questionnaire which were classified based on Schmitt (1997)'s taxonomy. The taxonomy has five categories which are determination strategies, social strategies, memory strategies, cognitive strategies, and metacognitive strategies. The questionnaire was administered to 242 first-year high vocational certificate students that were selected from five vocational colleges in Krabi Province, Thailand. The students were categorized based on fields of study which include engineering, accounting, and hotel and tourism. This research reported that social strategies have the highest mean score in comparison to other strategies in terms of frequency of use among the students. Puangsang (2017) also stated that the mean scores of each strategy indicate that the students sometimes used vocabulary learning strategies in learning English vocabulary. The research further explained in detail on the strategies that are frequently used among vocational students. It was found that there were nine strategies that are most frequently used among the students with analyzing any available pictures or gestures having the highest mean score. The least frequently used strategy was reported to be listening to a tape of word list strategy with the lowest mean score among other strategies. The findings of this research also showed that students in hotel and tourism field employed vocabulary learning strategies more frequently than accounting and engineering students in memory strategies.

Ghazali and Ali (2017) investigated the impact of using vocabulary games which belong to metacognitive strategies on learning technical words among engineering students. A vocabulary game called VocBlast was designed to help in vocabulary learning among engineering students as the words are taken from engineering books. The game which can be downloaded from Apple AppStore consisting of ten vocabulary games that can help learners to learn new technical words. This research employed a Likert-type questionnaire to gauge the students' perception of using VocBlast. This research selected 68 students majoring in engineering courses from Universiti Malaysia Pahang (UMP) using purposive sampling technique. The findings of this research showed that there was no significant difference between male and female students' views on the impact of using VocBlast. Ghazali and Ali (2017) stated that this situation that happened may be due to the fact that adoption of mobile technologies as suggested by Adegbija and Bola (2015) did not have any impact on both genders. This research concluded that more time is needed for the students to play with VocBlast to measure a more significant impact on vocabulary learning on longer exposure to learning aids.

The theory that becomes the backbone of this study is Explicit Learning Theory which was proposed by (Ellis, 1994, 1997). This theory falls under Incidental Vocabulary Acquisition which also includes Implicit Vocabulary Learning. This theory proposes that learning vocabulary needs both explicit and implicit acquisition. However, only explicit learning concerns learning the semantic properties of the words and mapping word form to meaning in which the learning process involves awareness. Inferring or

discovering new or unknown word meanings from context involves conscious cognitive operation including selective attention, hypothesis formation, and strategy application. Thus, it can be inferred that vocabulary learning strategies are employed in the process of learning a word and its meaning.

Basically, it means that some learners prefer to use memorization and some use repetition of reading and listening to increase their proficiency. There are already scholars covering this understanding in the literature in terms of skills. However, a literature review on the area of investigation particularly in industry 4.0 and multidisciplinary study are limited. This is due to the theory employed by scholars such as Explicit Learning theory is used in education and psychology fields. Nevertheless, there is an opportunity for the scholars to expand the theory further in the latest trend in IR 4.0.

This research was conducted to answer these research questions:

1. What are the most and the least frequently used strategies among engineering undergraduates in learning engineering terminology?
2. Is there any significant difference in strategies used among engineering undergraduates in learning engineering terminology according to the field of study?
3. Is there any significant difference in strategies used among engineering undergraduates in learning engineering terminology according to years of study?
4. Is there any significant difference in strategies used among engineering undergraduates in learning engineering terminology according to English language proficiency?

### 3. Methodology/Materials

This research employed a mixed method design in which quantitative and qualitative approaches were used in collecting data. Kumar (2019) stated that the main core of mixed method design is the use of multiple methods that belong to both quantitative and qualitative paradigms. This design was adopted from studies by Fan (2015); Puagsang (2017); Wanpen, Sonkoontod, and Nonkukhetkhong (2013) which employed both quantitative and qualitative paradigms in answering their research questions.

#### 3.1. Participants

150 students majoring in engineering from five different clusters participated in this study and 12 students volunteered to be participating in the interview sessions. The five clusters involved in this study represent the main engineering clusters available in Malaysia. The population of this study is university students while the sample frame is engineering students in the third and fourth year of study.

#### 3.2. Vocabulary Learning Strategies Questionnaire (VLSQ)

A vocabulary learning strategies questionnaire was employed in investigating the use of vocabulary learning strategies in learning technical vocabulary. Questionnaires are suitable for a study that has a substantial number of participants and they usually take minimal time from the participants. The questionnaire was adapted from Puagsang (2017) which consists of 39 5-point Likert-scale questions. The questions were divided into five categories based on Schmitt taxonomy which includes determination, social, memory, cognitive and metacognitive. This study reliability test of Cronbach alpha has a high value of 0.917. This pilot test was conducted before real data collection took place through e-survey.

#### 3.3. Semi-Structured Interview

The interview was held after the collection of quantitative data using the questionnaire was completed. The interview was a one-to-one interview which helps in eliminating responses based on other students' views on vocabulary learning strategies. The interview questions were adapted from Fan (2015). The interview questions later went through Interview Protocol Refinement (IPR) as proposed by Castillo-Montoya (2016) to strengthen the reliability of the questions. The process of refining the questions includes suitability and language check which aims to eliminate vague content and words that might affect the outcomes of the interview.

#### 3.4. Data Analysis

The data were analyzed using descriptive statistics, analysis of variance (ANOVA) and independent sample t-test. The mean scores were ranked according to the ranking of frequency by Puagsang (2017). The interpretation of the mean score was applied also from research by Puagsang (2017) in analyzing the vocabulary learning strategies questionnaire. The mean score of vocabulary learning strategies was interpreted as follows: Always used (4.21 to 5.00), Frequently used (3.41 to 4.20), Sometimes used (2.61 to 3.40), Seldom used (1.81 to 2.60), Never used (1.00 to 1.80)

## 4. Results and Findings

#### 4.1. Results

This section presents the data analysis of the data collected which includes descriptive statistics, ANOVA test, and independent sample t-test. Table 1 shows the descriptive statistics of vocabulary learning strategies used among engineering undergraduates.

**Table 1.** Descriptive statistics of vocabulary learning strategies used among engineering undergraduates

Vocabulary Learning Strategies	Mean	Std. Deviation	Frequency Level
Determination	3.49	0.510	Frequently
Social	3.23	0.641	Sometimes
Memory	3.25	0.577	Sometimes
Cognitive	3.09	0.643	Sometimes
Metacognitive	3.68	0.587	Frequently

Table 1 shows the mean scores of vocabulary learning strategies used among engineering undergraduates based on Schmitt’s taxonomy. It was found that the strategies that were most frequently used among engineering students are determination and metacognitive strategies with a mean score of 3.49 and 3.68 respectively with metacognitive being the most frequently used vocabulary learning strategies. Social strategies with 3.23, memory strategies with 3.25 and cognitive strategies with 3.09 belong to the sometimes-used strategies category. Table 2 shows the descriptive statistics of the ten most frequently used strategies in learning technical vocabulary

**Table 2.** Descriptive statistics of the ten most frequently used strategies in learning technical vocabulary

Strategies	Category	Mean Score
Listen to and watch English media	MET	4.29
Analyze any available pictures or gestures	DET	3.95
Guess word meaning from textual context	DET	3.95
Read English media (cartoon books, magazines)	MET	3.94
Try to speak or describe in English	MET	3.85
Ask classmates for meaning	SOC	3.84
Translate word from English to the first language	MET	3.77
Translate word from the first language to English	MET	3.75
Play online games	MET	3.74
Learn word through verbal repetition	COG	3.71

As shown in Table 2, listening and watching English media such as movies and songs strategy was found to be the most frequently used and most preferred strategy among engineering undergraduates. It is aligned with the overall strategy used among engineering undergraduates which are strategies from Metacognitive category. Metacognitive strategies were found to be the dominating strategies in the ten most frequently used strategies. Table 3 shows the ten least frequently used vocabulary learning strategies among engineering undergraduates.

According to Table 3, the least frequently used strategy is found to be keeping a vocabulary notebook everywhere you go under Cognitive category with 2.41. Similarly, another least frequently used strategy was found to be another strategy under Cognitive category which was listening to a tape of word list with a mean score of 2.45. Table 4 shows the mean score for vocabulary learning strategies used

among engineering undergraduates according to their field of study.

**Table 3.** Descriptive statistics of the ten least frequently used strategies in learning technical vocabulary

Strategies	Category	Mean Score
Review words by reading the vocabulary sections in textbooks	COG	3.07
Ask teachers to describe similar meaning or provide a synonym of the word	SOC	3.05
Make a group of words by topic	MEM	3.01
Play vocabulary games	MET	2.97
Ask teachers for a sentence including the word	SOC	2.95
Ask teachers for a first language translation	SOC	2.86
Spell words aloud when studying	MEM	2.85
Use flashcards	DET	2.69
Listen to a tape of word list	COG	2.45
Keep a vocabulary notebook everywhere you go	COG	2.41

**Table 4.** Mean score for vocabulary learning strategies used among engineering undergraduates according to their field of study

Field of Study	N	Mean	Std. Deviation	Frequency
Chemical Engineering and Natural Resources	30	3.35	0.276	Sometimes
Civil Engineering and Earth Resources	34	3.30	0.440	Sometimes
Electrical and Electronics Engineering	26	3.30	0.406	Sometimes
Manufacturing Engineering	27	3.49	0.481	Frequently
Mechanical Engineering	33	3.38	0.556	Sometimes

Manufacturing Engineering students were found to be using vocabulary learning strategies frequently compared to students from other four faculties with a mean score of 3.49. Students majoring in Chemical Engineering and Natural Resources were found to be in the sometimes-used vocabulary learning strategies with a mean score of 3.35. Similarly, students from Civil Engineering and Earth Resources, Electric and Electronic and Mechanical Engineering Faculties also belonged to the sometimes-used vocabulary learning strategies with a mean score of 3.30, 3.30 and 3.38 respectively. Table 5 shows the result of ANOVA which was done to determine the significant difference in vocabulary learning strategies used among engineering undergraduates according to the field of study.

**Table 5.** ANOVA test result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.688	4	0.172	0.871	.483*
Within Groups	28.626	145	0.197		
Total	29.313	149			

It was found that  $p$  ( $p > .05$ ) indicates that there was no significant difference in vocabulary learning strategies used among engineering undergraduates in learning technical vocabulary according to the field of study  $F(4, 145) = 0.87, p = 0.48$ . Table 6 shows the mean scores of vocabulary learning strategies used in learning technical vocabulary among engineering undergraduates according to years of study.

**Table 6.** Mean score for vocabulary learning strategies used among engineering undergraduates according to their year of study

Year of Study	N	Mean	Std. Deviation	Frequency
3	105	3.31	0.397	Sometimes
4	45	3.48	0.524	Frequently

According to Table 6, it was found that fourth-year students used vocabulary learning strategies more frequently with a mean score of 3.48 than third-year students with a mean score of 3.31. Table 7 shows the result of Independent Sample T-test which was used to determine the significant difference in vocabulary learning strategies used among engineering undergraduates according to years of study.

**Table 7.** Independent Sample T-test result

Vocabulary Learning Strategies	t	df	Sig. (2-tailed)
	-2.104	148	.037*

As shown in Table 7, it was found that  $p$  ( $p = 0.04$ ) is lower than 0.05. Thus, it can be implied that there is a significant difference in vocabulary learning strategies among engineering undergraduates with a different year of study;  $t(148) = -2.10, p = 0.04$ . Table 8 shows the mean scores of vocabulary learning strategies used among engineering undergraduates according to English proficiency level. English language proficiency in this study was measured using the Malaysian University English Test (MUET) which is the standard test to measure English proficiency level in Malaysia.

**Table 8.** Mean scores of vocabulary learning strategies used among engineering undergraduates according to English proficiency level

MUET	N	Mean	Std. Deviation	Frequency
Band 2	37	3.41	0.487	Frequently
Band 3	69	3.33	0.412	Sometimes
Band 4	38	3.39	0.469	Sometimes
Band 5	6	3.24	0.403	Sometimes

It was found that students with Band 2 used vocabulary learning strategies more frequently than students with Band 3, Band 4 and Band 5 which were found to be the moderate user of vocabulary learning strategies. Table 9 shows the result of ANOVA which was used to determine the significant difference in vocabulary learning strategies among engineering undergraduates with different English proficiency levels.

**Table 9.** ANOVA test result

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.0281	3	0.094	0.471	.703*
Within Groups	29.032	146	0.199		
Total	29.313	149			

As shown in Table 9, it was found that  $p$  ( $p = 0.70$ ) is more than 0.05. Thus, it can be implied that there is no significant difference in vocabulary learning strategies used among engineering undergraduates with different English proficiency levels:  $F(3, 146) = 0.47, p = 0.70$ .

### 4.2. Findings

The engineering students use metacognitive strategies most frequently which corresponds to the result of research by metacognitive strategies to be the most preferred vocabulary learning strategies among engineering undergraduates. The finding is consistent with results from researches by Ahmad et al. (2016); Cengizhan (2011); Leilei (2016); Yunus et al. (2013). However, this study is different from the other studies as this study investigates the strategies used in learning technical vocabulary while the other studies mentioned investigate the use of strategies in learning general and academic vocabulary. Thus, it shows that the use of metacognitive strategies is consistent with learning all types of vocabulary namely general, academic and technical vocabulary. In moving forward to IR 4.0, educators need to be aware of the strategies outlined under metacognitive strategies as these strategies can be helpful in assisting students to learn technical vocabulary. According to Puagsang (2017)'s results, the engineering students preferred to use social strategies more frequently followed by determination strategies which are different from current research's result in which metacognitive dominates the use of vocabulary learning strategies and is followed by determination strategies. This situation is similar to research by Arani (2006) in which the students prefer to use written and verbal repetitions and bilingual dictionary strategies which belong to cognitive strategies more often than metacognitive. Similarly, Lee (2007) reported that the participating students in the research employed cognitive and memory strategies more frequently than metacognitive and social strategies. The results from these abovementioned studies imply that there are possibilities of students preferring to use other types of strategies instead of metacognitive strategies which were found to be the most popular and frequently used strategies. Educators need to pay attention to other strategies besides metacognitive strategies as these strategies might not be helpful towards certain students. Combining learning strategies and integrating them in the lesson is essential as it can create more possibilities in learning and might be time and cost saving. In support of the revolution, simplifying yet creating more chances and

possibilities in learning is encouraged to make sure that the learning process is beneficial and fruitful.

Listening and watching English media namely movies and songs was proven to be the most frequently used strategies which may be due to the convenience of the strategy. This finding is consistent with Cengizhan (2011)'s discovery in which the most frequently used strategies were listening to songs and watching movies. It means that the materials for learning technical vocabulary can be easily obtained. For example, students can watch movies or videos that contain technical vocabulary via Youtube, a website that contains almost every video uploaded to the internet. This result shows that students are moving forward and utilizing technology at full capacity. With the help of the internet, students can choose and select the content that they want to learn as easy as clicking a button. Technical vocabulary learning might be complex, and students might be having a hard time comprehending the materials during the learning process. However, the learning process can be simplified by using media which are mostly created to assist students in learning. Simplified and easy to understand materials and techniques might be the reason that students are opting for media and the use of technology in learning these terminologies. Students can also watch documentary shows that are usually high in technical vocabulary. For example, *Mythbusters* shows from Discovery Channel talk about physics and engineering topics in every episode. Using media especially digital media in learning helps the students to engage with the content directly besides the more interesting and interactive content. Besides, digital media such as videos, songs, and podcasts are easily accessible in comparison to physical media such as books, reports, and dictionaries which might be a hassle to some learners. In comparison to Puagsang (2017)'s study, watching and listening to English media was not the frequently used strategies but it belongs to the sometimes-used strategies.

Cognitive strategies were found to be the least frequently used strategies among engineering undergraduates which were similar to research by Cengizhan (2011). Keeping a vocabulary notebook everywhere you go was found to be the least frequently used strategy among other strategies. This is consistent with the findings of research by Vela and Rushidi (2016) that stated only the minority of the students want to continue using and keeping the vocabulary notebooks. This may be due to the inconvenience caused by this strategy. Inconvenience in this context refers to the need to bring the vocabulary notebooks wherever one goes. Furthermore, it is no longer relevant to the current era in which one can easily jot down the newly learned vocabulary in a mobile phone instead of pulling out a pen and a book to do the process. In addition, this strategy might not be relevant for IR 4.0 as it serves as a reminder to the learner and for documentation rather than for technical vocabulary improvements. Another strategy that was found to be the least preferred strategy is listening to a tape of the word list. This may be due to the fact that tapes that contain word lists are not easily obtained and it

is also troublesome because the students need to listen to them instead of reading them. Tapes of word lists are now replaced by songs that are friendlier towards the learners. Similar to children songs which are helpful for children in learning vocabulary, word lists that are turned into songs are more preferable than the traditional word list tapes. This is similar to Puagsang (2017)'s result in which both keeping a vocabulary notebook and listening to a tape of word list were found to be the least frequently used strategies. Arani (2006) and Lee (2007), however, found that social strategies were the least frequently used strategies among participating students which is not consistent with the current research.

As for the difference of strategies used in learning engineering terminology according to the field of study, students majoring in manufacturing engineering were found to be using strategies more frequently in comparison to other engineering majors. It was also reported that there was no significant difference found in the strategies used among these engineering majors in learning engineering terminology. It implied that all these engineering majors used strategies moderately. This finding is supported by the result of the interview conducted in this research. According to the interview, most students claimed that they did not use strategies frequently in learning this terminology while some of them have their own preferences in the strategies they use in learning. Some students also said that they prefer only to use one strategy that suits their learning styles. As for the year of study, it was found that fourth-year students used strategies more frequently in comparison to the third-year students. This may be due to the awareness level of the learning strategies that can be used in learning engineering terminology and the exposure of engineering terminology as the level of study increases. Students with lower English proficiency level which is Band 2 used strategies more frequently in comparison to students with higher English proficiency level. This may be because their English proficiency level is low, so they have to employ strategies more frequently in learning this terminology. Exposure may be one of the factors of the reason students with higher English proficiency level used strategies moderately. Students with higher English proficiency level may be exposed to higher level English texts, thus they are more familiar with the terminology in comparison to students with lower English proficiency level. Therefore, exposure to higher level English texts which contain an abundance of jargons and terminologies is crucial in preparing students especially those who are majoring in technical courses in preparation towards the IR 4.0.

## 5. Conclusions

This research found that engineering majors preferred to use determination strategies (analyzing pictures or gestures) and metacognitive strategies (listening and watching English media) more frequently in comparison to memory, cognitive

and social strategies. It was also found that listening and watching English media was the most popular and most frequently employed strategy among these engineering majors. Keeping vocabulary notebook everywhere you go was found to be the least frequently used strategy among engineering undergraduates. It signifies that this strategy might cause trouble or hassle to some students despite having been proven to be one of the most effective strategies in improving vocabulary knowledge. Further research is recommended to be conducted in exploring the effectiveness of this strategy and the reason students do not use it frequently.

Current research proposes that further research be done in investigating the vocabulary learning strategies used among engineering students with different fields of study such as marine engineering, biomedical engineering, and aerospace engineering. It would be interesting to find out if there are significant differences in using vocabulary learning strategies among other engineering fields. This study shows that information technology is capable of mediating student's technical vocabulary mastery to achieve performance. Furthermore, the type of media has the potential to be a connector or influencer in technical vocabulary mastery. It would be beneficial if further research can reveal the vocabulary learning strategies employed by students majoring in other technical courses such as medical, law and accounting. Furthermore, further research can select a specific strategy from the taxonomy and investigate the effect of the strategy on students' vocabulary acquisition.

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# Mobile Assisted Vocabulary Learning: Examining the Effects on Students' Vocabulary Enhancement

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**Abstract** The use of mobile phones combined with internet has become so handy in the present world of science, information and communication technologies. The mobile learning strategies have created several new ways to assist learners in the progression of learning a second language. One of the most vital challenges that learners will face during the learning of a second language is knowing the meaning of a vocabulary in order to understand the idea of the sentence. Given the importance of knowing the meaning of vocabularies / words through mobile assisted learning, this study attempts to investigate the effectiveness of using Mobile Phone to search for the meaning of vocabulary compared to the conventional way of using a printed dictionary. Therefore, 50 form 5 arts stream pupils from a public school in a state of Malaysia were selected for an experimental study. A Pre-test and Post-Test of vocabulary have been performed to find out the effectiveness of using the mobile phone technology compared to the printed dictionary. The results of the experimental study clearly show that using mobile phones enhances the pupil's knowledge in learning and knowing the meaning of the vocabulary deeper compared to the printed dictionary. This is because the vocabulary can be found in the form of images and the pronunciation of the word can be listened and seen in the form of an audio or video. The use of mobile phones which combined with the internet, have led to an increase in the scores of the pupils and the search for the vocabulary can be done faster than the printed dictionary. In conclusion, mobile phone can be considered as a good pedagogical tool in learning English as the second language (ESL).

**Keywords** Mobile Assisted Vocabulary Learning, Mobile Phone, Dictionary, Technology, ESL

Technologies (ICT) currently created amazing changes in many fields and education is one of the major fields that needs reformation. It is difficult to imagine educational institutions without computers and internet access. The use of internet and computers has led to huge change in our lifestyles. The reformation of education is an enormous undertaking. It has to start with a clear idea what and how it has to be carried out to make an improvement that is practical in the real current world.

## 1.1. The Malaysian Education System on English Language

The National Education Philosophy which was written in 1988 and revised in 1996, aims at the holistic development of all children in producing intellectually, spiritually, emotionally and physically balanced individuals. In order to produce these individuals, our Malaysian Education Ministry came up with an excellent Malaysia Education Blueprint 2013-2025 (Preschool to Post- Secondary Education) (Malaysia, 2013). There are 6 key attributes needed for the children to be globally competitive. Every student will have knowledge, thinking skills, leadership skills, bilingual proficiency, national identity, ethics and spirituality which are very much aligned with our National Education Philosophy. The bilingual proficiency as one of the six key attributes; highlights on the child's proficient level in Bahasa Malaysia as the National Language which is also a language of unity and English as the international language of communication. The Ministry of Education expects all the students to be able to work in both languages; Bahasa Malaysia and English language environment, upon leaving school. This shows that English language has been given equal importance in our education curriculum. It is important for the students to learn English Language and score in their Public Examination in order to attain good results for the English Paper. Their English language result is important for their future because the result will be used as the proof on

## 1. Introduction

The fast growth in Information Communication and

their achievement in the language. There are also 11 shifts of transformation in the Malaysia Education Blue print 2013-2025. The seventh shift mentions on the leverage ICT to scale up quality learning across Malaysia. There were few points highlighted here which are; providing internet access and virtual learning environment for all 10,000 schools, increasing online content to share best teaching practices and maximising the use of ICT for distance and self-paced learning. (Malaysia, 2013).

### 1.2. The New ICT Transformation Plan (2019-2023)

Recently, The Malaysian Education ministry ((KPM), 2019) has come up with a new plan of transformation known as ICT Transformation Plan (ITP) for the ministry of Education, 2019-2023 with the idea of strengthening ICT delivery capability to support the education ecosystem. The ITP plan is a 5-year to transform the Education Ministry that accelerates the usage of ICT to support the overall education ecosystems. The ITP also intends to create opportunities for the Ministry to embed digital and innovation in operations which will give impact to all the personnel at the ministry, educators and students. The 5-year, Education lifecycle platform also includes Mobile App integration. In our public schools currently, mobile technology has been widely exposed to the teachers to get their administration work such as keying in attendance done as soon as the students reach the school. Besides that, there is big project connecting 10000 government schools in Malaysia which is known as “1 BestariNet Project” providing an online Virtual Learning Environment (VLE) enabling students to learn anywhere at any time. However, without the technology, mobile learning device and internet access, this will not be possible. (Frog VLE, 2019)

### 1.3. Mobile Phone and Restrictions

In this current situation, obtaining information is not a big deal with technology around us. One of the most used devices is mobile phone. Mobile phones have become a necessity in our lives and it has become the medium of communication. Nowadays mobile phone comes with the access to the internet as well because many deals and errands are done with just a touch on the screen. (Giselle Tsurulnik). In the current era, dictionary use via mobile devices has mostly been used for referential purposes. Referential use refers to how the students google for information that

provides student with access to content such as dictionaries, Wikipedia, pictures, graphics, e-books, etc. at anytime and anywhere learning processes or activities occur. The portability and mobility of mobile devices which is handheld are so convenient for the learning purpose. Research on student using mobile devices such as hand phones in vocabulary learning in the Malaysian Public School remains scant, and no in-depth studies have been carried out to investigate the effectiveness of word search using the mobile phones for vocabulary learning among the form five students in the public schools. This could be due to the restriction of the circular issued on 25<sup>th</sup> March 2009 – KP (BS-Dsr)201/002/1 Jld 2(2) by the Office of Director-General of Education Malaysia restricting the use of mobile phones in school.

Mobile phones will be the best tool to use in the learning process for the Upper Secondary Level students in our public schools because of its size and how this device can actually help the learners. This small size device can connect the students with many links for information. The size and the weight of the device is much smaller and lighter making it more convenient to be carried around and information be obtained faster compared to a printed material because much information is accessible on this device at anywhere and anytime as long as it is connected to the internet. The Education Ministry of Malaysia is really working on the accessibility to provide the internet access according to the Malaysia Education Blueprint 2013-2025 (Preschool to Post-Secondary Education) and ICT Transformation Plan (ITP).

## 2. Literature Review

This section describes the literature review to the study. This section is divided into 3 sub sections which are (2.1) The Dale’s Cone of experience (1969) and Mobile Phone as a tool in Learning Language, (2.2) A linguist prediction and (2.3) Past Studies on the Use of Technology and Mobile Learning.

### 2.1. The Dale’s Cone of Experience and Mobile Phone as a Tool in Learning Language

The Dale’s Cone of experience (1969) would be an appropriate Model that can be used to demonstrate the effectiveness of the Mobile phone usage in the learning of vocabulary meaning.

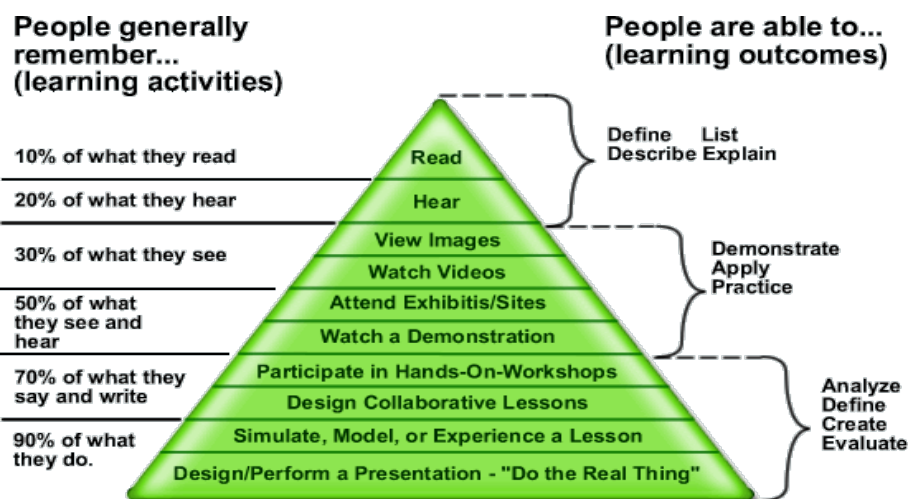


Figure 1. Cone of learning adapted from Dale's cone of experience (1969)

(Foundation, Cone of Experience - Edgar Dale (1969), 2018) Cone of experience research shows the most effective methods are at the very bottom. The more you progress downwards the more you strengthen the knowledge. In another word, the more you see, hear, participate in activities, present and express the idea, it will enhance the learning more. This can also be applicable to learn vocabulary and understand the meaning in its context. Therefore, this theory will be appropriate for the use of mobile phone as a learning tool to learn vocabulary. It will be applicable when the word is put as the subject of the learning. The final stage of the learning outcome is at the very bottom stage which enables the students to define a word on their own. The students use a different learning style to learn vocabulary by remembering what they see which is the image of the word; remembering what they hear which is the pronunciation of the word; and remembering what they write which is the spelling of the word and lastly to apply the word learnt whenever they get the chance to use the word in the their conversation. These enable the students to be more productive in knowing, learning and applying the word in the language which will lead them to perform better in their academic results and their daily language practice.

## 2.2. A linguist Prediction

(Krashen, 1989) says that you don't have to "live in the country" in order to achieve any real proficiency in acquiring a second language, and the informal actual environment is always superior compared to the formal environment because it supplies comprehensible input. He predicted that a set of materials aimed at language acquisition will encourage acquisition at the fastest possible rate. This "language acquisition device" may be so powerful in the future. Thus, he leaves this to the future enhancements. So, this is the future he would have probably predicted to help learners in acquiring the second language. In this case here, we can compare the 'chalk and talk' classroom, printed books

method those days to the current strategies in language acquisition with the optimal use of the technology.

## 2.3. Past Studies on the Use of Technology and Mobile Learning

Many studies have been carried out on the Use of Technologies and Mobile Technologies for Learning a language.

(Dorothy Chun, 2016) stated that incorporating technology for language teachers into their teaching is important but also considers the consequences. This technology can be incorporated by considering and evaluating their suitability and the impact of the type of technology used. The technology should support specific learning goals. When the teachers and students use the technology wisely and purposefully, it will certainly engage them in some degree of critical reflection of their own learning as communication technologies these days that provide meaningful and useful resources for language learners to become aware of and actively reflect on communicative practices. It is important for the language learners and teachers to follow and know the current trend of technologies influence and also to consider the social consequences that might occur. This will be a key to adapting proficiency in a second language or a foreign language. Though this study mentioned on the consequences of a technology but it still supports the idea using technology appropriately to enhance the learning process.

(Maslawati M., 2014) indicated that the integration of Technology in language learning has profited students as they are not just learning in isolation, but are able to relate their learning to actual life situations

Another technology-based tool used in a current recent study is the infographics in an ESL context towards enhancing the 21<sup>st</sup> century learning skills. This study (Fetylyana Nor Pazilah, 2018) stated that integrating infographics as a part of the visual aids in an ESL classroom

will increase the motivation among the learners who are digital natives. It increases the learning interest to use the technology that they are very much into currently. It will also boost the 21<sup>st</sup> century skills that are very much highlighted in this current education transformation.

Mobile Assisted Language Learning (MALL) is a method where language learning is enhanced or assisted through a handheld mobile device such as iPad, Tab, MP3, PDAs, mobile phone and etc. It provides global access to learning anywhere, anytime the user has the reception to the internet which enables users to improve on any language skills that they want to learn (Foundation, Mobile Assisted Language Learning (MALL), 2019). The use of MALL in a local private vocational college was conducted by (Wan Ummu Aiman Wan Azli, 2018) with positive results in enhancing the teaching and learning process. The study proves that MALL can be used as an effective pedagogical method to teach the second language such as English. The study recommends the stake holders such as curriculum designers and educators to use the mobile phone as a tool of learning because it is more interactive and learners are more independent.

(Harwati Hashim, 2017) stated that learning English as Second language using the mobile technology will enhance the teaching and learning. The portability of the device allows the learners to learn at anytime and anywhere. The mobile devices which are widely used among the students can be used in education and it can be considered as motivational tool for the learners. Mobile devices can be used for multi-tasking purpose such as recording notes in the form of audio or text, taking photos, creating, editing and publishing writing English language materials for the ESL learners. It also stated in this study that using MALL may bring constraint however, it has been concluded here that it could bring more benefits that constrain. Thus, the mobile device is a convenient tool to be used by students if it is used in an effective and productive manner.

A recent quantitative study conducted by (John Gyang Chaka, 2017) supports the idea that mobile phone is a good teaching aid in learning. This is a study carried out on the perception and readiness of college students towards mobile learning in Nigeria. The education system in this country is a big challenge due to its extreme growth of its population, ethno-religious crisis and some terrorism activities. Therefore, this study was conducted to ease the learning process through mobile learning. The researcher carried out a study based on the Unified Theory of Acceptance and Use of Technology (UTAUT) involving 320 students from three colleges of education. The findings concluded that students in the education college supported the idea of mobile learning because it is useful and eases them in accessibility to learning process.

Another study on the use of mobile devices was conducted by (Nadire Cavus, 2016) to teach children's stories for the English as second language user. This was an experimental study to find out the potential of using the interactive mobile

application in enhancing the learning skills such as listening, comprehension, pronunciation and vocabulary of these second language learners without the guidance of the teacher. The results of the study clearly indicated improvement in all the skills mentioned by the experimental group. Therefore, this study suggests that young children who are interested in improving these four skills listening, comprehension, pronunciation and vocabulary should find that the mobile application would be an enjoyable and useful tool to learn language. This finding is very much appropriate to the Dale's cone of learning where all the four skills are included in the pyramid (figure 1) and it will be effective if the learning process reaches the bottom of the pyramid. Another study of teaching ESL academic the potential of mobile learning was highlighted. In this study (Arlina Ahmad Zaki, 2015) touches in the integration of mobile technology in academic writing as she claims that there aren't many studies conducted but based on the findings it is believed that this mobile technology can benefit the process of teaching and learning. The mobile learning motivates the educators and learners to use mobile applications due to its accessibility, mobility and privacy as well. It also promotes self-directed learning as it can provide spontaneous and immediate information to bring up for discussion. In another word, mobile learning can be as a very interactive tool for learning.

A study done by (Mehrak Rahimi, 2014) investigated on the impact of the mobile dictionary on 34 lower-intermediate language learners and proved that mobile phone is considered as valuable learning tools in language learning as the experimental group of 17 people who used the online dictionary in the mobile phone and outperformed the 17 students from control group who used the printed dictionary. The findings showed that the EFL students who used the mobile dictionary to learn the English as Foreign Language improved their language ability compared to those who used printed dictionary. It is also mentioned that using mobile dictionaries helps learners acquire vocabulary and it is time efficient too. This experimental study (B.T Wang, 2015) used iPad as a mobile technology tool to facilitate the learning of English vocabulary. The classes were divided into two groups which are the experimental and the control group, the experimental group uses the iPad and the control group uses the semantic-map method to teach vocabulary. At the end of the semester, the group with the iPad vocabulary teaching instruction performed better in the post-test than the group who uses semantic-map. Besides that, the findings also indicate that the learners agreed on the use of technology in the classroom as it helps the learners in learning language, increases the students' learning motivation and enhances their learning outcome too. The researcher believes that using iPad app in teaching English vocabulary has positive effects on the students.

Another study of metanalysis done by (Yao-Ting Sung, 2015) on the effects of Learning languages with mobile devices revealed that by integrating mobiles in teaching and learning method it produced better learning achievements. It

is also mentioned that using mobile devices for mixed language skills or vocabulary produced better learning effect than for single skills such as reading and writing. For the L2 learners using mobiles produce better achievement too.

The Malaysian government is moving towards the 21<sup>st</sup> Century Learning and using technology in the education system. The current generation who is known as overcome this should see the most convenient and latest device that a student would have and carry with them frequently so that it can be used for the learning purpose. This is one of the challenges that need to be handled by the teachers in Malaysia as it is mentioned in the 21<sup>st</sup> Century education challenges. Students are no more into the 'chalk and talk' teaching style instead they want to explore. Students should be encouraged to surf the internet for good purpose in learning and to find the latest information (SISC(+), 2016). Based on all the above studies done by the researchers, using mobile technology in learning a language gives a lot of benefits and will actually enhance the learning. The mobile phone will be an appropriate device to be used as a pedagogical tool because of its ability to retrieve information at anywhere anytime.

All the above studies have proven that the use of technology and mobile learning enhances the students' language and enables a learner to capture language in a rapid manner. It's also mentioned in the past studies that technology is a motivational tool for language enhancement. It is believed that if the Ministry of Education of Malaysia would integrate technology as mentioned in the transformation plan, it will lead them to acquire the English language faster and fulfill one of the 6 keys attributes needed for a student as in the Malaysia Education Blueprint 2013-2025.

### 3. Methodology / Materials

#### 3.1. Research Respondents and Setting

This study uses the quantitative approach. The purpose of this experimental study is to investigate on the effectiveness of using mobile phone as a tool for learning vocabulary compared to the conventional way of using a dictionary for English as a Second Language (ESL). The subjects for this study were 50 form 5 arts students (23 male and 27 female) of 17 years old from a public school in a state of Selangor, Malaysia. They were chosen out of 156 form 5 arts students from the school. The respondents were chosen based on their quick placement test consisting of 50 questions testing on their grammar and vocabulary ability. The selected students' marks ranged from 32-39 points. This is to determine which level they are in and to make sure all chosen respondents are in the same level of the language ability. (Kerr) This placement test results suggest the level of vocabulary be

given to the students for the experimental study too. The outcome recommended upper intermediate test.

#### 3.2. Instruments

The type of instruments used here is subject completed instrument – achievement test to measure an individual's knowledge or skill in a given subject. They are mostly given in schools to measure learning or the effectiveness of instructions (Jack R.Fraenkel, 2012). Two instruments were used in this study: a pre-test and a post-test on choosing the correct synonym. The words in the pre-test and the post test will not be the same because the pre-test answers could influence the choice of answer in the post-test as they already looked and found the correct meaning of the words in the dictionary. This is to make sure on the validity of the answers in the post-test. The vocabulary test consists of 50 multiple choice questions (MCQ) of synonym and is answered within 60 minutes. The mobile phone with internet access and the printed Oxford Dictionary (Wehmeir, 2002) from the library was used to look for the answers. The test was scored out of 50.

#### 3.3. Data Collection and Analysis

The data needed will be the score of the pre-test and the post-test. The selected respondents were given a pre-test on the language ability by giving them the placement test before they were chosen to be the respondents. The respondents will be given a short 20 minutes briefing on how to use the printed dictionary to look for word meaning. Then they will go through the pre-test in the library where the same referential material (the printed dictionary) will be given to all the students. Time allocation for the test is 60 minutes. Test papers will be collected after one hour. The score of the pre-test will be recorded. After 3 days, the same students will be called for another vocabulary test, which is similar to the earlier test but different words were given. Time allocation for the test is 60 minutes. Test papers will be collected after one hour. The score of the post-test will be recorded. All the data scores will be analyzed by using excel program to get frequency of the score in the form histogram and line chart.

### 4. Results and Findings

The findings are presented in three sections. First, figure 1- bar chart describes the individual score of the student that is followed by figure 2- line chart to give a clearer picture on the achievement, which is then followed by figure 3, describing the mark range frequency of using dictionary. Figure 4 describes the mark range frequency of using mobile phone. The last two figures, Figure 5 and figure 6, describe the number of questions unanswered within the time allocated – 1 hour, for both pre-test and post-test.

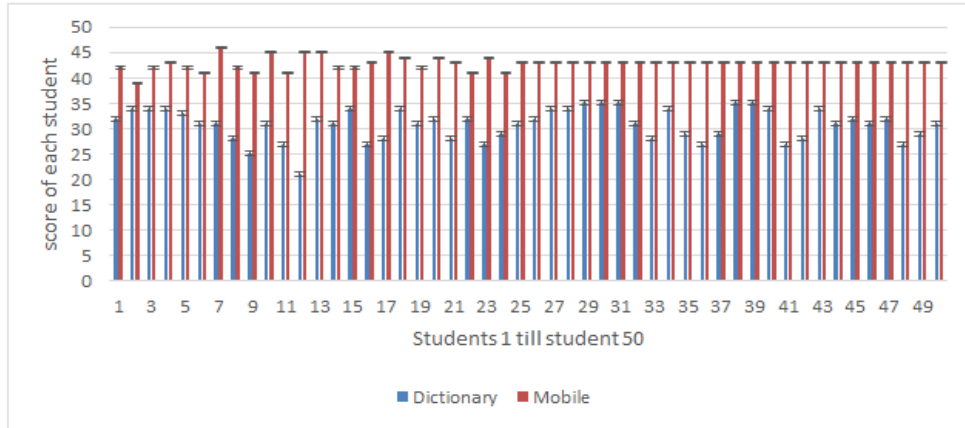


Figure 2. Individual score use of dictionary and mobile phone

Based on the figure above it is very noticeable that the score of every students using mobile phone is higher than the score of students using printed dictionary.

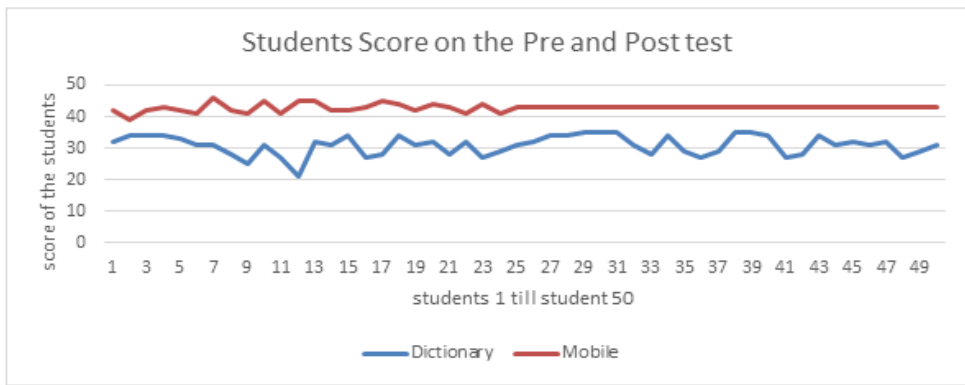


Figure 3. Comparison of achievement of score using of dictionary and mobile phone

Based on the line chart figure 3, the major score of students using mobile phone is higher 40 marks but the score of students using dictionary is in the range of 20 to 35. This clearly shows good achievement of scores in the post-test who uses mobile phone as the tool to search for the word.

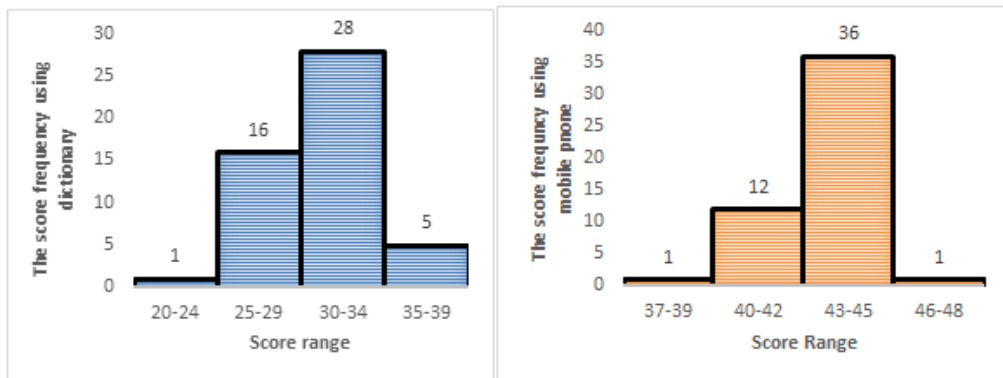
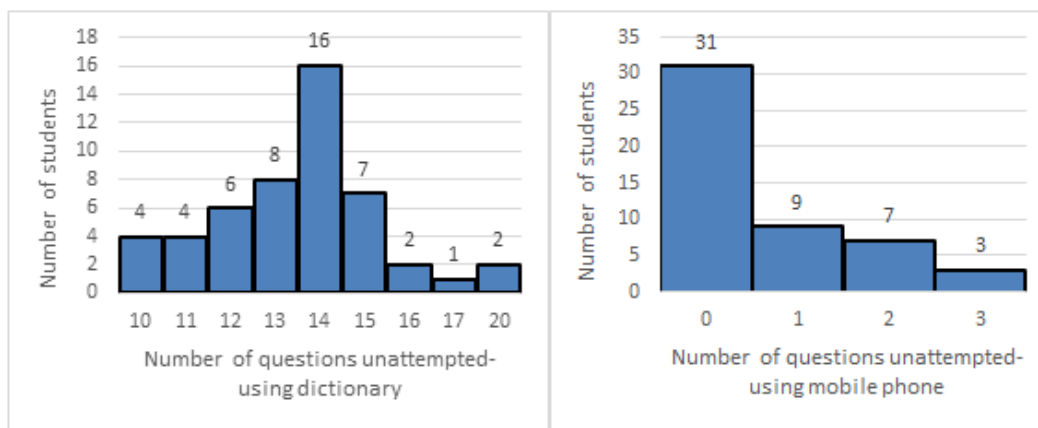


Figure 4. The comparison on the frequency of mark range for dictionary and mobile phone

The above charts show two different score range for the use of dictionary and use of mobile phone. Both charts show the highest frequency of score is more than 50% and the lowest frequency of score is only 2% but it differs in the range of the marks. The highest score frequency for dictionary is 30 to 34 and the highest score frequency for mobile phone is 43-45. In another word it can be concluded that the mobile phone user scored better marks in the post-test. However, further analysis was done on the reason why the mobile phone user can score better than dictionary user in figure 5.



**Figure 5.** The comparison on the frequency of unanswered questions for dictionary and mobile phone

The time allocated for the pre-test and the post is 1 hour for 50 multiple choice questions.

The charts in figure 5 show that the frequency of unanswered question – using dictionary ranging from 10- 20 questions with the highest frequency of 14 questions by 16 students. The frequency of unanswered question – using mobile phone ranging from 0- 3 questions with the highest frequency of 31 students has answered all the questions. This is due to the time pressure.

## 5. Conclusions

The finding of this study reported that integrating technology via mobile phone is very beneficial to the Second Language learners because learning words via mobile phone is much faster than the conventional way; the printed dictionary. Everything appears on screen of the mobile phone when the students key in the words they are looking for. The mobile phone will also enable the students to do advance search on the usage of the word, origin of the word, images and the pronunciation. The students will also be able to listen to the pronunciation of the word but use dictionary and it is impossible for the students to say the pronunciation because the pronunciation or the words in the dictionary is written in the form of phonetic symbols.

Students are able to learn and improve their vocabulary knowledge using the internet resources which are searchable or browsable at any point of time. It can list words with an explanation of where they came from and when they were first used and even the real coloured picture or images of it to give the students better understanding of the words. In conclusion the adoption of mobile phone usage as a pedagogical tool will surely enhance the learning and teaching process. With a nearly unlimited number of websites dealing with different aspects of language learning, this would be a very good way of learning a specific section of language such as vocabulary. However, this could only be done with internet access to the mobile phone and the readiness of teachers who are still unprepared and sceptical

of students bringing mobile phones to the school. The management of school should plan a way to allow the students to bring the mobile phones to school for learning purpose with a few restrictions so that mobile phones are not misused but they are used wisely and productively to gain knowledge.

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# Mobile Learning to Development of Students' Self-concept of Chemistry

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**Abstract** The study aims to develop students' chemistry self-concept in learning electrolyte solution and oxidation-reduction reaction by using mobile learning. The research method used was the qualitative method. Research data were obtained through observation during learning, questionnaires chemistry self-concept, reflective journal, and interviews. Chemistry Self-concept observed amounts to four indicators: Chemistry Self-concept, Academic Enjoyment Self-concept, Academic Capability Self-concept and Problem Solving Self-concept. The results showed that four indicators tend to awaken and develop learning with mobile learning. Based on the results of chemistry self-concept which shows positive self-concept chemistry because in mobile learning there is a compact content, easy to understand, thus causing students to prefer to learn. There are images, music and color variation so as students are interested in learning. There are tests simulation that is used to try students' learning abilities, and there is video content that can be used as a reference for students in solving a problem.

**Keyword** Chemistry Self-concept, Mobile Learning

## 1. Introduction

Chemistry includes the science that has various kinds of concepts that must be understood in each learning process. This makes it difficult for students to interpret abstract chemistry. This difficulty causes a sense of self-confidence in chemistry learning. Self distrust which eventually makes students less interested in chemistry, so that it can result in the process of transferring knowledge to be hampered. In fact, chemistry is a branch of natural science that is closely related to human life. So, it can make interpreting chemistry difficult for students (Middle Camp, Kean, 2001) If the learning strategy is not correct, abstract material will lead to misconceptions for students. If chemical difficulties are not

resolved properly, then the chemical impression becomes bad. When chemistry learning takes place, students become uninterested, uninspired, uncomfortable and unmotivated to study chemistry. For that reason, it needs the right strategy to make the impression of chemistry good by increasing student motivation (Rau, 2008. Huang, 2016. Chiampa, 2014). Based on the chemistry learning curriculum in Indonesia in 2017 the importance of technology can accelerate the addition of chemical materials so that students do not feel left behind when students do not understand the material and with a limited time allocation teachers can provide appropriate learning approaches, methods and techniques that can provide comfort and building student motivation when studying chemistry.

The field of educational and social psychology illustrates the importance of students' attitudes and beliefs in the learning process because a student can form an assessment of his ability in several subjects in school such as chemistry, so students must know the chemistry self-concept (Sara E. Nielzen and Ellen Yeziarski, 2015). This is consistent with (Bauer, Christopher F., 2005) which states that self-concept is an individual's way to prepare his ability in a field that is run by someone, in this case, self-concept can be said to play an important role for the learning process so that students become more confident so that the transfer of knowledge is not hampered. However, unfortunately there are still many institutions or schools that have not analyzed or measured the students' self-concept so that there are still many teachers who teach without regard to children's self-concept. In fact, before wanting their students to get high learning achievement, a teacher must know the students' perceptions of these subjects, after which the teacher can find out the methods, approaches or media that are in accordance with the students' self-concept. Most students and teachers just want to learn formulas, and low-level learning materials with the aim of passing the exam without being able to develop meaningful understanding of concepts, and principles in chemistry. Information technology integration takes an important role as a tool to study abstract chemical material.

Currently in the 21st Century, the development of information and communication technology is very rapid. Information Technology is the knowledge needed to manage information so that information can be searched easily and accurately, information can be in the form of writing, sound, pictures and videos. The rapid development of information technology is marked by the development of communication devices, namely mobile phones. Now mobile phones have many features that can make it easier for humans so that mobile phones can be called smartphones. Almost all activities have used technology, and all can be accessed easily using a smartphone. The world of education also utilizes smartphone sophistication as a learning medium that can support the learning process. Currently written teaching materials in the form of books such as modules have been made a lot, but the teaching materials displayed in ICT-based audio-visual media (Information and Communication technology) have not been done much. The use of unlimited time and place has made many researchers conduct research on cellular learning, and international cellular learning has been studied, and new findings obtained including students can increase their cognitive awareness, because discussions that often use relevant sources of cellular learning can facilitate teenage thinking, can help students in solving problems (Lai, 2014), and content contained in mobile learning can motivate students to learn (Martin, 2013), and media can make students learn, because media is the key to learning success (Hwang, 2014) learning mobile can train students in critical thinking (Cavus, 2009), mobile learning can help students solve problems in chemistry (Jehan, 2011), etc.

Relevant journals and research (Wu, 2016) that mobile learning provides a significant positive effect on self-concept in learning habits are felt useful and can provide ease of use in the learning process. The next relevant journal and research is Rad (2015) which shows the results that mobile learning can improve achievement motivation, emotional experience, self-concept, and self-confidence compared to traditional learning. However, self-concept in this journal emphasizes that teacher's expression when teaching can influence students' self-concept to know their success or failure of the two relevant journals the self-concept discussed is self-concept in the field of psychology. Therefore, there needs to be research that analyzes in depth the concept of self in the field of education, namely students' self-concept in chemistry through the use of Mobile learning media.

## 2. Literature Review

Mobile learning (M-Learning) is defined as wireless, digital, and technological devices, generally produced for the public, used by students because they participate in education (Traxler J., 2007). Mobile Learning is a forward-looking tool that can support learning in ways that were previously impossible and increased use of technology

in education (Traxler & Vosloo, 2014). Learning practices use direct mobile technology or simply complement learning with technology and communication information (ICT), to enable learning processes to occur anytime and anywhere (Volsoo, 2015).

Mobile learning focuses on student mobility, interacts with portable technology, and learning that reflects a focus on how the community and its institutions can accommodate and support. However, it is clear that mobile learning not only refers to the tools used, but also to learner mobility (Sharples, Taylor, & Vavoula, 2005).

Mobile learning is technology-based learning, where learners can access learning materials, directions and applications related to learning, whenever and wherever. This will increase attention to learning material, make learning active and can encourage students' motivation for learning. Mobile learning is proven to have advantages for students in language learning to encourage independence in learning (Leite, 2014). M-Learning is part of electronic learning so that, by itself, becomes part of distance learning (d-Learning) (Figure 1).

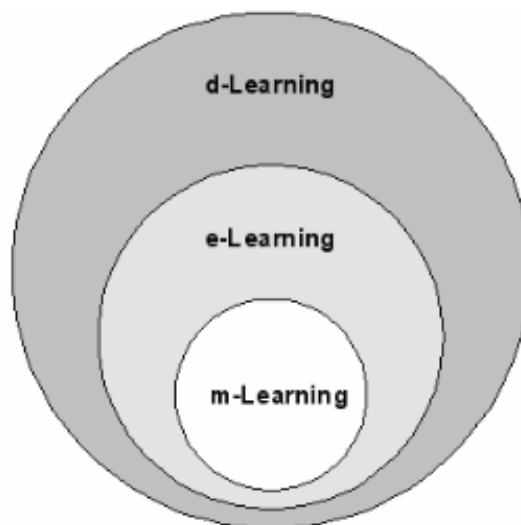


Figure 1. Scheme of M-Learning (Tamimuddin, 2010)

As for some of the advantages of mobile learning compared to other learning are as follows: a) Can technology be used whenever and wherever by teachers and students in accessing lesson information b) Because of the use of technology in the current era of globalization, the scope becomes unlimited so that it can include more learners. c) Devices used are cheaper than PC and laptop prices. While the limitations are mainly from the side of the device or learning media. The limitations of mobile devices include the following: a) limited processor capabilities; b) internal memory capacity that is still minimal; c) display screen that is still not maximal; d) fast battery power supply. The operating system on certain devices is limited.

According to (Bauer, Christopher F., 2005) self-concept is the way individuals perceive themselves as being related to general or specific fields of knowledge, and their beliefs.

Meanwhile, according to Henderson and Dweek (in Clara, 1993), the concept of self in the academic field for the first time refers to the individual's perception of competence or ability in the academic field. Academic self-concept is basically a basic force that energizes and directs individuals who include individual trust in themselves, see their self-image and self-esteem and their assumptions towards others in relation to their abilities and achievements in the academic field, learn and work in school, do school assignments as well as responses to academic achievement that he achieved. A positive self-concept is directly proportional to student achievement in school; this is supported by The Reflected Glory Effect theory if students have a good self-concept then learning achievement will be good too, because students have been comfortable in learning, so students are able in academic fields (Yeriezki, Sara Nielsen, and Ellen, 2015).

There are several things that will encourage students to build positive self-concepts such as positive suggestions from students, teachers who are attentive and careful in addressing each student's activities, students with positive images, and increased courage of students. So that the implementation of learning will lead to the position of the individual towards him to be positive. It is from this positive that self-development begins, as a result of learning and high trust in him who can achieve the things he aspires to. This view will greatly influence the success of student learning, or other impacts of negative external influences must be avoided (Wahyuningsih, 2010).

### 3. Methodology/Materials

The research method used is qualitative method according to (Bogdan, 2013) that is a type of research that produces findings that are not obtained by statistical procedures or other tools of quantification. Qualitative research is an inquiry (discovery process) approach. Which is useful to explore and understand a phenomenon and characteristics of qualitative research seen regarding research stages (Rianti, 2017).

This research was carried out in Class X with a total of 31 students in the even semester of 2017-2018 school year. When the research was conducted from December 2017 to June 2018, using qualitative research procedures with the paradigm of Interpretivism, namely a perspective that is based on the goal to understand and explain the social world

from the eyes of respondents involved in it. Data obtained through several ways of collecting data, including:

- The research instrument in the form of a chemical self concept inventory sheet (CSCI) which has been modified in the form of an instrument in the form of statements about students' perceptions of chemistry learning, according to (Yeriezki, Sara Nielsen and Ellen, 2015) instruments are arranged in writing and using a Likert scale with alternatives 1 to 7 answers, if you do not agree that 1 to very agree that is number 7.
- Interview. Which contains 10 questions that will be asked to some students about the impression of carrying out learning with mobile learning, the implementation of learning with mobile learning media, the ability of students in understanding the material, the convenience of students in the learning process when using mobile learning and students' perception of the usefulness of mobile learning in solving problems chemistry. Interviews were conducted on several students who in particular had negative chemical self-concepts and some students who had positive chemical self-concepts.
- Observation, carried out by the teacher as well as researchers to observe the implementation of learning using mobile learning media. Observations include learning interaction, student interaction, ability, comfort and ability to solve problems in the learning process. Observations were carried out by researchers and two observers, namely fellow researchers. The Observer will fill in the observation sheets provided during the Learning Activities.
- Reflective Journal aims to determine students 'responses regarding the learning process of each meeting and how students' chemical self-concept by giving questions that have been directed, as well as the views of researchers on the learning process called the reflective research journal.

### 4. Results and Findings

The results of the research were obtained from four types of findings that are percentage of chemistry self-concept instruments, observation sheets, reflective journals, student interviews and the results focus on four indicators of chemistry self-concept. The following is the percentage of the chemistry self-concept instruments presented in the table below:

**Table 1.** Percentage Indicators of Chemistry Self-Concept

No	Statement	Percentage	Information
1	I participated in discussions with school friends on the topic of chemistry using the help of mobile learning	90,3%	(+) , Chemistry self-concept
2	I am working on interesting and challenging chemical questions with the help of mobile learning		
3	When I experience difficulties in the chemical material, I always do it well	74,1 %	(+) , Academic Enjoyment self-concept
4	I enjoy chemistry when using mobile learning		
5	I understand chemistry after using mobile learning	96,7%	(+) , Academic Capability Self-Concept
6	I got good grades after using mobile learning		
7	I was able to convey an event	54,8 %	(+) , Problem-Solving self-concept
8	I am not passionate about chemistry even though I have used mobile learning	9,67%	(-) , Chemistry self-concept
9	I am hesitant to take chemistry lessons even though I have used mobile learning		
10	I feel depressed if I study chemistry even though I have used mobile learning		
11	I have difficulty understanding chemistry despite using mobile learning		
12	I am not interested in chemistry even though I have used mobile learning	25,9%	(-) , Academic Enjoyment self-concept
13	I have never received good grades, even though I have learned to use mobile learning	3,3%	(-) , Academic Capability self-concept
14	I am not able to solve problems despite using mobile learning	45,2%	(-) , Problem-solving self-concept

The result from observation sheet:

1. Chemistry self-concept:  
"Students in groups play an active role in practicum activities and form collaboration between students (January 22, 2018)"
2. Academic enjoyment self-concept:  
"All groups enjoy the learning process (January 15, 2018). Students were very enthusiastic when the quiz took place (February 5, 2018) "
3. Academic capability self-concept:  
"Students understand the questions posed by this, which can be seen from the answers given by students (January 22, 2018). Students' focus is seen from the questions given by the teacher, and students understand the material presented by the teacher (January 29, 2018)"
4. Problem solving self-concept  
"Interaction between groups at the time of presentation (there are objections/additions) is good, and students answer well, and there are some who have different answers so that they can complement each other (15 January 2018). Students can explain the answer well and smoothly (15 January 2018). "

The result from reflective journal:

1. Chemistry self-concept:  
"The concept of chemistry regarding group participation is quite good, but there are still some

students who have not been active in the group (15 January 2018) and group participation at this meeting is better than the previous meeting (January 29, 2018)"

2. Academic enjoyment self-concept:  
"Students are very interested and enthusiastic in practicum because students can prove their material in books and videos on mobile learning with these activities (January 22, 2018). Students enjoy the learning process even though the material is classified as difficult but with mobile learning (January 29, 2018) "
3. Academic capability self-concept:  
"Understanding the material of students is still not well marked by there are several students individually who have not understood the questions from researchers. However, students can work on LKPD and can practice the questions given by researchers with the help of mobile learning. Students are enthusiastic in trying test simulations on mobile learning (January 15, 2018). Students' learning abilities are quite good because the test simulation (which was given before) students become often practice questions. Test simulation results are quite well marked by only 3-4 students who have the lowest simulation score (February 5, 2018) "
4. Problem solving self-concept  
"Problems arise during practicums such as the nature of the rainwater solution that students get different

*results and work tools does not run well students initiative to solve problems by replacing lights/batteries / re-assembling tools to find out what errors occur in the lab (January 22, 2018). There is a problem with the discrepancy between mobile learning and books regarding the development of the concept of reduction and oxidation. Students are asked to find answers to the actual development of the concept. (January 29, 2018) "*

The result from student interview:

- Chemistry self-concept:  
R = Researcher; S = Students  
R = "in this material is there something difficult for you?"  
S = "yes, I haven't memorized the terms of the oxidation number. So, I still not able to determine what elements the oxidation number is looking for. However, there is no difficulty with electrolyte solution material. "  
R = "is there any difficulty in memorizing the terms of the oxidation number?"  
S = "I am lazy to see books with pages making me feel bored."  
R = "then, whether the media I provide can help you understand oxidation number? "  
S = "yes, help! Before there was mobile learning, I felt bored quickly, but because there is now a medium that can be brought wherever and whenever and the contents of the material are concise, I become excited about learning. "  
R = "Alhamdulillah ... are there any other influences that you feel like a sense of doubt and pressure on chemistry learning after using mobile learning media?"  
S = "there must be, I used to feel hesitant to study chemistry and felt depressed when studying chemistry because I did not understand the material, but because now I can study wherever and whenever and the simple material content makes me often learn. However, the teaching factor also affected me in studying chemistry. If getting a good teacher, I feel even more uncertain and depressed in learning chemistry. "
- Academic enjoyment self-concept:  
R = Researcher; S = Students  
P = "do you think that learning with mobile learning can provide a sense of comfort in learning chemistry?"  
S = "yes, learning to be not sleepy. Because there is a little music. "  
R = "besides music, what else makes you feel interested in learning with mobile learning?"  
S = "hm .. the contents of the material that has been made into a coin make me feel easy to read and also the image makes me interested in learning

about mobile learning "

- Academic capability self-concept:  
R = Researcher; S = Students  
R = "why is water a good solvent?"  
S = "because water has two poles which are poles H + and OH- so it can dissolve acidic, basic or neutral compounds."

*"Yes (understand), because in mobile learning the material has been summarized like a summary in the book. I understand it faster, so I can memorize quickly ... "*

(Student interview 04, March 22, 2018)

*"Yes, several times I use mobile learning, it can make it easier for me to work on chemical problems."*

(Student interview 15, 22 March 2018)

*"A little help. But it's more helpful to use a textbook. Because there are many examples of questions + explanations that I can apply when I encounter chemical problems. "*

(Student interview 03, March 22, 2018)

*"Before, the value of me was rich just like that but now using mobile learning is good ..."*

(Student interview 02, 22 March 2018)

- Problem solving self-concept  
PS = students who are prescribed; S = Students  
PS = "in practicum activities, the result of rainwater is nonelectrolyte."  
S12 = "the result that our group can get rainwater is an electrolyte solution because rainwater is the result of electrolytic evaporation of seawater because in the sea there is a mineral."

*"For video problems, it helps because it can be played repeatedly so that you can understand and video as a reference in practicum activities."*

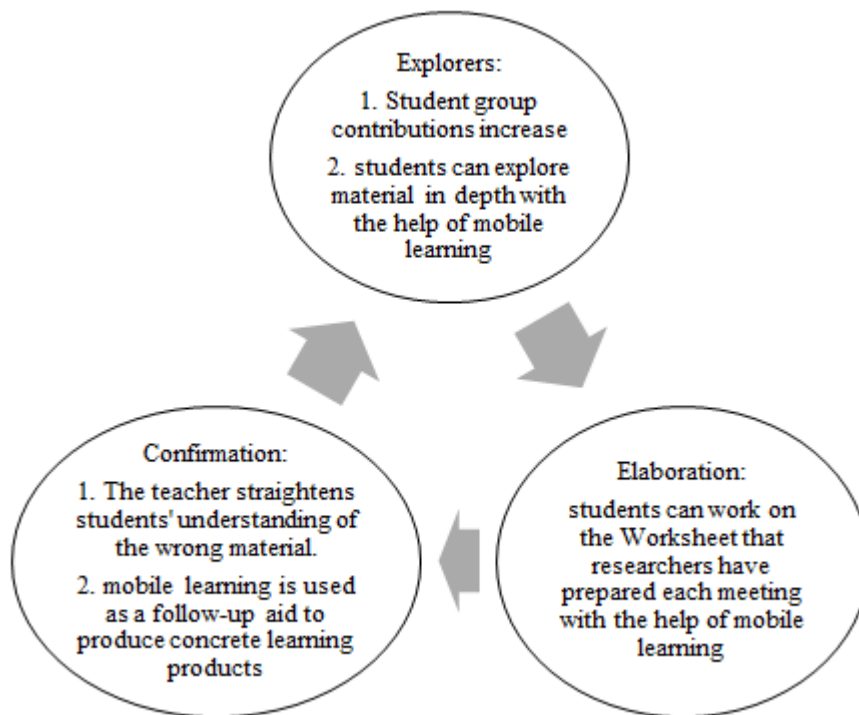
(Student interview 03, March 22, 2018)

*"Yes, because the video explains how to test electrolyte and non-electrolyte solutions and it is easy to know the classification of electrolyte and non-electrolyte solutions."*

(Student interview 05, March 27, 2018)

#### Learning Implementation with Mobile Learning:

The study was conducted once a week, with learning time (3 x 45 minutes) for four meetings. Each learning exercise was carried out an observation of four indicators of chemical self-concept according to Nielsen and Yeziarski who were fighting for students. The results of observations will be recorded in observation sheets of observers and researchers. Learning activities in this study used cooperative learning models, and obtained results:



**Figure 2.** Analysis of Students' Self-Concept Chemistry in the Implementation of Mobile Learning Media

Students' cognitive awareness can be improved because frequent discussions with other students and relevant sources can be obtained from mobile learning and the internet. Thus, it can be considered that mobile learning can facilitate the thinking of youth development (Lai, 2014). In the indicator of chemical self-concept based on the results of the questionnaire, students agree on chemistry learning using mobile learning media. But at meetings that do not use mobile learning the group's contribution has not been well developed, each student is still considered less active in his group, besides that the chemical self-concept that has not developed well especially on reduction and oxidation material so that students find it difficult to understand chemistry, it has an impact on students towards chemistry that are feeling depressed, doubtful and a sense of enthusiasm of students. After being analyzed, the discussion process between students in the group can run well and students can answer interesting and challenging chemical questions given by researchers because according to the interview results above mobile learning can help students to learn chemistry because of the nature of flexible mobile learning, the material presented in a concise and easy way to understand manner so that the students' chemical concepts can be well developed, besides that it can reduce the difficulty of understanding chemistry and can give the impression of learning chemistry well and students become passion for learning chemistry.

Technology can make students enjoy learning because the content in the technology is presented attractively so that the material is easily understood and this learning takes place effectively and can motivate students to learn (Martin, 2013).

In the indicator of academic enjoyment self-concept, students agree on chemistry learning using mobile learning. Based on the results of interviews and observations it was found that the convenience of learning with mobile learning can be considered as providing comfort when the learning process is carried out. If, the feeling of learning pleasure has been formed in students, then there is no feeling of stress, doubt and lack of enthusiasm in the learning process, so that the cognitive aspects of students in learning can work well.

Whereas from learning abilities, mobile learning applications provide opportunities to help students learn better because learning tools (media) are one of the keys to successful learning (Hwang, 2014). In this indicator the research is the students' understanding of the chemistry materials, based on the results of the observation, it was found that at the beginning of the meeting students had not yet marked a good focus on learning, but for the next meeting, students began to understand the material. According to the interview results, students' comprehension skills can be trained and improved with the help of test simulations contained in mobile learning, but in mobile learning the material for electrolyte and redox solutions has the weakness, there is no discussion content if students are wrong doing the question. For this reason, the researcher held a quiz taken from a simulation question with the aim to see the answers and analysis of students. The score on the simulation test can be used as a benchmark as a result of students' understanding of the material, students have low self-concept chemistry and learning abilities, while students who have the highest score have good learning skills. This is because media learning can be used flexibly, students can try questions

repeatedly to get satisfactory grades so that students' understanding of the material can be awakened and students can enjoy the learning process.

When chemistry self-concept, academic enjoyment self-concept and academic capability self-concept are positive, students can be to solve a problem, it can be seen from the discussion group. Students who have been given problems by the researcher to each group will discuss and present other groups from the results of the discussion. After the presentation, there are other students who will refute because of incompatibility with the results obtained and there are those who add so that they will get new findings about the problem. In addition, the practical skills of students in solving problems are also found, for example when designing electrical conductivity tools students are assisted with videos contained in mobile learning without requiring internet data anymore, so when students are wrong in assembling the tools students can see the incompatibility of the results with the video. Videos in mobile learning can provide good assistance in solving problems, but the duration of time that is too fast becomes a weakness of mobile learning. A mobile learning process that can continuously improve the ability to solve problems is deeper (Lai, 2014).

## 5. Conclusions

The students' self-concept of chemistry on the use of mobile learning media can be analyzed from four indicators, namely Chemistry Self-Concept Indicator, which is due to group learning that makes the discussion process run well so that the existence of student learning groups that have low Self-Concept Chemistry is increasing because of joining a friend who has a high Chemistry Self-Concept. Mobile learning media can minimize learning difficulties in chemistry because the material in mobile learning is concise, easy to understand, and flexible (does not have to carry books) which makes students' enthusiasm to learn chemistry high so students can do chemistry learning well. As for the indicators of learning convenience, the existence of mobile learning media makes students interested in learning chemistry because of the appearance, images, and music found in mobile learning.

Academic capability self-concept indicators develop after the use of mobile learning media due to a test simulation that is useful to train students' understanding of non-electrolyte and Redox electrolyte solution material, and test simulations contained in mobile learning can be used whenever and wherever making students practice frequently so that students' school grades, especially in chemistry, can be better. The last indicator is an indicator of problem-solving self-concept ability, and students' skills in solving problems develop after the use of mobile learning media, especially regarding practical videos that help students to solve chemical problems when practicum activities other than the consequences of mobile learning.

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# Need-analysis of Interactive Games of Reading Literacy for Slow Learners

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**Abstract** In the 21st century, the way of learning has changed based on sophisticated technology. The use of technology tools is a basic necessity in today's education. In the meantime, interactive games are one of the most famous and effective technology tools in teaching and learning. Interactive games have been used to facilitate learning of reading skills. There is a need to pay attention to reading skills to improve and encourage Literacy Numeracy Screening (LINUS) students to engage and be responsible for their own learning. Many studies have shown that interactive games are capable of helping students improve their reading skills. However, researchers found that the existing interactive games do not emphasize on reading skills. In addition, the games have failed to sustain students' attention in learning because they are not empowered with gaming elements for learning purpose. These issues indirectly have limited active participation of students. The purpose of this paper is to identify slow learners' difficulties in reading literacy and develop Reading Literacy Interactive Games by incorporating the relevant pedagogical elements namely 5 Gaming Elements for Effective e-Learning by Kapp which listed 5 principles which engage learners into subject learning. The research method focuses on following stages: requirement analysis, design and development including alpha testing by validation from expert and beta testing which is user acceptances test to support efficiency and effectiveness of the courseware for further improvement. The result from the alpha and beta testing indicates a positive feedback on Reading Literacy Interactive Games (RLIG).

**Keywords** Interactive Games, Reading Literacy, Participation, LINUS, Slow Learner

## 1. Introduction

Today's education is often customizing goals and curriculum in line with technological developments. The technology-based learning process has a high impact on Learning and Teaching (L&T) through the application of dynamic and interactive learning elements (Genc, 2016). According to Case (2016), the application of technology in education encourages students to think critically in solving problems in learning. Therefore, more studies in educational technology are made especially interactive games.

According to Anderson (2015), interactive game usage can improve student achievement in L&T. The use of interactive games in mastering of reading skills can make learning more interesting, effective and productive (Sharifah, 2015). This statement is supported by Sanai (2013), in his study that the use of games in education can channel information quickly and accurately to facilitate reading literacy learning. In his study, Maimon (2013), agreed that the use of play materials can easily attract students to focus on L&T. Anderson (2011), and mentioned that using interactive games is a great resource for developing reading skills. Although interactive games have many advantages in L&T, there are some problems in the interactive games that need to be addressed so that they will not hinder in learning. Therefore, this study aims to review on the technical problems found in existing interactive games for reading literacy and its implications issues in the learning process.

Effective design of the game plays an important role in learning. Kapp (2016), insists that game designs should be user-friendly. Zicherman (2015), says most games on the market do not have user-friendly design elements and this causes players to fail in getting the general idea of which direction or the earliest problem solving. Wolfe (2016), expresses that a game for alphabetical and verbal teaching is

still a problematic issue in terms of clarity and allows players to quickly despair due to inadequacy of instructions. At the same time, Crawford (2015), states that reading-based games do not have effective interactive elements. According to Ertmer (2015), learning elements integrated with less playing do not interest students in learning and are less active in engaging themselves in learning. According to Noraiti (2014), the lack of elements of fun in the game also allows students not to get excited with their games and not to show interest in L&T. As a result, Blair (2016) states that the existing game design is less responsive, therefore students are not able to operate the game quickly. If a student waits long to get a decision or response to the answer, it will disappoint the student. It is supported by Crawford (2013), stating that a slow respond may leave students feeling bored and this hinders learning. RLIG believed to help slow learners to engage and raise their construction of knowledge in reading literacy (Sharifah, 2016).

## 2. Literature Review

### 2.1. Game Based Learning in Education

According to Rennie & Morrison (2013), games in education are a social interaction tool and contribute to cognitive development in early childhood education. On the other hand, Ya-Ting (2012), says that most of the existing games lack the cognitive development of pupils because of less focus on pedagogy emphasis. This is because, most games are designed based on the business model of Canvas and commercial purposes (Beetham & Sharpen, 2013). This Canvas Model is a model that is often used to develop a business-oriented game. Commercial interactive games do not stress the focus on learning and learning objectives are difficult to achieve (Perrotta et al, 2015). Students focus only on games but focus and confidence in learning are hard to achieve. Howard (2013), said the interactive game creators did not adapt learning skills aligned with the changes in the educational system but they were concerned with the elements of commercial games. This is why students who learn through interactive games do not make high achievement because they are more interested and engaged in playing games while focusing less on learning content. sed (Ronghuai et al, 2013).

At the same time, Prensky (2013) also said that interactive games for learning that emphasize "fun" elements as the main point of attracting pupils will cause pupils to lose interest in learning. Papastergiou (2015), the overwhelming element of excitement in the interactive games makes the student active in the game alone rather than learning.

Learning reading skills should be generative. The learning of reading skills according to constructivism is an active learning process, where pupils are educated to build their own knowledge and adapt them from old experiences (Jonassen, 2014). Instead, Gibson. et al., (2015), has stated

that interactive games fail to encourage students to actively engage in L&T because of the aspect of joining the old experience with new being ignored. This opinion is supported by Mahzan (2017), stating that pupils will reject games with no content similar to old experiences. While Ford (2014), said the lack of continuity between old and new learning in the game also enabled pupils to be inactive in L&T. The Education Policy Planning and Research Division (2010), proved interactive gaming tools for reading skills mislead students and they are not actively involved in L&T as students cannot compare prior and new learning. Joyce (2016), and Sandford (2017), pupils do not involve themselves actively because interactive games are not 'friendly' with them. Bitter & Legacy (2017), said interactive games that are very compact with learning environments also cause students to be less interested in using them again. In short, interactive games in reading literacy can improve student achievement, active involvement in L&T and increase student's interest in reading literacy learning. Instead, the existing interactive games for reading literacy still have some deficiency to focus on. The researchers have developed a framework for design interactive games that emphasize the elements of the game Kapp (2012), and the constructivism learning theory so the game gives a good impact on learning reading skills.

### 2.2. Designing Games for Education

According to Alessi and Trollip (2016), the challenge given in the reading interactive game allows pupils to combine skills that they have mastered earlier. However, Schifter (2013) said that the challenges in existing games cannot develop creativity and cultivate interest in learning. This opinion is supported by Gee (2016), the lack of elements of challenge in the game is difficult to stimulate players' thinking to solve problems unaware and they cannot apply some of the concepts and skills learned. Freeman (2014), said that most maze games for reading skills did not create opportunity rooms for students to use solution skills with quick response. Divjak (2015), proved this statement in his studies saying that students were not passionate in reading because power point based on games did not challenge students to answer the exercises.

Sitzmann (2016), said some games like Adventure Game are very concerned about the storyline. On the other hand, Nor Laila (2014) states that most pupils cannot improve their thinking skills analytically and do not understand the meaning or values contained in the words that are read because narratives in games are difficult to follow. Allen and Seaman (2013), stated that the absence of narrative elements in the game resulted in pupil's slow learning ability. Gary (2017), stated that pupils will depend on teachers if there is no narrative as a guide in the game. This is because, the students cannot understand the topic addressed if there is no such guide as the story narrative (Craft, 2016). Glonek (2014), however, says that games that do not apply narrative

stories will not create students who are involved actively in learning and they are less interested in learning. With narrative in games pupils can easily follow reading content. While Wiesendanger (2015), describes a well-designed narrative will cause the child to experience difficulty in reading and understanding the text easily and clearly.

According to Rennie & Morrison (2013), games in education are a social interaction tool and contribute to cognitive development in early childhood education. On the other hand, Ya-Ting (2012), says that most of the existing games lack the cognitive development of pupils because of less focus on pedagogy emphasis. This is because, most games are designed based on the business model of Canvas and commercial purposes (Beetham & Sharpen, 2013). This Canvas Model is a model that is often used to develop a business-oriented game. Commercial interactive games do not stress the focus on learning and learning objectives are difficult to achieve (Perrotta et al, 2015). Students focus only on games but focus and confidence in learning are hard to achieve. Howard (2013), said the interactive game creators did not adapt learning skills aligned with the changes in the educational system but they were concerned with the elements of commercial games. This is why students who learn through interactive games do not make high achievement because they are more interested and engaged in playing games while focusing less on learning content. sed (Ronghuai et al, 2013). At the same time, Prensky (2013) also said that interactive games for learning that emphasize "fun" elements as the main point of attracting pupils will cause pupils to lose interest in learning. Papastergiou (2015), the overwhelming element of excitement in the interactive games makes the student active in the game alone rather than learning.

The design of an existing reading literacy game focuses on playing only besides learning a lesson or reading skills. This is because, most games are designed based on the business model of Canvas and commercial purposes (Stockwell, 2015). This Canvas model is a model that is often used to develop a business-oriented game. Commercial interactive games do not emphasize the focusing of students on learning and learning objectives as well as difficulties (Perrotta et al., 2013). Butler (2014) also notes that interactive game creators don't have educational background and they are focusing on interactive game sales markets such as Angry Birds, Candy Crush and others so that pupils focus only on games and confidence in learning is less achieved. Lin et al., (2016), also said interactive game designers did not adapt their learning skills often with the changes in the educational system but they were concerned with the elements of commercial games. This is why students who learn through interactive games do not achieve high achievement because they are more interested in playing because content is less focused (Ronghuai et al., 2013). At the same time, Prensky (2013), also said that interactive games for learning that

emphasize "fun" elements as the main point of attracting pupils will cause pupils to lose interest in learning. According to Allen et al., (2014), interactive games lack the skills to improve and give students confidence to learn but the element of challenge in the game attracts pupils because of the excitement and satisfaction that come from winning in the game. This opinion is backed by Altura (2015), stating the overwhelming element of excitement in interactive games causes the student to be active on the game alone instead of learning. In short, the perspective of nature (Dalton, 2016), behavioral learning perspective (Dourda, 2016), cognitive perspective (Figueroa, 2015) self-determination perspective (Eisenchlas, 2016), perspective of interest (Fernandez, 2013) are less emphasized in the existing interactive game.

In short, interactive games in reading literacy can improve student achievement, active involvement in L&T and increase student's interest in reading literacy learning. Instead, the existing interactive games for reading literacy still have some deficiency to focus on. The researchers have developed a framework for design interactive games that emphasize the elements of the game Kapp (2012), and the constructivism learning theory so the game gives a good impact on learning reading skills.

### 2.3. Reading Literacy Problems

There are so many students who are in the level one (standard 1 to 3) and still do not recognize the letters that are reading literacy problems and it causes them to fail to read well (KPM, 2012). According to Block (2017), the pupils read the alphabet by guessing. While Corey (2017), states that there are some small letters which have the same shape such as 'p' and 'q', 'b' and 'd', 'n' and 'h' and so on confuse the students. Duke (2015), also states that students are afraid to read the word due to the inability to interpret the symbol of the letter. Teele (2018), says there are still elementary pupils who can't discriminate against the shape, position, name, or designation of a letter. The students are also confused with the sounds of the same letter such as 'p' and 'b' (Blanton, 2017). There are some of students who are not sure to name the uppercase and lowercase as their shape changes (Bonds, 2017). Chiristo et.al (2016), emphasized that pupils with basic reading problems are not categorized as dyslexic students. Table 1 shows the number of slow learners who have basic reading literacy problems in Johor.

Based on Table 1 the Segamat district has the highest number, with a total of 7983 students. Mersing is followed by 7478 students. The third place was Johor Bahru with a total number of pupils without basic literacy skills of 6978 students. For other districts the number is not so high than the actual amount. This number proves our country faces serious reading problems amongst students.

**Table 1.** Number of Slow Learners Who Have Basic Reading Literacy Problems In Johor 2019

District	Enrollment of Level 1	Total of Slow Learners	Percentage of slow learners
Batu Pahat	11618	1079	9.29
Johor Bahru	24099	1349	5.60
Kluang	8421	580	6.89
Kota Tinggi	6110	569	9.31
Mersing	2600	247	9.50
Muar	6880	548	7.97
Pontian	5108	451	8.83
Segamat	5571	629	11.29
Kulai	10924	770	7.05
Pasir Gudang	22551	1400	6.21
Tangkak	3824	307	8.03
Total	<b>107706</b>	<b>7929</b>	<b>7.36</b>

### 3. Purpose of the Study

This paper focuses on the learning of reading literacy. Ministry of Education Malaysia (MOEM), determines that all students in level 1 need to master reading skills that pass the 12 reading literacy constructs. According to Ministry of Education Malaysia (2013), the first three constructs in reading literacy are very important and basic support for mastering reading skills. Otherwise the students are categorised as a slow learner. The topics namely reading vowel and consonants letters, reading simple syllables and reading the simple words. All the learning topics interrelated to each other. According to Kamaruddin (2013), there are many students who can not recognize letters, do not spell syllables and can't read simple words. Hence, the main concern of this research is to identify the difficult topics in reading literacy among level one students in primary school, design and develop an interactive game based on the difficult topic by integrating five engaging game elements by Kapp (2012) and constructivism learning principles by Jonassen (2014). Finally, alpha testing and beta testing conducted to support suitability and acceptability of the RLIG. This paper discusses the early stages of the project such as analysis of number of students and the needed analysis only. The design and development and evaluation areas that focus on performance will be discussed in the future.

### 4. Method

This study aimed to find the problems of interactive games and reading literacy problems among level one students to develop an interactive game for reading literacy (RLIG) as a learning tool for learning of reading literacy for slow learners. The researcher conducted a screening test to 60 students who were categorized as slow learners in two primary schools from Johor, Malaysia to identify problems of reading literacy. Screening test is a test to filter or screen pupils with learning

problems from the normal class. Teachers can track pupils who are expected to need a remedial education as a result of the Screening Test (MOEM, 2012). Screening tests have been verified by content experts before implementation. This screening test has been conducted to generally examine students' weakness in reading literacy among primary schools. Therefore, screening tests are conducted to diagnose areas of literacy reading difficulties among students. The screening test contains 12 reading literacy constructs as listed in the Remedial Education Curriculum. This test is tailored to Reading Literacy Screening Test, year 2018. Each learning topic has five questions. So, sixty questions should be answered by the student. Students must answer four out of five questions correctly. If less than four, the pupil is categorized as slow learner while more than four, categorized as an ordinary student.

According to Kamaruddin (2013), diagnostic tests need to be conducted to identify the causes of student failure to master reading literacy and specific groups according to their capabilities and difficulties faced. The results of this diagnostic test also help to design specific content in RLIG for the individuals or groups more accurately and systematically according to student's level. KPM (2012), students need to master all the sub-skills in each reading literacy to master reading skill. Accordingly, researcher provide diagnostic tests that examine three basic constructs of basic reading literacy that examine each sub-skill in its construct.

Thereafter, the researcher collected various information related to learners' difficulties to acquire reading skills before designing and developing the RLIG. Then, the prototype of learning interactive games was constructed and was designed and developed by using 3D Unity Software. During the design and development phase, the researcher adapted 5 engaging game elements by Kapp (2012) and constructivism learning principles by Jonassen (2013). Finally, the interactive game was evaluated by adapting

alpha testing, beta testing and user acceptance testing to support efficiency and effectiveness of the interactive game for further improvement.

## 5. Results and Discussion

### 5.1. Requirement Analysis

A total of 60 remedial education students answered the screening test. The initial test results found that the number of students facing difficulties in literacy reading was different. Table 2 shows the number of pupils and their difficulties in reading literacy constructs.

The results of this screening test showed that many students still failed to master the first three reading literacy constructs. According to Kamaruddin (2013), the first three

constructs in reading literacy are very important and basic for mastering reading skills. There are 56% of students unable to master the three basic constructs in reading literacy. So they are unable to continue next construct of reading literacy. So the researcher concluded that the achievement in the first three constructs in reading literacy is very meaningful to master reading literacy by slow learners. This screening test enables researcher to identify the difficult topic in reading literacy to further investigate specific inability in respective topic of learning.

Researcher has undergone another measurement called diagnostic tests to detect the causes and areas of weakness in detail faced by slow learners. The researcher selected 33 out of 60 students who had failed in three basic constructs in the screening test for oral diagnostic tests. Table 3 shows the number of pupils and their difficult areas according to reading literacy constructs.

**Table 2.** Number of Pupils and Their Difficulties in Reading Literacy Constructs

Reading Literacy Constructs	Number of students master the topic	Percentage of numerated (%)	Number of students yet master the topics	Percentage of innumerate (%)
Read vowel and consonants letters	27	45	33	55
Read open syllables	25	42	35	58
Read the words of open syllables	25	42	35	58
Read closed syllables	23	38	37	62
Read the words of closed syllables	23	38	37	62
Read the words containing syllable of "ng"	20	33	40	67
Read the words containing a diphthong.	19	32	41	68
Read the words that contains double vowel	18	30	42	70
Read the words containing a prefix and suffix	17	28	43	72
Read simple sentences	14	24	46	76
Read and understand sentences based on materials	14	24	46	76

**Table 3.** Number of Students and Difficulties Based on Reading Literacy Construct

Construct	Sub-skill	Mastered	%	Not yet mastered	%
1	Read vowel				
	a	20	61	13	39
	i	15	45	18	55
	u	14	42	19	58
	o	20	61	13	39
	e	16	48	17	52
	Read consonants				
	b	20	61	13	39
	k	14	42	19	58
	n	13	39	20	61
	p	12	36	21	64
	q	14	42	19	58
2	Read open syllables				
	ba	8	24	25	76
	cu	8	24	25	76
	do	7	21	26	79
	ne	6	18	27	82
	ri	7	21	26	79
3	Read the words of open syllables				
	sapu	2	6	31	94
	dobi	3	9	30	91
	keju	2	6	31	94
	petola	0	0	33	100

Researcher found that 49% of students were still unable to read vowels and 57% of students did not read the consonant letters. Furthermore, 84% of students were unable to read the open syllable. Total of 95% of students were unable to read the open syllable words. Researcher can formulate all these problems as the main cause of students not mastering reading literacy. So the researcher wanted to develop RLIG with three basic constructs of reading literacy.

## 6. Conclusions

The paper discusses on requirement analysis and content of interactive games of reading literacy that is able to help slow learners to overcome their difficulties of basic reading literacy skill. The integration of basic learning skill according to the latest syllabus, learning theories and game-based elements is able to enhance learners' participations in learning. Thus, it will lead to better understanding on topics of learning. In sum, the RLIG creates much more fun learning and allows learners to grasp the content of knowledge by retaining their engagement on learning.

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# Juvenile Delinquents' Learning Experiences in School within Prison: Narratives from the Malaysian Context

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**Abstract** Juvenile delinquents are those within the age of 10 to 18 years old who committed crimes or engaged in acts against the law. Those who are caught would be punished according to the law and serve their time either in correctional institution or prison depending on the severity of crime committed. Since they are considered as minor and supposed to be at school, while serving their time, they would have to attend school within the prison. Within the Malaysian context, these schools are referred to as Integrity Schools. This study aims to explore the learning experiences of juvenile delinquents in one of these schools. This qualitative study employed a narrative approach involving two students aged 18. Data was collected using semi-structured interviews, which were divided into two parts. Part A focused on the background information of the respondents while Part B consisted of questions meant to answer five research questions. Salient themes were derived from an inductive content analysis guided by the five research questions related to the juvenile delinquents' learning experiences while participating in educational program at the integrity school. The findings showed that both of the respondents expressed various learning experiences and there were a few similar experiences identified among both of them. Finally, the study suggested future researchers to include post-release experiences of juvenile delinquents in order to examine whether the benefits they hoped for upon release were genuinely attained.

**Keywords** Juvenile Delinquents, Learning Experience, Integrity School, Qualitative Study, Narrative Approach, Malaysian System

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## 1. Introduction

Juvenile delinquent refers to a person aged below 21 who

participates and acts a crime such as rape, burglaries, property crime and so on has been sentenced to the Juvenile Court<sup>1</sup>. The phenomenon of juvenile delinquency among adolescents is increasingly alarming in Malaysia and leads them to be apprehended by law enforcers and juvenile delinquents end up in prison or correctional institution<sup>2</sup>. In general, for severe crimes committed, offenders would serve their time in prison, rather than correctional institution though. However, for offenders below 21 age, since they still hold the status as students at this age, they are regarded as juvenile delinquents and thus this later will raise the question of how juveniles who are serving a sentence obtain their educational right<sup>3</sup>. In this regard, with the introduction to correctional education as a part of the prisoner's rehabilitation, it provides a second chance for offenders to improve their chance to be reintegrated into the society and diminishes the rate of committing similar crime in the future<sup>4</sup>.

Based on statistics of juveniles' education level<sup>5</sup> in Malaysia as reported in 2013, it showed that out of the total 2831 juveniles, 161 or 5.69% aged 17 and under, 611 or 21.58% aged 17 - 18 years and 2059 or 72.73% aged 19-20 years. In general, 2257 students or 79.72% went to pursue their study at the secondary school level. Moreover, as stated by The National Education Policy, Secondary Education is for students aged 12+ to 17+, therefore, this high rate indicates that they should be given an opportunity to continue schooling<sup>6</sup>.

It is significant to establish in-school communities that encourage school surroundings because these elements increase students' engagement and participation in the academic activities at schools. Students who think their schools provide constructive quality, attentiveness and encourage the growth of learning environment will meet academic success preferably than their peers who drop out from the school<sup>7</sup>. Major offenders desire to become better individuals when released from detention and hope not to be detained in prison and even desire to become employed

successfully<sup>3</sup>. It was further stated that numerous studies displayed that the effective method to rehabilitate and reform behavior is through education.

## 2. Background of Study

Currently, there are only few countries in the world that provide educational facilities in prison and Malaysia is one of them. Malaysia's current history shows both the potential and difficulties of education in prison<sup>8</sup>. The success of the school within prison, known as Integrity Schools, was not only an outcome of school's decision in providing support for its students. In fact, despite all odds, students take the initiative to actively engage in classroom, determine to complete their assignments on time and work hard to achieve an excellent result<sup>9</sup>.

Even though there might be rooms for improvements in prison education, there are still vast potentials for exploration. Students often experienced the barriers to obtain knowledge in learning due to various factors existing in prison environment. Due to the personal educational experiences of offenders both prior to and during incarceration, they have negative thoughts related to schooling which is due to unpleasant experiences that contribute to the feelings of embarrassment and rage at becoming ineffective in a society whereby educational attainment is greatly valued<sup>8</sup>.

Most studies in the field of education in prison in Malaysia only focused on the effectiveness of the educational program<sup>10,11</sup> and recidivism<sup>10, 12, 13</sup>. However, only a few local studies carried out are regarding the challenges faced by students while engaging in the learning process in the prison<sup>14, 15</sup>. Moreover, general qualitative approach related to juvenile delinquents' educational experience in the school within the prison is limited in Malaysia. This study intended to narrow down the gaps in the literature by giving the opportunity to voice out unheard educational experiences but directly affect offenders at school within the prison or Integrity Schools. The following research questions were addressed:

1. What are the students' perceptions towards their prior education?
2. What motivates the students to participate in education program?
3. What are the students' perceptions regarding their studies in the prison?
4. What kind of challenges faced by the students while studying in prison?
5. What are the possible benefits of studying in prison to bring in their lives after released from detention?

## 3. Methodology

### 3.1. Research Design

This research used a qualitative methodology in order to

explore the research questions stated, and to ensure a rich body of information and data was collected. Specifically, this qualitative study employed a narrative approach. As a distinct form of qualitative research, narrative approach usually emphasizes on studying an individual, gathering data through the collection of stories, reporting individual's experience, and discussing the meaning of those experiences for the individual<sup>16</sup>.

### 3.2. Sampling Design

The current research utilized purposive sampling to determine and select the information-rich cases for the most proper utilization of available resources. This requires identification and selection of individuals or groups of individuals who are experienced and well-informed with a phenomenon of interest<sup>17</sup>. Apart from knowledge and experience, importance was emphasized on the willingness and availability of the participants, and ability to express their experiences and perspectives in articulated, expressive, and reflective manner.

The sample size was limited to two juvenile delinquents who were currently undergoing educational program in Integrity School and willing to participate in this study in sharing their learning experiences. This study involved only two participants from a population of 91 juvenile delinquents from an Integrity School situated in the southern state of Peninsular Malaysia, established and maintained by the Department of Social Welfare.

### 3.3. Data Collection Procedure

Research data was collected by using semi-structured interviews with open-ended questions. Sub-questions were determined in the semi-structured interviews. Research using semi-structured interview is able to necessitate clear exploration of research questions as well as provide reliable, comparable qualitative data<sup>13</sup>. The open-ended questions in semi-structured interviews allow researchers to further their investigation in searching more detailed and elaborated information that is significant for respondents. In addition, this also provides the opportunity for identifying new ways of seeing and understanding the relevant issues which may not have previously been thought of as relevant to be researched.

In short, in this study the semi-structured interviews with open-ended questions were considered as one of the most appropriate types of interview because the interviews lead to narration of experiences in story-telling form by the respondents. Before the commencement of the interview session, the respondents briefed about the purpose of the research and the ethical principles such as confidentiality, anonymity, and right of withdrawal at any time during the interview sessions. The briefing helped the respondents to understand the interviewing process and minimize any discomfort that they might experience while being

interviewed. All of the interview sessions were audiotaped and written notes were taken during interview sessions with respondents' permission.

**3.4. Method of Data Analysis**

The study employed inductive content analysis approach to analyze the data. As the name indicated, the inductive content analysis depended on inductive reasoning, in which themes were derived from the raw data through repeated examinations and comparisons. There are five steps that should be considered in inductive content analysis, which are, (1) open coding, (2) axial coding (3) creating themes, and (4) report findings of the study<sup>19</sup>. Therefore, the inductive content analysis was commenced by organizing the raw data by transcribing and typing verbatim transcripts, and following by close readings of the data. Data was analyzed by identifying open coding and axial coding. In the open coding column, the main parts of the responses of the participants were highlighted which answered the questions<sup>20</sup>. From the open coding specific responses that were derived and presented in axial coding column in which they contained axial coding to create description for themes<sup>20</sup>. Finally, presented were the findings based on the interpretation of the data.

**3.5. Reliability and Validity**

In order to strengthen the reliability and validity of qualitative studies as well as balance bias issues that may occur in data collection or while analysing qualitative data<sup>21</sup>, credibility, transferability, and dependability were used.

**3.6. Ethics Approval**

Informed consent was obtained by registering and

submitting application form to conduct research through MyResearch, an online application system of Department of Social Welfare, Malaysia. As a part of the regulation to conduct research involving juvenile delinquents at a prison integrity school, the report was submitted to the Department of Social Welfare upon the completion of the research. Confidentiality was applied by securing respondents' identity through the use of pseudonyms assigned for the research participants. In addition, the respondents explained their rights to participate or withdraw prior to data collection i.e. the interview sessions.

**4. Findings**

This section highlights the common, dominant and frequent themes raised by the respondents during their interview sessions. Data gathered from the interviews was analyzed and interpreted which was derived from two (n=2) respondents. The background information of the respondents was presented first in order to underpin the potential transferability of the research findings.

**4.1. Background Information of the Respondents**

Table 1 shows the background information of the respondents. Both respondents were 18 years old when this study was conducted. Both were female and identified themselves as Malay. The highest level of education of both respondents was Malaysian Certificate of Education or *Sijil Pelajaran Malaysia* (SPM). The type of educational program that was currently participated by both respondents is vocational program. Respondent 1 indicated that she had experienced health problems or involved in substance abuse previously whereas Respondent 2 did not have any health problems nor involved in substance abuse before.

**Table 1.** Background information of the respondents

Name	Age	Gender	Race	Highest level of education	Types of educational program	Health problems or substance abuse
Respondent 1	18	Female	Malay	Malaysian Certificate of Education ( <i>Sijil Pelajaran Malaysia</i> )	Vocational	Yes
Respondent 2	18	Female	Malay	Malaysian Certificate of Education ( <i>Sijil Pelajaran Malaysia</i> )	Vocational	No

#### 4.2. Analysis of Interview Data

The following section highlights the themes that are derived from the interview data. Each research question has several interview questions and therefore, the themes are displayed according to each of the interview questions. Both respondents are assigned and identified with pseudonym, namely R1 for Respondent 1 and R2 for Respondent 2 to present their responses from the verbatim transcript.

*Research Question 1: What are the students' perceptions towards their prior education?*

Table 2 summarizes the main themes derived from responses of the respondents regarding their educational background, relationship with teachers and authority figures, and peers as well as their perceptions on the influence of the relationship they had and prior academic achievement. Three interview questions were asked and seven themes were emerged from Research Question 1. Responses from Question 1 displayed that school mobility occurred from kindergarten until they discontinued their study in secondary school prior to detainment. They stated one common reason of school mobility which was following their family to move to different areas. Their answers mainly illustrated their experiences while attending primary and secondary schools. They elaborated how frequent change of schools affected their academic performance specifically how it interfered their learning due to their family move to a new place. They lamented how transition to the new environment made them face different sets of difficulties which they had to cope and it took longer time for them to adapt to new surroundings. They also had to catch up with the syllabuses which might have been covered in their new school. In addition, they also had to adapt to the pace of teaching and learning activities which might be different from their previous school. This resonates with what Respondent 1 had experienced

*"I felt difficult to study because change schools...new school... new teachers, there is things that I did not learnt in old school, will already been taught in new school. Sometimes I will be thinking what the teacher is teaching because I just came into the class"*

However, both respondents did not report any extreme behavior of not completing school assignments. Respondent 1 stated that her own attitude and inability to comprehend the content of the subject as the reasons for not completing schoolwork or homework. Respondent 1 further explained that

*"Some school work is really difficult to do. Like Mathematics right, I don't know how to do it so I won't do it."*

In this regard, her performance in learning was reported through reviewing her academic achievements and attitude in the classroom.

Interview about question 2 explores the relationship between the students and their teachers and school authority figures and how the relationship has an impact on the students' academic performance. Losing concentration in learning by displaying behavior of being inactive in class concerns the teachers. In accordance to this, the teachers displayed their concern by encouraging the student to involve in the various learning activities. It can be seen that the respondent identified herself as a quiet student and less engaging in classroom activities but still expected the teacher to pay attention to her learning.

In interview of question 3, respondents expressed that they tended to befriend with older students whom they considered as mature, reliable and with thoughtful ideas, which would help them in their learning. Peers' willingness to assist them in teaching using simple, straight-forward method and also giving tips and tricks to study has helped them to learn better.

**Table 2.** Themes emerged from interview questions in research question 1

Interview Question	Themes
<b>Question 1: Share about your educational background from kindergarten up to the highest level that ever learn before you enter into this school?</b>	Frequent school changes affect student academic achievement
	Failure in submitting school assignments
	Inconsistent performance in learning
<b>Question 2: Share with me your relationship with teachers and school authority figures and how it influences your academic performance?</b>	Teachers' concern towards student's academic progression
	Teachers' lack of attention on student ability in learning
<b>Question 3: Share with me / describe your relationship with the friends and how it influences your academic performance?</b>	Surround oneself with smarter students
	Peer tutoring in learning

**Table 3.** Themes emerged from interview questions in research question 2

Interview Question	Themes
<p><b>Question 1: What is the reason you chose to participate in the educational program?</b></p>	To get a job after release
	Learning to acquire training certificate
	Education and training available at low-cost
	Learning to attain a specified objective
	Participate to do something enjoyable
	Passing the time effectively

*Research Question 2: What motivate the student to participate in educational program?*

Table 3 summarizes the main themes derived from responses of the respondents regarding the reasons they chose to participate in vocational program. Six themes emerged in Research Question 2. Respondent 1 stated her aim to get employed as motivation for her to learn new skills through vocational program provided by the school. The respondent also considered the program availability at her place of residence. Besides that, she also expressed several reasons that motivate her to participate in the vocational program. One of the reasons is she not only can obtain certification but also learn skills like sewing that are beneficial to her to get employed after serving her time in prison. In this case, she believes that she can be self-sufficient in getting herself employed.

Another reason is the program that Integrity School provides is perceived as comprehensive and such training might be costly elsewhere. Respondent 1 specifically said Integrity School helps her to attain several goals in life. Respondent 2 retrospectively elaborated her motive to participate in the educational program provided at the school.

*"My time in here won't go wasted after I complete my academic program. Actually, I don't like tailoring but I would not be wasting my life for another one month. I will get released next month so I feel instead of not doing anything, I can actually learn something here"*

Respondent 2 also reported that she feels motivated to engage in enjoyable various activities while studying in Integrity School and this reason drives her to actively participate in the educational program it offered. She also wishes to use her time in prison constructively.

*Research Question 3: What are the students' perceptions regarding their studies in the prison school?*

Table 4 summarizes the main themes derived from responses of the respondents regarding the students' current participation and learning experience in educational program. There are two questions asked and four themes emerged in Research Question 3. When asked to describe their feelings about the school environment and the facilities available in the school and its influence on their learning – Question 1, both respondents stated they are satisfied with the sufficient facilities and activities provided in the school. Respondent 2 elaborated in detail

*"In the term of education, sport ... we have everything here. This school gives me a second chance to study ... continue my academic, gives me a chance to participate in sports ... all sort of things. It helps me to become a disciplined student ... first, be punctual in sports practice and complete my class work. We have a theory and practical so I need to finish my sewing within certain time before moving to next stage. Second, discipline myself by marching. I'm a leader of marching band, then I can also participate in dance, Kompang"*

However, Respondent 1 lamented that the environment of her dormitory creates unpleasant atmosphere. Both of the respondents shared similar discontented view on the limitation for visiting hours by their family members. In Question 2 – relationship with peers while studying, Respondent 2 shares that she seeks for peers' assistance to improve her learning. She decides to befriend and surround herself with smarter students as a strategy to learn effectively.

**Table 4.** Themes emerged from interview questions in research question 3

Interview Question	Themes
<b>Question 1: Share/ describe your feelings about the school environment and the facilities available in this school and its influence on your learning?</b>	Various facilities and activities
	Unpleasant environment
	Limited visiting hours
<b>Question 2: Share/ describe about your relationship with the students/ peers while studying?</b>	Peer teaching assist student's learning

**Table 5.** Themes emerged from interview questions in research question 4

Interview Question	Themes
<b>Question 1: Share with me your experience with the school environment that does not help/ prevent from learning and achieving in school.</b>	Limited social interaction
	Unpleasant atmosphere disrupt learning
	Distracting school schedule
<b>Question 2: Share with me your experience with the teachers that do not help/ prevent from learning and achieving in school.</b>	Negative attitude of the teacher towards the student
	Insufficient number of teachers available
<b>Question 3: Share with me your experience with the authority that does not help/ prevent from learning and achieving in school.</b>	Receive unfair treatment from authority towards the student

*Research Question 4: What kind of challenges faced by students while studying in prison?*

Table 5 summarizes the main themes derived from responses of the respondents regarding difficulties faced by the students in the term of school environment, the available facilities and how prison condition affects their learning. There are three questions asked and six themes emerged in Research Question 4. In Question 1, Respondent 1 emphasizes social interaction that she perceived has been restrained for students studying in prison school. She reported the school environment which is situated in a prison created a confined space by limiting students from interacting with friends and family freely. Respondent 1 also lamented that the school environment within school also creates an unpleasant atmosphere which interferes with her learning. She struggles to focus on her learning due to various disturbances mainly caused by other students and offenders. The respondent stated that she feels stressful by one of the school rules which emphasizes on roll call during teaching and learning period specifically as well as punishment which would be given to all of them even though they are not the perpetrators. She lamented that

*"If one makes mistakes, everyone will get punishment at once ... so for me, it's very challenging. They like to mess around ... until get punished. They are quite stubborn people so everyone will get punishment because of them"*

In Question 2, Respondent 1 felt that the teachers have negative attitude towards her involvement in other activities apart from sewing classes. Respondent 2 brought up the issue of lack of teachers' availability in the school. In Question 3, both respondents shared a similar experience where they received unfair treatment from prison school authority. The school authority plays little roles in student's education

because they focus more on student' behavior management and rehabilitation.

*Research Question 5: What are the possible benefits studying in prison to bring in their lives after released from detention?*

Table 6 summarizes the main themes derived from responses of the respondents regarding benefits the student received during their participation in the educational program or the benefits that they hope to attain after being released from detention. There are two questions asked and five themes emerged in Research Question 5. In Question 1, Respondent 1 and Respondent 2 stated in the interview session that the school helps to improve their educational performance by developing self-discipline. Respondent 1 felt the school helps to improve her educational performance by associating it with the skill certification that she would receive when she completes the vocational program.

In Question 2, Respondent 1 shared about her aim of not repeating the offence she previously committed by appropriately matching re-offending thought with learning religion. Respondent 2 correlated her self-confidence with the types of activities and achievement she attains while participating in several activities while Respondent 1 believes that she has benefitted a lot throughout her involvement in the sewing program which helps to increase her employability skills. Respondent 2 reflectively stated that *"Before this, I wasn't confident enough. But after I came here, I learn to believe myself. When I was outside, I always said I can't do anything. I did not expect that I will get the opportunity to represent sports at regional and state level. So, I think it just my own words have been haunting me that I can't do anything but in reality, I could achieve something."*

**Table 6.** Themes emerged from interview questions in research question 5

Interview Question	Themes
<b>Question 1: Do you feel this school helps to improve your educational performance? Explain why.</b>	Develop self-discipline
	Employability skills
<b>Question 2: Tell me about the benefits that you believe you received in this school throughout your involvement in the educational program.</b>	Reduce the thought of re-offending
	Increase self-confidence
	Enhance employability skills.

## 5. Discussion

### *Research Question 1: What are the students' perceptions towards their prior education?*

The juvenile delinquents' perceptions on their prior education influence their learning either positively or negatively. Their neutral perceptions of the influence of prior education would be associated with their experiences to face challenges due to frequent school changes. The feeling of low self-esteem and adjustment difficulties to new environment, friends and teachers are attributed to frequent change of schools that they perceive to interfere with their learning. A sense of insecurity affects them to confidently form new relationships as well as learn new things which can be related to female students' personal traits<sup>22</sup> as having high tendency to be affected by internalizing responses such as depression and anxiety as compared to boys who are more likely to react externally. Shifting to new school might cause students to lose contact with their old friends and teachers and it also requires them to form new relationships at their new schools in order to survive in the new setting. Interaction with peers at school could also be affected while they are adjusting themselves to the new environment and facing various social challenges<sup>23</sup>. As expressed by both students in this study, gaps or repetitions in coursework and curricula, different academic standards and expectations pose challenges for them as they are required to repeat some of the content of certain subjects or syllabuses that they have already learned and mastered<sup>24</sup>.

In addition, another cause of students to perform poorly in their learning might be due to failure of submitting schoolwork which could be attributed to students' attitude and inability to comprehend the content of the subject list which inadvertently leads to hyperactivity, easily feeling bored and tired, shy and overly sensitive. The current findings reported that they are incapable of understanding the assigned homework. Another major reason of students who don't complete homework is they do not know how to do it and sometimes they are not able to comprehend the instructions of the assigned homework.

However, ineffective technique of learning paired with lack of focus might also lead to inconsistent academic performance. Paying attention might assist the learning process where it has substantial influence on immediate response of student and eventually leads to better academic outcomes<sup>26</sup>. Both juvenile delinquents shared common

perceptions regarding their teachers' influence on their academic performance. Teachers' concern towards their students learning shows that positive relationship was established among both parties. It is essential to have educators who concern for their students' strengths and needs, and who build and sustain an encouraging relationship with their students as well as maintain equality in providing opportunities to engage in the learning process<sup>27</sup>. Such chances make students feel comfortable to engage in classroom discussion and activities and this would inadvertently improve their academic skills. However, it is also important for the students to have a reciprocal relationship with their teachers.

Respondent 1 had difficulties to establish such relationship but expected the teacher to encourage and motivate passive students like her in the learning process. Almost every student has experienced moments where they feel difficult to express themselves in class due to shyness while doing activities at school. If a teacher has not dealt with the issue well, this might cause such students to decrease their level of self-confidence and usually, the students would withdraw from participating in any classroom activity<sup>28</sup>.

Respondent 2 viewed positively the peer effects towards her learning. She has benefitted through peer interaction to increase her knowledge in learning especially through socializing with smarter peers. Students who are interested in academic issues are more likely to associate with peers who have the similar interest and aspiration and usually are perceived as smarter than them in order to help improve their academic performance and students who build positive peer group make more effort during learning and social activities<sup>29</sup>.

### *Research Question 2: What motivates the student to participate in educational program?*

Generally, goal is the factor that affects the intrinsic and extrinsic motivation of a student. The factor of choices to participate caused by internal and external factors puts the goal as a drive for participation in the educational program among the juvenile delinquents in the school within the prison<sup>30</sup>. Respondent 1 hopes to achieve specific objectives that she has set for herself by starting up a sewing business. She also has an alternative plan where she wants to get employed upon released related to the educational program that she undergoes at Integrity School. This is one of the

reasons she prefers to participate in the vocational program and does not aim to pursue her studies in academic line.

In this case, having desire to improve one's occupational skills to be better prepared for the labor market after being released motivates them to participate in the educational program as exemplified by Respondent 1. Motivation is a set of processes that energizes one's behavior and the aims lead the behavior to achieve a goal<sup>31</sup>. In this sense, a motivated person will make a positive choice based on the set goals and he or she is convinced that the action is meaningful to him or her and can satisfy his or her needs.

Intrinsic motivation is also important to sustain student engagement in vocational activities. Students who are intrinsically motivated to participate in a program are due the way they perceive the task as interesting and it is enjoyable to learn<sup>25</sup>. Intrinsic motivation exists in the nexus between a person and a task in which the task is being perceived as interesting or in the other sense, the feeling of enjoyment and satisfaction a person gets while engaging in the task. Student's desire to alleviate or have a distraction from the prison environment drives the offender to participate in the educational program<sup>32</sup>. Even though escaping from other prison work and wanting to kill the time is not an ideal motivation to participate in learning, yet over a period of time offenders might become involved in prison education and indirectly start to develop the interest in the learning and conclude that it is something worth pursuing. The behavior of individuals who are motivated could be signified by the individual desire to overcome obstacles and be able to work hard to achieve their goal<sup>31</sup>.

As exemplified in this study, even though there are several obstacles faced by the Respondent 1 while learning such as having disruptive peers and unpleasant environment, she decides to participate and start to work hard by creating routines with the aim to gain knowledge and skill from learning theoretical and practical sewing techniques of various clothing designs that would enable her to pursue better work opportunities. She embraces this goal wholeheartedly. Respondent 1 is highly motivated by extrinsic motivation where she participates in learning with the hope to acquire certification and relieve her from financial burden. All behavior is motivated by rewards and intrinsically motivated activities appeared to be ones for which the reward has existed in the activity itself<sup>35</sup>.

Acquiring the certification is considered as a reward and testimony of the learning and training that they have undergone. Certification that is obtained also serves as the sign of completing the prison education and a source of pride and joy. Such certificate is highly valued for advancement in their future career. Providing education at lower cost by an organization naturally attracts low socio-economic status and families to encourage their children to participate in those education programs<sup>35</sup>. A limited option available in the vocational program or the difficulty of the course does not hinder one of the respondents to pursue her education because the motivation to get a low-cost education in order to free from financial burden when she completes her studies

emerged as a priority.

*Research Question 3: What are the students' perceptions regarding their studies in the prison school?*

Adequate and various facilities and activities for prison education help the offenders to learn effectively. Sufficient provision of facilities and active participation in various activities assist the student to acquire knowledge successfully<sup>36</sup>. The availability and genuine utilization of Integrity School facilities and activities influence positively students' personal development and academic achievement. Integrity School understudied in this study provides various non-educational activities and encourages the students to participate in it in order to develop self-concept, reform, and occupy their time outside classroom learning and training.

Although the school does it best in providing quality educational program, both of the juvenile delinquents have perceived some drawbacks. The feeling of unpleasant feeling towards the school environment stated by one of the respondents is specifically associated to the disruptive behavior of other students in the dormitory which creates uncondusive setting for learning. Disruptive behavior has negative impacts in the classroom through various ways and it disrupts the smoothness of the learning process of other students<sup>37</sup>. It was highlighted the difficulties associated with the negative attitude of inmates by involving in fights or bullying other inmates interfere with learning process as well as create a hostile atmosphere and develop a sense of insecurity for other inmates<sup>38</sup>.

Apart from that, although the prison school designed and required the students to obey the rules and regulations, the students viewed limited visiting hours by family members who develop feeling of detachment and sense of longing to gain love and affection from their family members. Students are still allowed to have physical contact with outsider but the rules are devised to limit the contact due to the security risk. The effect of strict security causes imprisonment to increase the feeling of loneliness and it may not in itself be conducive to the acquisition or strengthen social skills<sup>39</sup>.

Prison school culture is different from mainstream school culture but, the students' experiences or relationships with the other students or peers are quite similar. One of the respondents' attitudes towards surrounding herself with smarter students is regarded as an educational strategy to learn effectively that could be sustained and applied in future as well. The closest social interaction for an offender is with other offenders where eventually they will establish a decent relationship and assist each other in learning as well as give moral encouragement<sup>40</sup>. Similar to normal school, peer tutoring is essential since teachers are available for a certain and limited time, but peers can assist each other anytime by sharing ideas, giving-receiving feedback, and evaluating their own learning<sup>41</sup>.

*Research Question 4: What kind of challenges are faced by students while studying in prison?*

The challenges experienced while participating in

learning interfere the student's learning as well as education attainment. Respondent 1 shared her experiences of limited social interaction with the individuals from outside of the school as a form of social education. As a matter of course, the offenders feel they are marginalized from the community and the experience of living behind the bars predominantly will aggravate their sense of detachment from the community as well as intensify their strains in coping or interacting with the community at large<sup>42</sup>. Restrained from interacting with outside world develops a negative attitude among the public and it was taken as a discouragement for the students to continue and give their full commitment in learning.

Unappealing environment in which education takes place can weaken the juvenile delinquents' motivation to learn. When educational activities take place together in an indistinct location where an unattractive atmosphere has already established, learning would pose extra challenges for the students within the prison school<sup>43</sup>. To be specific, offenders might perceive disruptive behavior of peers in the learning environment that creates an unpleasant environment for the student to learn. Disruptive behavior of the peers in the current study is seen coming from other students' exhibition of aggressive behavior, bullying other students, disturbing learning environment by talking frequently as well as being verbally and physically aggressive. Such behavior becomes a challenge where it creates chaotic and less conducive atmosphere for learning which more often than not would be perceived as harsh, ineffective and depressing process. Strict sentencing guidelines also emerged as a barrier, which disrupted learning process. Respondent 1 exemplified this when her time in learning was disrupted as students were instructed to assemble in order for prison school authority to take attendance or known as roll call.

While instructional time is commonly devoted to a particular subject, but in this study, it was found that it is a common practice to devote certain segment of the period with activities which have little or nothing to do with learning, such as roll call, briefing on disciplinary issues, and numerous interruptions by official announcements<sup>44</sup>. Therefore, with inadequate allocated time to teach or learn subjects, to some degree, it deteriorates students' education performance. Besides that, Respondent 1 experienced challenges in learning due to lack of support from teachers. Teachers in this current study demonstrated negative attitude towards the student's involvement in the other activities other than the vocational program by exhibiting verbal disapproval responses. Several studies put forward that teacher's criticism and strong disapproval negatively affect a student's behavior in the classroom and it is an ineffective method of maintaining student attentiveness in classroom. The current study found that the shortage of teaching staff for English Language subject caused Respondent 2 to be forced to learn English without proper guidance from any teacher. As a result, she failed to get good grades in her Malaysian Certificate of Education or

*Sijil Pelajaran Malaysia* examination.

Another important agent that plays a role in school within the prison is the prison school authority. Both of the respondents voiced out that they receive unfair treatment from prison authority. Prison authorities are always in contact with the juvenile delinquents and their attitude and behavior towards the students affect how successfully their complete education or training programs. In present study, even though, the respondents did not associate directly between the education and the treatment, and a feeling of dissatisfaction was developed by both respondents of this study. This might be due to the fact that even though the students display good behavior in the school, and receiving undeserved punishment from prison authority may lead the students to engage in and display anti-social behavior again.

*Research Question 5: What are the possible benefits of studying in prison to bring in their lives after released from detention?*

Both of the respondents believed that Integrity School helps them to improve their educational performance such as developing self-discipline and employability skills. There are also other benefits mentioned by both respondents throughout their involvement in the vocational program such as reducing the thought of re-offending, increasing their self-confidence, and enhancing employability skills. Behavior is formed based on the reinforcement given<sup>34</sup> and when an individual promotes good behavior, he or she needs to be given continuous recognition and encouragement for such good behavior through reinforcement such as praise, gifts, tokens and other elements that encourage good behavior. Examples of positive reinforcement can be found in the responses given by Respondent 2. One of the reinforcements is in the form of allowing the student to watch movies because of good behavior exhibition or improvement in grades which encourages the student to retain her behavior and strive to excel well in upcoming exams.

Apart from that, the school helps to improve the student educational performance by associating it with the skill certification that they would receive upon completing the vocational program they underwent. The Integrity School located at the southern state of Peninsular Malaysia is one of the schools that offers their students to obtain Malaysian Skills Certificate (or known as *Sijil Kemahiran Malaysia*). The benefits of acquiring such skills certification are the certificate that is recognized by industry in Malaysia and also it would provide a better career path and encourage self-development comparable to career paths based on academic qualifications<sup>45</sup>. One of the respondents was well aware of the benefits she gets through participating in Malaysian Skills Certification training where she gets opportunities to explore the intricacies of business in terms of theoretical and practical aspects through training courses especially in entrepreneurship and business plan preparation courses.

The rationale behind providing education in prison or Integrity School is to reduce the rate of delinquency and detainment. Respondent 1 expressed that religious education that is offered in the prison school helps to rehabilitate her in reforming her behavior and increasing her knowledge of Islamic teachings and this strengthens her belief of not repeating the offense she made before that landed her in prison. Even though religious education taught in Integrity School is considered as a non-formal education, it helps the offenders to identify issues such as anger management, and how to develop thinking skills among other skills to get integrated in society on release<sup>46</sup>. At its best, prison education helps the offenders to develop or build self-confidence. Self-esteem development is relying on a substantial degree of individual resources as well as situational condition, therefore the development of self-esteem highly varies between individuals<sup>47</sup>. When social conditions offer encouragement and possibilities to attain these basic needs, personal growth, liveliness and well-being could be enhanced<sup>48</sup>. The number of activities offered in the prison school increases one of the respondents' participation and achievement and this directly increases her confidence where she believes to have the capabilities to learn as well as perform good behaviors. Besides that, her self-confidence is also increased when teachers recognize the student's ability and allow them to demonstrate it. Apart from that, the provision of education and training brings benefits where the employment opportunity outlines how training and education need to be relevant to employment opportunities that exist in the location that the offender lives and is likely to be employed in.

## 6. Conclusions

The current study concludes that it is strenuous to impart implications for practice throughout the nation because the research findings are grounded on the stories of only two juvenile delinquents in the local authority even though the research findings reveal about various factors that influence the educational experience of the juvenile delinquents. Nevertheless, the results point out a guide for future studies, in addition, if homogenous findings have been demonstrated in other studies based on the implications which inflate the validity of the research study, essential recommendations for practice at a national level could be proposed then. Even though, the teachers' main duty is to provide education, an act of concern and unbiasedness towards the students, and constantly encourage them to do their best and show affection that would help students in deterring them to develop a sense of detachment from social interaction. The relevant organization ought to identify the current academic and vocational needs and upgrade or improvise the resources that help to improve learning and need to be relevant to the current education policy.

Several limitations are identified in the current study. The sample was limited to only two juvenile delinquents in one of

the schools within prison in Malaysia. If the study was carried out involving other states' prison schools, different findings might be achieved. Secondly, in the current study only female respondents were involved and thus by employing male respondents in future research, different perceptions regarding their educational experience in the school within the prison could be attained. Thirdly, the researchers utilized purposive sampling and qualitative research approach therefore, the findings cannot be generalized. Finally, the researchers only used interview as a data collection method.

Other methods such as observation would help the researchers to gain empirical information regarding the students experience in the educational program. Future researchers are recommended to include post-release experience in order to examine whether the benefits they hope to get upon release are genuinely attained. In addition, respondents from different demographic backgrounds may be employed as well as different ages and races in order to explore relation between age or race and their educational experience. Most offenders desire to become better people so that they never have to return to prison. Many studies have shown that the best way to reform and improve behavior is through education even though students studying in prison face numerous challenges in their endeavor to ameliorate themselves. Our nation has a long way to go to ensure that prison education is successfully implemented in Malaysia and specific organization should take an initiative to resolve the challenges emerging in the prison education so that students could learn in conducive environment and successfully reintegrate into society.

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## Conflict of Interest

Authors declare that there are no conflicts of interest.

## Ethical Clearance

It was obtained from Department of Social Welfare, Malaysia.

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# Generic Green Skills in Teaching and Learning: Meaning and Implementation

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**Abstract** The burgeoning of green economies has sparked the development of green skills, primarily to fulfil the demanding requirement of green-collar employees. Human resources equipped with specific generic green skills will become a catalyst to penetrate the green job market. On the principle that skills can be shaped through education and training, a qualitative study was conducted using in-depth interviews with senior academics from the School of Education, of a local university in southern Peninsular Malaysia. The interview data were transcribed and analysed using *NVivo*. The findings showed that generic green skills are additional skills which complement existing generic skills and focus on conserving and maintaining the quality of the environment. Pertaining to that, embedding generic green skills in teaching and learning activities can be carried out through the ingenious use of Information and Communications Technology (ICT) which involves digital skill, internet technology and electricity saving consumption. Furthermore, additional studies of generic green skills are required to contribute to sustainable development.

**Keywords** Human Resource, Generic Green Skills, Green Jobs, Teaching and Learning, Generic Skills

influencing progress and development. Amiruddin, Ngadiman, Abdul Kadir & Saïdy (2016) further assert that the quality of human resource development is the most pivotal capital contributor to a nation's success. In terms of terminology, human capital is more comprehensive than human resource (Zaini Ujang, 2009). Also, 'human' comprises the entire human faculty consisting of its physical, intellectual and spiritual dimensions. Zaini Ujang describes the ultimate development of human capital to produce more qualified, skilful and efficient workers (Rahmah Ismail, 2008). Producing competent human capital requires not only high technical skills but also non-technical skills otherwise known as generic skills.

Various terms were used to portray generic skills. For instance, Sodemann (2008) referred to it as non-technical skills, employability skills, necessary skills and key qualification, while Robles (2012) named it soft skills. Others called it emotional intelligence (Nicolaide, 2002 in Nik Safiah Nik Ismail, 2010) and skills of workability (Mohamad Sattar and Rose Amnah, 2010). These skills may differ depending on the context and situation. In any case, it refers to all skills other than technical skills possessed by employees. According to Lippman, Ryberg, Carney & Moore (2015), soft skills are a broad set of skills, attitudes and personal qualities which enable employees to manage their work environment effectively, work comfortably with other employees, perform a task well and focus on achieving the targeted goals. They further explained that these skills are widely used and complement other fields of education such as technical, vocational and academic.

In a green job context, Arasinah Kamis, Ridzwan Che Rus, Mohd Bekri Rahim, Faizal Amin Nur Yunus, Normah Zakaria & Haryanti Mohd Affandi (2017) define green skills as the technical skills, knowledge, values and attitudes required by the workforce to develop and support social, economic and environmental sustainability. This definition covers three areas of employees' living. However, according

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## 1. Introduction

### 1.1. Human Capital and Generic Skills

If the mast of a country's development lies in its economy, then sustainable economic growth relies heavily on its human resources. With respect to that, an indicator of national competitiveness is the quality of its human resources (Mahfud, Jati & Mulyani, 2017). This aligns with Amiruddin and Zainudin (2015) who mentioned that human resources are acknowledged as the most crucial capital in

to Zaki Kamsah (2004), there are two major issues faced by today's employers. The first is to get good employees, and the second is to train them. Good employees are those who receive specialised training in their field, are competent and have outstanding and competitive work discipline, coupled with an exceptional personality.

### 1.2. Green Job and Generic Green Skills

In line with the green economy development agenda, the proliferation of green technology has contributed to the fourth industrial revolution and has led to the growth of generic green skills, especially in green jobs. In tandem with that, Agus Setiawan (2017) concluded that green jobs require workers with generic green skills. Asnawi and Djatmiko (2015) contended that current and future employment across sector and industry would focus on green jobs.

Green jobs are closely related to green technology and contribute to green economic prosperity. Green technology refers to eco-friendly, clean and environmental-friendly technology designed to preserve nature and natural resources (Ramlee Mustapha and Siti Shuhada Mat Abu, 2014). To ensure the success of green jobs, employees must be equipped with well-founded generic green skills. With that, generic green skills will be employers' key criteria in hiring and recruiting new employees (Mohd Zolkifli Abd Hamid, Yusri Kamin, Dayana Farzeeha Ali & Mohd Azlan Latib, 2014). Ahmad Nabil Md. Nasir, Muhammad Khair Noordin & Nurliana Matam (2015) referred to generic green skills as any form of employment that has the potential to engage in eco-friendly activities comprising 3R (Recycle, Reuse and Reduce) practices. These features are included in Pavlova's (2011) definition of generic green skills, which are environmental awareness, attitude and willingness to learn about sustainability, issues and challenges in the development of sustainability. The 3R's refer to activities which contribute gradually towards sustainability. In the same vein, generic green skills could best be described as the effort to preserve good environmental quality through the implementation of the 3R's.

Meanwhile, the Swinburne University of Technology through its Education for Sustainability Hub (2014) has listed generic green skills at work as minimising resource use, reducing emissions of greenhouse gases, recycling, using environmentally friendly products and conserving nature. These skills are related directly to generic green skills. At the same time, Maclean, Jagannathan & Panth (2018) listed generic green skills as environmental awareness, energy efficiency, water conservation, waste reduction and waste management.

Other than generic green skills, some scholars incorporate technical skills with generic green skills, which led to the emergence of Green Skills, which might confuse many people. Callan (2003) specified that there is confusion about the wide range of terms being used. Green skill is a skill that brings together elements of knowledge, technical and

non-technical skills, capabilities and attitudes needed to produce sustainable human resources (Mohd Shahril Mohd Hassan, Azman Hassan & Ruslina Awang, 2016). Following that, they classify the green skill elements into 'soft' green skills and 'hard' green skills. According to them, soft green skills are non-technical skills, which include attitudes and capabilities while hard green skill is the technical knowledge and skills required to achieve sustainability goals. Altogether there are 20 elements of 'soft' green skills and 13 elements of 'hard' green skills (Mohd Shahril Mohd Hassan et al., 2016). Since the primary motive of generic green skills is towards preserving the environment, some academics call it environmental-friendly skills (Asnawi and Djatmiko, 2015).

### 1.3. Embedding Generic Skill in Teaching and Learning

As specified by Yassin, Hasan, Amin & Amiruddin (2008), all undergraduate programmes offered in public higher learning institutions in Malaysia are now required to incorporate generic skills in the curricula. This reinforces the fact that generic skills can indeed be inculcated in teaching and learning. Generic skills can be shaped through teaching and learning designed by lecturers using diverse teaching methods, which may result in strengthening various aspects of generic skills (Rosini Abu and Fitrisehara Kazilan, 2008). Moreover, giving a full lecture or demonstrating the skills is not proven to be methods of developing the skills among students (Zaki Kamsah, 2004). In higher education, lecturers play a crucial role to enhance students' employability skills (Mohamad Rasidi Pairan, Shahrul Azmir Osman, Nur Hazirah Seth, Ahmad Nabil Md Nasir, Mohd Rustam Mohd Rameli, Hanifah Jambari, Nurul Aini Mohd Ahyan & Muhammad Nasir Nasrul, 2018). Concurrently, students must be responsible for ensuring that the necessary skills are fully mastered in preparation for the job market. As emphasised by Suarta, Suwintana, Fajar Pranadi Sudana & Dessy Hariyanti (2018), nowadays, employees are anticipated to have additional skills other than occupationally related technical skills. In other words, generic skills are an 'intrinsic-licence' to secure exceedingly viable green jobs.

## 2. Methodology

To explore this issue in-depth, a descriptive study was adopted using a qualitative approach. Raw data from in-depth individual interviews with respondents were collected using a semi-structured interview protocol. The interview data were then transcribed manually and analysed using *NVivo*. Three levels of coding (open, axial and selective) processes were conducted to identify the themes that provide answers to the research questions. Respondents were senior lecturers from the School of Education, Faculty of Social Sciences and Humanities in a Malaysian research

university located in the southern part of Peninsular Malaysia. All respondents have a Doctor of Philosophy majoring in technical, vocational and engineering education, specialising in either building construction, mechanical engineering, electric and electronic engineering or living skills.

### 3. Findings

#### 3.1. The Meaning of Generic Green Skills

Most of the respondents opined that generic green skills are supplementary skills focusing on maintaining a good quality environment. According to one respondent:

*“I think generic green skill is generic skill too, nothing new, more or less is almost the same. The only difference is.... this (generic green skills) is more towards an effort to keep the environment in good quality. For example, awareness and habit of switching off the table-top computer is also a generic green skill too. Moreover, this practice could save electricity. Instead of letting the computer off by itself, why not we simply switch off the power and take off the power plug.” (respondent A)*

Referring to the above statement, in essence, generic green skill refers to the awareness and attitude on energy saving. It is also evident that academics will ask students to switch off the computer as well as the LCD (Liquid-Crystal Display) projector. However, an insensible habit is leaving the power plug attached to the power socket. This will permit the non-stop flow of electric current to the computer and LCD, which will gradually increase the energy consumption.

Another question was raised. ‘What are generic green skills all about’ which evoked this feedback from other respondents:

*“As we all know, ...actually...this is a generic skill too, but the difference is that this kind of skill tends to the practice of electricity saving and preserving the environment through 3 R’s activities.” (respondent B)*

This statement suggests that generic green skills are not new. It is the zealous effort to sustain a healthy environment by practising the concept of Reduce, Reuse and Recycle, together with the austerity that measures against the use of electricity.

A detailed inquiry produces a more precise explanation:

*“Generic green skills are a non-technical skill which is very much needed by future workers, where with these skills, they can help environmental sustainability and save energy consumption.” (respondent C)*

Closely related to the meaning of generic green skill, one of the respondents linked it to soft skills (*non-technical skills*) and the endeavours to heighten good environmental quality show that the term of sustainability has to do with the

meaning of generic green skill. It shows that sustainability could be developed and maintained through the 3R’s (as mentioned by respondent B). It is a term used commonly in discussions on environmental sustainability. At the same time, reducing the use of energy resources is also considered part of generic green skills.

In the context of students at higher learning institutions, by observing the rules and regulations related to cleanliness and energy-saving practices, they contributed to a healthy conducive learning environment and reduced the university’s spending on electricity. These practices can be equally defined as implementing green practices in the learning environment and as such, contribution towards the accomplishment of the Occupational Safety and Health Administration (OSHA). These green practices are consistent with generic green skills among undergraduates and graduates who will be entering the job market.

Another respondent elucidated:

*“I think, generic green skill is simply another version of generic skill..... sometimes they refer it as employability skill or soft skill. However,...the apparent difference between these skills is...generic green skill is more towards keeping a good environment. So...I think...anything goes with the aim to preserve the environment is called generic green skills”. (respondent D)*

Another respondent agreed that generic green skills are skills which correspond with a clean environment. It indicates that efforts (*preserve the environment*) to curb pollution concern environmental prosperity and also relate to generic green skills.

#### 3.2. Instilling Generic Green Skills in Teaching and Learning

*“During teaching and learning, I use paperless activities whereby students are asked to hand over their paperwork or assignments via on-line mode, which is likely in tandem to the needs of e-learning. So... to enable students to submit their paperwork, assignment and whatever it is... they must know how to use the computer as a medium of interaction, not only with lecturers but also among their friends. Lately, I noticed that many students use their savvy handphones to capture my notes on the screen, share among their friends through WhatsApp group... to facilitate group discussion. Even...lecturers were asked to use QR (Quick Response) technology to take students’ attendance. To make it happen, all students need to have a smartphone...and...of course...this is a good move to inculcate generic green skill among them. (respondent E)*

Fast-growing technology also affects teaching technology in the lecture room. The implementation of e-learning in the lecture room is an example of a holistic approach to

teaching and learning. More state-of-the-art teaching aids, coupled with the use of digital devices, are becoming standard compared to the conservative and traditional approach to teaching and learning. This development forces students to become more skilful in digital and internet technology. In other words, ICT literacy is extremely important for both students and academics. Indirectly, advancement in digital technology compels students and academics to master the skill of using various smartphone applications.

Dexterity in using smartphone indicates that the use of technology in education aligns with green practices and will enrich generic green skills. The ability to make full use of smartphones could be classified as being digitally literate and can be considered part of the generic green skill. As asserted by Pavlova (2009), technology in education is seen as a means for developing knowledge, skills, attitudes and values (these are all generic skills) that allow students to optimise their flexibility, adoptability and adaptability for their future employment.

The competency of using computers and software, together with internet technology is an essential factor in ensuring the success of e-learning. This strengthens the reason why information technology is categorised as part of generic green skill as it does not use paper to communicate (for instance handing over assignments or reports to lecturers) and indirectly reduces the use of printer ink. In doing so, it contributes to developing a low-carbon society and reinforces environmental sustainability.

## 4. Discussion

The green concept which comprises economy, technology, job and generic skill, has fascinated many industry players as well as academics. At the same time, in confronting the challenges of the Fourth Industrial Revolution, the quality of future human resources should be taken seriously. While it is believed that the number of human resources might reduce, it is imperative to produce excellent workers equipped with generic green skills.

Students of higher learning institutions are the future of 'human capital reservoir', and as such, there is an expectation that upon entering the labour market, they would be able to transform the economy towards a green economy. To ensure this, students must be groomed with generic green skills. This responsibility is entrusted to the academics. To this end, it would be beneficial for studies to explore how academics perceive generic green skills.

The findings showed that academics perceived generic green skills as an addition to the existing generic skills coupled with a prudent attitude and belief in preserving a healthy environment. Any non-technical skills which focus on maintaining environmental sustainability such as minimising environmental degradation and efforts to save energy consumption are considered part of generic green

skills. This finding is corroborated by the conclusion by Mohd Zolkifli Abd Hamid, Yusri Kamin & Zuhairi Che Mohammad (2016) that any activity that mitigates environmental degradation and energy saving could be defined as green practices and leads indirectly to environmental sustainability.

Generally, when someone mentions 'green', they tend to associate it with the environment and a manifestation of generic green skills and practices. It means that generic green skills are generic skills which become a catalyst for green environment. Indirectly, this answers the question raised by the European Centre for the Development of Vocational Training (CEDEFOP, 2009) of whether there is a need to create new generic green skills or enhance the existing generic skills. Obliquely, Mohd Zolkifli et al. (2014) concluded similar findings. Thus, generic green skills are the betterment of existing generic skills.

Pertaining to the innovative practices in lecture rooms such as the extensive use of computers and LCD projectors, e-learning implementation and the awareness of electricity saving are some examples of inculcating generic green skills in teaching and learning. Concurrently, students are encouraged to use smartphones. To record students' attendance in the lecture room, QR codes were used extensively. This indicates that the ingenuity of students in the use of smartphone showed that digital skill is another complement to generic green skills.

It is well acknowledged that generic skills can be taught, learned (Zaki Kamsah, 2014; Nik Safiah Nik Ismail, 2010; Wentling, 1987) and nurtured. Similarly, Dayue Fan (2016) asserted that the green concept could be instilled in students through various teaching and learning activities. To make certain the effectiveness of instilling generic green skills among students, it is of utmost importance that academics have a clear and accurate understanding of generic green skills. In a nutshell, generic green skills are pertinent to green practices, and green practices are the interpretation of self-awareness.

In addition to the above discussion, Zelin (2016) proposed that the best way to instil generic green skills is through green education. She further elaborated that green education is important for cultivating a workforce of the future equipped with the knowledge of ecologically friendly and sustainable technologies. In a similar vein, Pavlova (2016) underpinned Zelin's statement about green education. According to her, green education combined with training programmes plays a significant role enabling workers to participate in the green economy and that educational reform may be the most important tool in determining the direction of future greening and sustainability (Baumgarten and Kunz, 2016).

## 5. Conclusions

Although generic skills are widely known, generic green

skills have yet to receive broad coverage. For these shortcomings, education is said to be the best medium to disseminate knowledge, understanding, awareness and practice of generic green skills among students of higher education. Before it can be executed, it is beneficial if we can examine academics' views on the inculcation of green generic skills in the lecture room. Generic green skills are auxiliary skills which focus on conserving, preserving and maintaining a quality environment. In other words, it is an 'add-on' to the existing generic skills. With regards to teaching and learning activities, generic green skills are closely related to the practice of e-learning, electricity saving, the use of smartphones, digital technology and application of ICT. To sum up, inculcating generic green skills in teaching and learning would enhance future manpower employability, especially in the green job labour market. Academics, as well as students of higher learning, must have a high awareness of generic green skills and practice it accordingly. Further studies are encouraged to reveal more details and explicit understanding of generic green skills implementation among academics and university students.

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## List of Abbreviations

**CEDEFOP:** European Centre for the Development of Vocational Training

**ICT:** Information and Communications Technology

**LCD:** Liquid-Crystal Display

**OSHA:** Occupational Safety and Health Administration

**QR:** Quick Response

**3R:** Recycle, Reuse and Reduce

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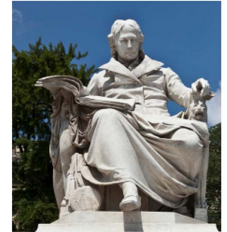
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