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Managing a Successful IT Learning Session with ICT Support

Torana Al.[1], Gaith Al[1], Ayoob Ayoob[2]

[1]School of Information Technology
Faculty of Science, Engineering and Built Environment
Deakin University, Geelong, Vic, Australia
[2]School of Electronics and Information Engineering
Huazhong University of Science and Technology
Wuhan, 430074.P.R. China
g.aliyev76@gmail.com

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ABSTRACT

One of the major developments in the education sector was the involvement ofICT in the learning sessions. This lead to the improvement of education in general as wellas the improvement of the ICT skills of the learners and teachers. Hereby in this paperwe present a methodology which was used in one of the large educational projects inDubai/United Arab Emirates specifically at 'ITEP' IT educational project, which we elaborate on the teacher's observations during the learning sessions. Also, weelaborate more on the teacher's methods used to plan and manage ICT sessions in severaloccasions during the project period or the course period. We also discussed some of themethods which were used by different researchers to enhance the learning session by Applyingsome ICT techniques in related work before moving to the ICT mythologies used in ITEP and theprogress observed in understanding ICT by both learners and teachers.

Keywords: *ICT, Learning, Teaching, Planning*

INTRODUCTION AND RELATED WORK

Every year the information technology does advance rapidly specially in the last decadeswhich made the ICT advancement in the field of education

inevitable. This rapid advancehas its impact on the education in general so that the education would lose itseffectiveness without the use of ICT. Many countries as well as educational institutionshad adopted new methods in teaching with the support of ICT yet there were not enoughstudies which has been conducted to introduce how do the teachers plan, manage, andevaluate the use of ICT in their learning sessions. Although many works have presented new mythologies and case studies on how to use the ICT in the learning sessions.

This includes a case study which was presentedby Torana and Gaith (2016) as we will discuss soon. The ICT hasbecome a major part of education since the use of computers and Internet and other technologies. There were also many researchers who addressed many case studies to determine the effectiveness of the use of ICT in classrooms and the benefits gained for both teacher and learners. Some studies have implemented to determine the outcome of some ICT educational projects which were designed to develop the learners as well as the teacher's ICT skills, knowledge, and awareness of ICT. Some papers and studies dodiscuss the learning environment, tools as well as definition while the learning process was defined. Torana and Gaith (2016) had commenced a case study to study the impact of the use of ICT on a Group of Mixed Abilities and Mixed Aged Learners at ITEP. Furthermore, it showed and discussed the results from the questionnaires provided by teachers to the students. Richards (2006) wrote an article which responds to the challenge of reconciling the often conflicting technological and pedagogical senses of the concept in terms of outlining a convergent notion or integrated framework. Also, seeking to provide more efficiency to connect alternate virtual andactual contexts of both teachers and learners since many teachers and trainers find it hard to use the information and communication technologies (ICTs) in their classrooms.

As we read in Katz (2000), the authors presented a study on three groups of college intellectuals participated in a case study about distance learning approaches, the results of the study showed that the interactive Picture-Tel distance learning system add significantly advanced levels of learners gratification and learners accomplishments than the interactive internet distance learning procedure. This in turn contributed to a higher levels of student satisfaction and academic accomplishment. In Hayes (2007), the researcher aims to describe and test the paths for the teachers

in the frame of utilizing ICT in the learning environments process for mediate learners. The results showed that ICT is largely integrated to the classroom and sessions topics. Besides, in Jain and Luaran's (2016) study inspects the pedagogical uses of mobile devices, specifically on the use of iPad among pre-service teachers. In Lee et al. (2016) a Design-based Research (DBR) approach was adopted to provide solutions to a practical problem that faces the Vietnamese educational context through a process of iterative analysis, design, development, and implementation according to researchers. While in Cheok et al. (2016), the researchers present successful experiences and solved some issues associated with the use of Information and Communication Technologies (ICT). Then the study showed that there were significant obstacles to the effective use of technology. The complex and less visible space of teacher trainers' as the study suggested must be addressed. We can see also in Juhary (2016) when the paper discusses how active learning can be promoted using Twitter at the National Defense University of Malaysia (NDUM). As the concept of back channeling through Twitter is illustrated by looking at the screenshots of tweets and retweets during classroom learning of a course at the NDUM. In Nordin, Embi and Norman (2016), the researchers discussed Massive Open Online Courses (MOOCs) and their impact on the learning environments and the learning process as they claimed that MOOCs will help the knowledge to be dispersed to a global set of learners in an open learning environment. There were also other ICT case studies which was discussed by researchers which targeted different type of people, such as the rural areas of South West China, when Jiake LV (2011) mentioned that the ICT education process in such place is a long-term process and demands a coordination of many complex factors such as equipment's, technology, funding, instruction contents, teaching practice and human resources. Again Audry and Dawson (2012)conducted a case study of the role of ICT in grade 3 classrooms, the case study method utilizing three data sources -interviews, observations, and questionnaires that used to collect data. There were aiming to determine how ICT can be integrated in grade 6 classrooms.

Later in the next section we will elaborate more on the teacher's methods used to plan and manage ICT sessions in several occasions during the project period or the course period. We will also discuss some of the methods which were used by different researchers to enhance the learning session by Applying some ICT techniques in related work before

moving to the ICT mythologies used in ITEP and the progress observed in understanding ICT by both learners and teachers.

RESEARCH METHOD AND DESIGN

Background of the Institution, Learners, and Teachers

This study was conducted in the labs of the IT Educational project 'ITEP' in Dubai/UAE. The project was initiated to enhance education by using ICT. The project began to provide IT Training to 1st & 2nd secondary students of 40 public schools across the state by using a purpose-built e-learning solution developed. There were over 13,000 students who pass through the program every year.

Following the success of the public school's project and to support the UAE government's e-government initiative, ITEP has been instrumental in promoting IT literacy with modern learning solutions within various sectors of the society and different government sectors. The learners were students which were aged between 16-55, with mixed and different educational backgrounds and from different government departments. Most have English as their second language and most of them had a medium IT knowledge. The use of the ICT was very helpful, and the teachers intended to gain the max benefit from the usage of the ICT in such a class to help deliver the subjects.

The teachers were highly skilled with good professional teaching experience. Their roles and responsibilities was to teach different kind of students and trainees with differentCourses in IT. Also, they had to set the monthly, weekly, daily plan for the classes as a part of their roles, select and create outlines for the Courses, managing materials to help students to understand IT and Making samples for the exam tests.

Using ICT to Investigate a Teaching and Learning Issue

The issue subject for investigation was on how to use ICT resources in the schools and department to help investigative work for the curriculum subjects, while the learning programin which related to investigation was to teach ICDL course for the trainees, that is a basic IT skills course. To elaborate more and identify the opportunities for using ICT to support the

Learning session which ICT to be used in was named 'using internet for information Search about virus's types' in an internet and communications lesson. The options available for teachers to use ICT is the use of the internet inside the class room that gave the teachers and students the opportunity to use search engines to search such a subject (computer viruses) since each students in the class had access to the internet. The ICT chosen was planned to contribute to meeting the learning objectives by encourage the students to work and learn independently rather than making the teacher lead the activities in the classroom by him/herself. Besides, it will meet the learning objectives by developing several skills of the learners such as technical and information's self-searching skills. By evaluating the main benefits to be gained from using ICT that will be gained from using this ICT recourse (the internet), this will expand the search area for the learners so that they can use the internet to access any site which they need in their research topic specially about computer viruses and the ways to prevent the systems from being infected. The teachers planned to decide to use this ICT resource in the class because of the benefits that the teachers and the students can gain. Also, the teachers thought that they can use the internet in a whole group approach that should be controlled or filtered to protect the students from the some not appropriate use by not giving a chance for the learners to use this ICT recourse in a way that won't support the teaching method.

Evaluating ICT Resources for Use by Teacher and/or Learners (Internet)

To evaluate the ICT resource that will be used in the future, the teacher in this case chose the internet by defining ways that this resource could support teaching and learning by helping students and trainees to carry out research from a 'world-wide database' by providing subjects, text and information's which related to the study material. The suitability of using this resource from the teacher perspective and from the learners' perspective was that internet will be connected to each computer which makes it available for each student when they need to search for information's over the web or when they are asked to do so. Also, the teachers will be able to reach the information's that they need and forward these information's to their students in the class. The planning method was that students and trainees can access the resource from any classroom using their own log-in ID's. Furthermore the internet access will be available of 24 hours a day in case the students

or the trainees needed to search for information's after the classroom usual hours. In addition, many students also have access to the Internet from home. The teacher and the learners can benefit from this resource by searching for specific information and results comprising of text, tables and sound files that can be integrated into reports by using simple cut and paste techniques.

The teachers' experience in trialing this resource was good especially when they asked the student to make a research or to write reports about a specific subject and hand it over to teachers at the end of the class for assessment. The internet on the other hand was so useful and they used the search engines in a positive way. They didn't waste their time surfing for useless subject since they had to finish the report at the end of the day, which makes them learn how to manage their time while they use the internet in between completing their own assignments and surfing for their personal interests over the web.

In their trail usage, the teacher's face the issue that the internet might be slow sometimes, due to some errors in its connections or it may contain many unsafe sites which causeserious threats for the systems through transferring viruses and spams from these sites to the computers. Sometimes, the students might use the internet in a bad way to log in to inappropriate sites, or they might use the net to listen to music or to chat rather than doing their research.

In handling issues that are related to managing the learning environment in using this resource, the teachers first had to prepare the environment before the class starts, andto check the computers' functionality if they had any errors or problems. They also had to check the internet connection and speed, the user names and ID's for the students in order to log in to the systems. On the other hand, the teachers had to check the Cooling/Heating system of the class room to ensure a comfortable environment for learning.

When these issues occur during the trail sessions the teacher has to contact themaintenance or the department of IT in case the connection went slow for a long period of time. Beside that the teachers were directed to ask the IT department to install virus protection system or Anti-virus program on each PC and update these viruses scanning program regularly. Also, the teacher has to make sure that he/she can control the internet access

and not allowed the users to log in to unsafe or useless sites and to report if any problem occurs in the system or the Pc's. On other hand the teacher again must be sure to help the students to filter the information's that they get from the internet in order to keep the useful points and reject the other unneeded information's.

Every time the teachers were asked for their recommendation on whether this ICT resource should be used, they recommended using the internet in the classrooms as it will expand the skyline and the knowledge for the students. They justify it by saying that it does save time, effort, and enable both the teachers and the students to search for more information's which are useful to them and which support their way of teaching. When students work in groups that enabled them to exchange information's between each other's, discuss ideas and shared thoughts about the same topic. That increased their knowledge and made it much easier for them to understand and practice the ICT in groups. Also, this method helped the middle ability students to have them participate and engaged in the class activities.

	Examples of Students' Work (That might be used to You)	Subjects
1	http://www.cold0zero.com/	Personal website
2	http://www.syrianita.blogspot.com	General subjects
3	www.anas.cc	Personal website
4	http://www.egolden.net/	General subjects
5	http://www.syrianita.blogspot.com	General subjects
6	http://egolden.blogspot.com	Personal website

Figure 1: Sheet which was provided to the Students by Their Teachers includes Some Examples of Websites that were classified by other Students

Evaluating ICT Resources for Use by Teacher and/or Learners (ROBOTEL)

The ICT resource evaluated in this session was a remote-control device which the teacher can use to control the activities of the students in the class room which also called (ROBOTEL). The Robotel is a device which allows the teacher to control and monitor the other student's computers from his location. Also, it does allow the students to watch the teacher work on their screens. This device might be a great help for both the students and teacher to support teaching and learning since it will be connected to each workstation in the classroom. The teacher can control the activities for each workstation to make sure that they are restricted to the lesson and not using other ICT resources in not appropriate way. On the other hand, the students can use this ICT resource to ask the teacher to help remotely in any problem they face during the class time. The suitability from the teacherand the learners' prospective was that this ICT resource will be very suitable since the ROBOTEL will be connected to each computer which makes it available for each student when they need to ask their teachers for any help or if the teachers wanted to explain to them an issue. The teachers will be able to reach out and monitor all the students PCs activities from a distance. Students and the teacher can both use this ICT resource from their workstations in the classroom because it will be connected to each work station then to the teacher work station that willbe in control of running the device. The teacher could also give instructions to the students before the class starts about how they can use the Robotel, while explains to them the advantages of the device. While the students can use the Robotel from their seats when theyneed to ask a question by pressing a button, the teacher can explain the lesson for all thestudents on their screens in the same time. The teacher can also supervise and monitor the students work remotely in each work station. The teacher's experience in trialing this resource found it very useful and it will save time.Even though there might be some issues accompanying the use of this ICT method. First, the remote control may give less human contact between the teacher and his student. Second, the students might not feel attracted to the lesson and they might feel bored which make it necessary for the teacher to consider not using this resource from time to time in the class. Besides, there were some issues related to managing the learning environment in using this resource. As sometimes the students need the teacher to explain the subject face to face without using

the device, the use of Robotel in teaching from distance makes them feel that teacher didn't yet answer enough for the questions they asked. This can be solved with increasing the human contact between the teacher and the students and by making sure that the teacher can be always near to the students even though he/she is using the Robotel device in the classroom. So, to deal with these management issues the teacher should talk from time to time to the students in person and walk down between his/her students every now and then to ensure that this human contact will continue between the teacher and his/her students. Yet with these existing issues, the teachers recommended using this ICT resource especially when the teacher will need to explain some issues as it does save time and effort for the teachers while they teach specifically if there were a wide range or large number of students in the class. Furthermore, the size and type of the information's that they gained from using the ICT resource expanded dramatically during the sessions. In Addition, the use of the ICT also enhanced the performance of the students in dealing with technical issues such as using the printer, downloading information's, and using Microsoft Word application and other software's and hardware's.

Figure 2: A Picture of the Labs Plan used during the Teaching Sessions

The Teacher's Observations during the Sessions

The teachers noticed that they had two levels of students, students who had a previous knowledge in IT and internet, and students who has weak knowledge in IT. Students co-operated with each other in finding their information and they were able to makedecisions upon which information's to share. Also, they noticed that many students were using the internet as a way of entertainment or chat with friends and family which caused loss of time and effort during class. Beside that, they found that key words for the searchengines had to be used carefully as some words might give a complete different meaning or it might be blocked by the Internet firewall. The teachers also realized that unless the search is clearly focused; students are in mistake of collecting lots of information but without any real purpose. They need to ensure that the students are not into making wide or vague searches. From a technical point of view, they've also noted that the Internet runs faster at morning and evening - possibly due to the resource being less in demand by the rest of the school but this should not really affect the timetabled lessons. The teachers suggested that the better way to prevent the above problems is to use a software which blocks the chat and entertainment sites during class time so the students can save effort, time and finish their search and work within the given time line. They also realized that they could group students together in a way that each group contains a student of each level in order to help and co-operate with each other. The teachers can see the ICT resource benefits clearly when they look at the students work. It's a better way to find information's than using books or newspapers and it helped the students to practice technical skyline where they had not yet used. It also improved the students working skills, time management skills, communication skills and decision-making skills as an extra non-IT skill.

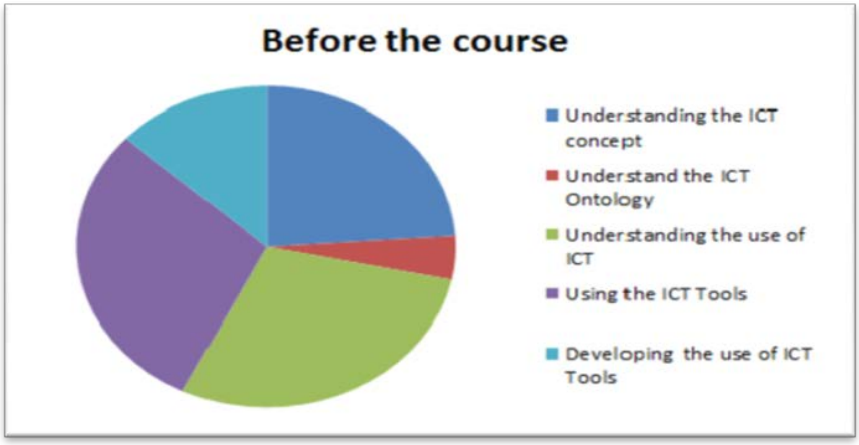

Figure 4: ICT Skills and Understanding among the Learner's Group before the Course

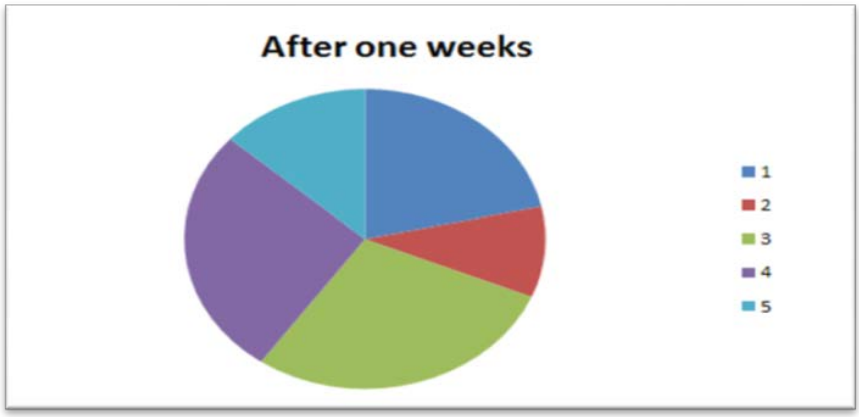

Figure 5: ICT Skills and Understanding among the Learner's Group after One Week from the Course

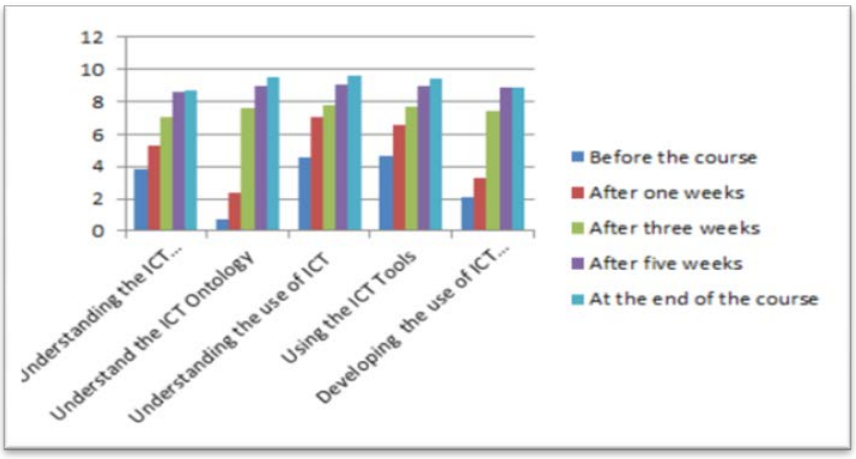

Figure 6: A Comparison between the Increased ICT Understanding and Skills during the Different Times of the Course Period

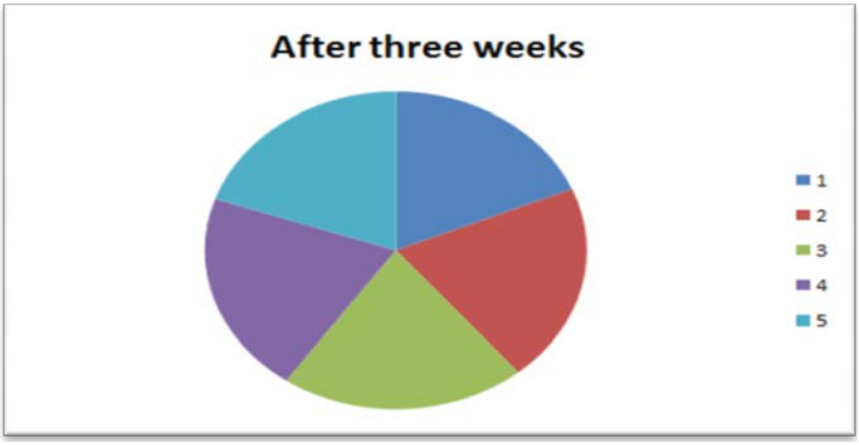

Figure 7: ICT Skills and Understanding among the Learner's Group after Three Weeks from the Course

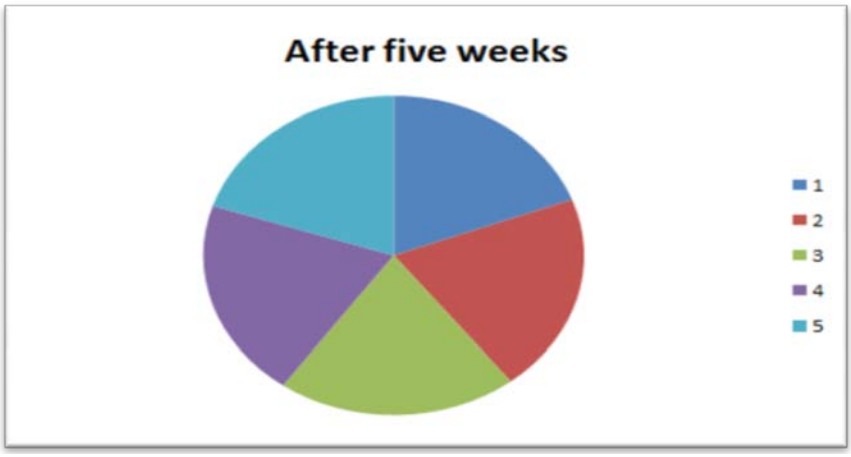

Figure 8: ICT Skills and Understanding among the Learner's Group after Five Weeks from the Course

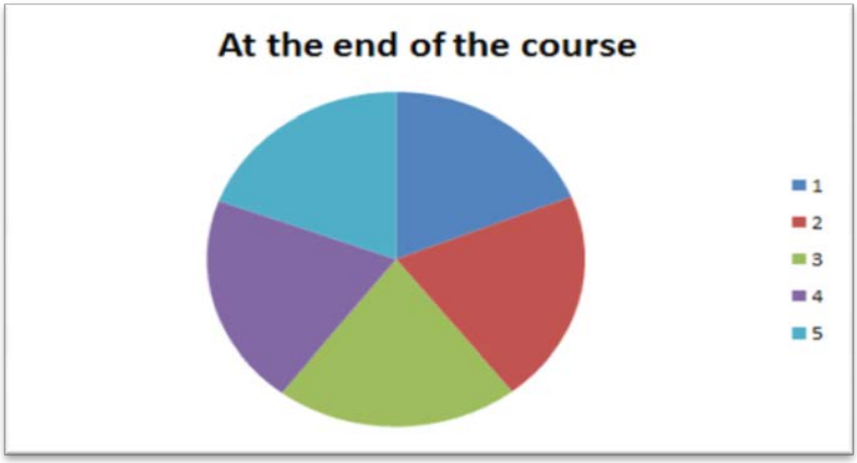

Figure 9: ICT Skills and Understanding among the Learner's Group after the Course

CONCLUSION

As we can see from the methodology explained above, the students or learners did benefit from the ICT use as well as the ITEP courses as we can see a tremendous difference in ICT understanding and skills developed by the learners. According to the charts, the learner's knowledge kept increasing and improving every week until the end of the course. Wealso noticed from the teacher's evaluations that the teachers and learners both did improve their IT skills, and the teachers were able to deal with the issues that occurred during the sessions. The teacher'scareful planning for an ICT session was very useful to manage the outcomes of the ICT session and on how to organize, manage the ICT session in the classrooms. On the other hand, evaluating the ICT learning session have an important role in planning the next session. They also gain benefits from the problems and issues experience in the previous ICT sessions. Most of these issues were technical issue which required the attention of the technical departments. In the end the teachers and students developed their skills to overcome minor technical issues or sometimes medium technical errors that were previously required a third-party attention.

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A Comparison of the Online Distance Learning and Traditional Learning Methodsin Enhancing Nursing Students Knowledge and Skills in using Glasgow Coma Scale (GCS)

Norimah Said.[1*,] Nurul Hasdiyanti N[1], Junaidah AB[1], Mohd Ramadan Ab. Hamid[2]

[1]Centre of Nursing, Faculty of Health Sciences, UniversitiTeknologi MARA
[2]Centre of Nutrition and Dietetics, Faculty of Health Sciences, UniversitiTeknologi MARA
**norimah2809@puncakalam.uitm.edu.my*

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ABSTRACT

Online education is currently one of the best practices for online distance learning students (e-PJJ) when combined with traditional learning. The evolution of advanced nursing education and practice has been influenced by changes in methods of teaching including online learning, blended learning and traditional learning. The Glasgow ComaScale (GCS)are knowledge and skill required by nursing students that are integral towards assessing the level of consciousness of patients with neurological injuries. This is because nurses play a vital role in minimizing the risk of deficiency and detecting early signs of Glasgow Coma Scale. The purpose of this study is to assess the knowledge and skills of nursing students in UniversitiTeknologi Mara (UiTM) PuncakAlam regarding Glasgow Coma Scale (GCS) and the differences between using online learning and traditional learning methods. A cross-sectional study using self-reported questionnaires was conducted among 125 undergraduate nursing students. The data were analyzed using SPSS version 21.0. On average, a full time undergraduate student has a higher level of knowledge compared to online distance-learning undergraduates ($t=3.932$, $df=123$,$p<0.05$). However, for the performance of the skill between fulltime nursing and online distance learning (e-PJJ), the latter students obtained a higher score for the correct item as compared

to fulltime nursing students at ($t=3.782$, $df = 131$, $p<0.05$). Online learning is useful for distance learning students because they have experience in daily nursing practices and skills of GCS. However, there needs to be improvements to their knowledge to maintain their competency in nursing practice. That being said, full-time students need traditional and blended learning to enhance their knowledge and skills on GCS.

Keywords: *Glasgow Coma Scale, Knowledge, Skills, Distance learning, Full-time students, Online learning*

INTRODUCTION

Undergraduate nursing students in universities specifically in UniversitiTeknologi MARA (UiTM) are usually split between full time students and onlinedistance learning (e-PJJ). Both groups of students are taught Glasgow Coma Scale (GCS) in theirsyllabus during year three. They also have to practice on a patient in a clinical setting.GCS is commonly used in the emergency department and critical care unit. Fulltimeundergraduate nursing student learn this topic in their syllabus using traditional learningwhere face-to-face teaching, lab sessions and blended learning are involved. Normally,the GCS topic has two hours allocated for face-to-face with a preparation time of fourhours. Lab sessions are allocated two hours for practice with a preparation time of twohours. Undergraduate students also learn this topic via blended learning. Blended learningis a combination of internet and digital media with established classroom, self-studymanuals, videos, and the web (Friesen, 2012).

Online distance learning (e-PJJ) undergraduate nursing students undergo a varietyof learning methods such as virtual classes, seminars, self-learning, and online forums viathe i-Class learning system platform. Teaching and learning for e-PJJ are carried outvirtually by using broadband internet. They are also being constantly updated with thelatest information on the course and syllabus. The questions, information and feedbackare relayed between students and lecturers on a real-time basis. They are able to accessand read, print and download updated notes from time to time. e-PJJ nursing students alsogo through the clinical area and have hands-on experience in their clinical expertise(Information system, Institute of Neo Education, 2016).

The Glasgow Coma Scale is a neurological instrument which measures theconsciousness level. This method is the most common scoring method for the level ofconsciousness in a person following a traumatic brain injury. It is used to sort out theseverity of an acute brain injury. The Glasgow Coma Scale is a reliable and objectiveway to measure an initial and subsequent level of consciousness in a person after a braininjury. This method has been used by trained medical staff in emergency and intensivecare units. A study by Waterhouse (2008) stated that the tool was designed as a clinicalscale for assessing the depth and consciousness of the duration impaired. The importanceof this assessment is to measure the consciousness level of the patient at an acute areawhich is the first assessment in the emergency area.

Nurses play a vital role to detect early signs of Glasgow Coma Scale syndrome sothat prompt treatment can be investigated. In addition, nurses who care for these patientsneed to have good knowledge and skills in performing Glasgow Coma Scale scoring todetect initial signs of complication (Nguyen & Sun-Mi, 2011).

Undergraduate full-time nursing students learn this neurological assessment intheir third year while online distance learning (e-PJJ) student nursing have alreadylearned this during their diploma years. Experience and education significantly enhancethe reliability of the assessment of the patient using the Glasgow Coma Scale (Jalali, R.,&Rezaei, M, 2014). In order to enter the online distance learning (e-PJJ) nursing course,students must be experienced nurses as stated in the UniversitiTeknologi MARA (UiTM)rules where only diploma holders with 3 years and above of working experience areoffered the Bachelor of Nursing course.

As concluded, experienced nurses use the Glasgow Coma Scale (GCS) with ahigh degree of reliability and accuracy while nurses of lesser experience and training(which in our study are referred to as full-time students) are able to use GCS with averagereliability and lower accuracy.

For this reason, this study is carried out to investigate the performance of bothmodes of learning for the GCS syllabus. The main objective is to assess the knowledgeand skills on using Glasgow Coma Scale among full-time undergraduates and onlinedistance learning undergraduates and compare the performance between both modes oflearning.

METHODOLOGY

Design

The study's design is cross sectional. A questionnaire is used in this study adopted fromMattar, Liaw and Chan M.F. (2013). In this present research, the researcher compared theknowledge and skills of the students from a different type of study.

Sample

The sample was selected from final year undergraduate nursing students fromUniversitiTeknologi Mara (UiTM) PuncakAlam with an estimate total population of164. By using the Raosoft software, the minimal sample size calculated is 116 with aconfidence interval of 5% and a confidence level of 95%. The purposive samplingmethod was used in order to recruit the participants for this study in which all theparticipants must fulfill specific criteria as follows; undergraduate year three full-timenursing students (final year) and undergraduate year three online distance learning (e-PJJ) nursing students (final year). The total participation of students who fulfilled allthe criteria is 125 from both undergraduate full-time nursing students and e-PJJ nursingstudents.

Ethical Consideration

All the respondents voluntarily participate in this study. Informed consent hasbeen taken from the respondents who are willing to take part in this study by filling upthe consent form as evidence for their permission to participate in the study. All ethicalrequirements including confidentiality of respondents and informed consent were strictlyensured for the study. The permission of this study was obtained from the ResearchEthical Committee, UiTM.

Data Collection

Self-administered questionnaires were distributed to all respondents. Two sets ofself-administered questionnaires were given to the respondents. Set A contains 15 multiple questions to test on knowledge GCS. The total score for Set A is 1 point for the correct answer and 0 points for the wrong

answer. This is based on a rule of thumb, Fink (1995) recommended using a neutral response only if it is a valid response. Set B contains one question that tests the respondents' skills. The score for Set B is categorized by scoring Level and Scoring Level 11 such as 12-15 (80-100%) for good, 9-11 (50-79%) for satisfactory and 0-8 (50%) for poor skill (Nahida&Taneepanichskul, 2008). Set B is used to evaluate the skills of the nursing students and attached inside the questionnaire was the Glasgow Coma Scale chart with a scenario. The scenarios with the accompanying chart are validated by the examination board of UniversitiTeknologi Mara (UiTM) PuncakAlam. The respondents need to pilot the GCS chart based on the scenario given. The respondents were given time to answer the skills questions.

RESULTS AND DISCUSSION

Demographic Data

Among the total respondents of this study, the mean age of the respondents was 28.42±7.23 with a minimum age of 21 years old and a maximum age of 47 years old. From 125 undergraduate nursing students who were involved in this study, 116 (92.8%) were female students while 9 (7.2%) of them were male students. Out of the 125 total respondents who took part in this study, 64 (51.2%) were undergraduate online distance learning (e-PJJ) nursing students while 61 (48.8%) were undergraduate full-time nursing students as shown in Table 1.

Table 1: Demographic Data

Characteristics	Percentage n (%)	Mean Score
Age	7.23(124)	28.42
Gender		
Male	7.2 (9)	9
Female	92.8 (116)	116
Mode of study		
Fulltime	51.2(64)	64
Distant-learning (e-PJJ)	48.8 (61)	61

LEVEL OF KNOWLEDGE FULL-TIME AND DISTANCE LEARNING STUDENTS (E-PJJ) IN PERFORMANCE GCS

Comparison of Level on Knowledge among Full-Time and Online Distance Learning (E-PJJ) Students Undergraduate Nursing Students in Performance GCS

Data shows that the full-time nursing students had better knowledge on GCS (mean score=10.67 as compared to distance-learning undergraduates' mean score=9.34). Refer to Table 2. However, Table 3 shows that the t-test results are significant ($t=3.932$, $df=123$, $p<0.05$). There is a significant difference between full-time undergraduate nursing students and online distance learning. On average, full-time undergraduate nursing students have better knowledge on GCS as compared to distance learning undergraduates nursing students.

Table 2: Level of Knowledge among Full-Time and Online Distance Learning (e-PJJ) Students Undergraduate Nursing Students in Performance GCS

Mode of learning	N	Mean
Full time nursing students	64	10.67
Online distance learning	61	9.34

Table 3: Independent Samples Test for Knowledge in Performance GCS

Mode of study	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Fulltime knowledge	*11.203*	*.001*	*3.932*	*123*	.000
Online Distance-learning (e-PJJ) knowledge			3.895	102.780	.000

Table 4 illustrates that the t-test result is significant (t=3.782, df = 131, p<0.05). There is a difference in the mode of study between full-time undergraduate nursing students level of skill on GCS as compared to distance-learning undergraduate nursing students.

Table 4: Independent Samples Test for Skills

Mode of study	Levene's Test for Equality of Variances		t-test for Equality of Means		
	F	Sig.	t	df	Sig. (2-tailed)
Fulltime skills	*10.218*	*.001*	*3.782*	*131*	.000
Distant-learning skills			3.817	103.029	.000

Table 5 shows that 31.25% or 20 respondents of the full-time students have scored good knowledge while 37 respondents or 57.81% scored satisfactory knowledge. Only 5 respondents achieved poor knowledge (0-8) which is 7.81% of all full-time student's. The table also presents the performance for online distance-learning (e-PJJ) students. Only 11 out of 61 students (18.03%) achieved good knowledge. Nearly half of the students which is 30 gained satisfactory level (49.18%) and almost one third (about 23 respondents or 37.70%) of the distant-learning group had poor knowledge in answering items in the questionnaire given.

The results show that knowledge scores for full-time respondents are better than online distance learning respondents (e-PJJ). A higher percentage of full-time respondents achieved good knowledge scores. Normally, full-time nursing students are allocated two hours of lecture for the GCS topic in the class and lab session.

The online distance learning (e-PJJ) group's low level of knowledge might be due to the short learning time on the theoretical aspects of the syllabus. Basically, the e-PJJ students are only allocated a 30-minute session in the classroom for the GCS topic while the rest is relegated to discussions in the virtual class. Few respondents from the distant-learning

(e-PJJ) group achieved good knowledge scores which is only 11 from a total of 61 respondents.

The researcher had found that most of the respondents informed that it was hard to understand the instrument properly. Other than that, most of the respondents had been working for quite a long time and might not remember the theoretical side of the Glasgow Coma Scale. Besides that, the online distance students (e-PJJ) undergo five seminars and virtual class for their online learning. The benefits of active participation of the students while engaging in the virtual class is required from the facilitator to increase their level of knowledge and skills on GCS. At the same time, the facilitators need to integrate methods a variety of teaching styles such as problem-solving learning (PBL) and traditional methods. This is supported by a previous study which states that the instructors' scaffolding for interaction is significant for the students' self- regulation for interaction in the virtual class together with individual knowledge and attitude such as their perceived importance of mastering the content (Cho & Kim, 2013).

Table 5: Scoring for the Level of Knowledge between Fulltime and Distant-Learning (e-PJJ) Students in Performance GCS

Performance / Mode of study	Good knowledge Score (12-15)	Satisfactory Score (9-11)	Poor knowledge Score (0-8)	Total
Fulltime students	20 (31.25%)	37 (57.81%)	5 (7.81%)	64
Distant-learning (e-PJJ) students	11 (18.03%)	30 (49.18%)	23 (37.70%)	61

Skills Performance on GCS for Full-Time and Distance Learning (E-PJJ) Nursing Students

Table 6 presents the skill level of the full-time undergraduate Bachelor of Nursing respondents in using the Glasgow Coma Scale. The findings show that of the 64 full-time undergraduate Bachelor of nursing students, 54 (84.3%) had correctly performed the Glasgow Coma Scale components of eye opening while 10 (15.6%) performed incorrectly. For the second component of the Glasgow Coma Scale, verbal response, 53 (82.8%)

portrayed correct performance while 11 (17.2%) portrayed incorrect performance. In the third component of the Glasgow Coma Scale which is motor response, only 35(54.7%) respondents performed correctly while 29 (45.3%) respondents performed incorrectly. For all the three components, there were 35 (54.7%) respondents with correct performance and 29 (45.3%) respondents with incorrect performance.

The result shows that only a few full-time undergraduate respondents achieved a good score in skill while nearly half of the group scored incorrectly. This might be due to a lack of clinical practice for these respondents. Skills are improved with more practice and experience in a clinical setting.

Online distance learning (e-PJJ) respondents' skills show good score which was expected by the researcher. This might be due to the abundance of previous experience of these respondents. Only a few of the respondents portrayed poor skills. This might due to a lack of experience in their current working areas. These results are supported by another study that found that the type of clinical discipline is significant in determining a nurses' knowledge of GCS. In the same study, it was found that nurses with experience in a neuroscience setting for 6 years or more scored higher mean scores (11.9) on the knowledge scale, whereas those who worked less than a year scored lower mean scores (10.0) (Mattar, Liaw, & Chan, 2013).

Table 6: Skills Fulltime Students in Performance GCS

GCS components	Fullmark scoring	Correct (n %)	Wrong (n %)
Eye opening	4	54 (84.3%)	10 (15.6%)
Verbal response	5	53 (82.8%)	11 (17.2%)
Motor response	6	35 (54.7%)	29 (45.3%)
All three components	15	35 (54.7%)	29 (45.3%)

Table 7 shows the skill levels among online distance learning (e-PJJ) undergraduate Bachelor of Nursing students in performing GCS. The findings show that from the 64 online distances learning (e-PJJ) undergraduate Bachelor of Nursing students, 49 (80.3%) had performed GCS components

of eye opening correctly while 12 (19.6%) performed incorrectly. For the second GCS component of verbal response, 49 (80.3%) showed correct performance and 12 (19.6%) showed incorrect performance. Lastly, in the third component of the Glasgow Coma Scale of motor response, only 37 (60.6%) respondents performed correctly while 24 (39.3%) performed incorrectly. For all three components, 36 (59.0%) respondents performed correctly while the remaining 25 (41.0%) performed incorrectly.

Table 7: Skills Distant-learning Student (e-PJJ) in Performance GCS

GCS components	Fullmark scoring	Correct (n %)	Wrong (n %)
Eye opening	4	49 (80.3%)	12 (19.6%)
Verbal response	5	49 (80.3%)	12 (19.6%)
Motor response	6	37 (60.6%)	24 (39.3%)
All three components		36 (59.0%)	25 (41.0%)

Table 8 below shows the correct item for assessing performance on skill between full-time nursing students and online distance learning (e-PJJ) (e-PJJ) students. The results show the differences among these two groups. As for full-time students, 35 respondents (54.7%) achieved all correct items while the other 29 (45.3%) had incorrect answers. The incorrect answers column consists of one, two or three incorrect answers. In the skill performance, distant-learning (e-PJJ) students showed a higher score for correct items. About 36 respondents (59.0%) achieved correct answers for all three items while 25 respondents (41.0%) answered incorrectly. On the other hand, it was found that more online distance learning (e-PJJ) students had correct answers than full-time students. Comparison of incorrect answers in the table shows that more full-time students answered incorrectly than online distance learning (e-PJJ) students.

Table 8: Correct Item for Assessing Skill of GCS between Fulltime and Distant-learning (e-PJJ) Students Performance

Performance / Mode of study	Correct (All three item)	Incorrect	Total
Fulltime students	35 (54.7%)	29 (45.3%)	64
Distant-learning (e-PJJ) students	36 (59.0%)	25 (41.0%)	61

CONCLUSION

Research on Glasgow Coma Scale for student nurses in UniversitiTeknologiMARA (UiTM) has been investigated before. Therefore, the researcher found this opportunity to do research on these topics. The importance of investigating the Glasgow Coma Scale comes from its role in treating patients and the need for confidence when the undergraduate student nurses use Glasgow Coma Scale to assess the levels of consciousness of patients. In a study by Shoqirat N. (2006) for a third-year nursing student, only 64% of the students felt it was a very important scale in the neurological field and an extremely low amount (15%) felt very confident in the Glasgow Coma Scale practice. These results imply that more experiences in clinical settings will likely lead to higher confidence and belief in the Glasgow Coma Scale scoring.

Both knowledge and skill play major roles in making sure the correct interpretation of the Glasgow Coma Scale which guarantees the high value and quality of the nurses produced in the general health sector. Based on the analysis, we have found that different modes of study affected the results. Full-time nursing students are better in answering the questionnaire because they have just learnt their syllabus while online distance learning (e-PJJ) learned the Glasgow Coma Scale but are not well practiced in them due to their working environment and roles for example some of them are working in the Health Clinic, some work as administrators while others work in the pediatric area.

Although most of the undergraduate full-time nursing student have better knowledge than online distance learning (e-PJJ), they had lower skills in performing GCS. This is supported by Nguyen, Shin-Mi (2011) who found that although most Vietnamese nurses had suitable theoretical knowledge and skills on the Glasgow Coma Scale, they were not able to apply it to analyze a clinical situation. Furthermore, their basic knowledge of Glasgow Coma Scale was not enough to ensure accurate performance of the Glasgow Coma Scale scoring. The undergraduate full-time students also have more time to spend for their study and are also more focused to enhance their knowledge on the GCS topic.

As stated in the results previously, the online distance learning (e-PJJ) students consists of experienced nurses who have better results in skill performance. This is supported by Mattar I., Liaw S.Y. and Chan M.F. (2013) in their study which concludes that staff nurses were more accurate in the use of the Glasgow Coma Scale and had fewer errors compared to student nurses particularly in the area of skills response. Teasdale,Brennan, McElhinney andMckinnon (2014) also emphasized the continued education of using the Glasgow Coma Scale. They found that the more education the medical staff received regarding the Glasgow Coma Scale, the more accurately they would perform.

However, there are those who have a low knowledge on GCS due to not being able to focus on their studies as a result of spending more time on work. Experience by itself is not enough without knowledge and skills. This research's results have confirmed that more accurate knowledge can contribute to the correct performance of the Glasgow Coma Scale. Safe care for a patient requires a skilled nurse who can perform their role to guarantee patient recovery. Pereira, Valle and Fernandes(2011) proved that care delivery by nurses requires various knowledge and understanding related to the leadership process of the team, with special emphasis on interpersonal relationship and decision making.

As a conclusion, the enhancement from a facilitator is important especially to utilize the virtual medium for online distance learning as part of students' education and guidance. Thus, the Glasgow Coma Scale (GCS) assessment is a vital part of the nursing procedure to maintain the accuracy of nursing record as well as to improve knowledge and competency level

in performing Glasgow Coma Scale (GCS) in a clinical setting among undergraduate nursing students. The online distance learning undergraduates also need to be exposed more to the required involvement in the virtual class before they enter the course.

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Evaluation on Massive Open Online Courses (MOOC) Awareness and Readiness among Radiographers in Malaysia

Muhammad Mukhriz Roslan[1], Shahrani Janudin[2], LyanaShahirahMohd Yamin[3]

[1&3]Centre of Medical Imaging Studies, Faculty of Health Science, UniversitiTeknologi MARA (UiTM) Selangor, PuncakAlam Campus, 42300 Bandar PuncakAlam, Selangor, Malaysia.
[2]Institute of Neo Education (iNED), UniversitiTeknologi (UiTM) MARA, 40450 Shah Alam, Selangor, Malaysia.
shahrani2609@salam.uitm.edu.my
** Corresponding Author*

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ABSTRACT

The purpose of this study is to evaluate the awareness and readiness towards Massive Open Online Courses (MOOC) among radiographers in Malaysia. As part of healthcare providers, radiographers also acquire long-life learning which can be relate to the purpose of MOOC. The data obtained can be utilized to improve the current MOOC in Malaysia and also help in creation of new MOOC specifically for Medical Imaging Programme in UiTM. This study was a prospective study, involving radiographers who are currently practices and work within the field. The questionnaire was disseminated via online survey through social media (WhatsApp® and Facebook®) using random sampling technique. Only 102 respondents from total of 377 responded to the online survey. Based on the acquired result from the survey, statistical analysis was done to evaluate the awareness and readiness of radiographer in Malaysia and to compare the Malaysian radiographers' awareness and readiness with demographic variables, background on mobile devices and their understanding towards blended learning. The result showed that all respondents are ready but most (76.5% from 102 respondents) are not aware about MOOC. Next, Kruskal-Wallis One Way ANOVA analysis revealed that the all comparisons between the demographic variables, understanding on blended learning and mobile

device background with MOOC readiness and MOOC awareness variables provide p-value more than 0.05(p>0.05), indicating the null hypothesis is retained, except for between MOOC awareness with understanding on blended learning which is less than 0.05(p<0.05), thus indicating the null hypothesis is rejected. Radiographers in Malaysia are ready but mostly not aware about Massive Open Online Courses (MOOC). Demographic variables, background with mobile devices and understanding on blended learning proved to have no relation with the awareness and readiness of radiographers in Malaysia, except for relation between understanding on blended learning and awareness which proved to be significant.

Keywords: *MOOC, Radiographer, Awareness, Readiness, Malaysia*

INTRODUCTION

The demand for highly-specialized healthcare professionals in recent years is constantly growing. Over the years, the extensive access to internet made it possible for everyone to explore numerous resources and education platforms that offer continuous education via online. The quantity of active online courses is rapidly growing and education been taken to a new level of development with the emergence these mediums. MOOC is a new learning atmosphere created in response to the challenge faced by students (Aboshady et al, 2015). It is expected to offer a quality education online to everyone who has internet connection with no fees. Firstly initiated in Canada by Stephen Downes and George Siemens, it was later gained popularity in the U.S. when a Stanford University's professor, Sebastian Thrun held a free online course on "Artificial Intelligence" in 2011. Some years later, MOOC expanded their audience to over tens of thousands users enrolling in courses in science and humanities. Then, it started to get attention from policy makers and creators, which resulted in the number of contracts involving major leading American universities. Coursera, edEx and Udacity are the three primary ventures that pointing the path to a new era of learning (Muzafarova, 2014).

The structure of MOOC is designed for mass audience and at the same time fits the needsof each student as a user and learner. A short video for example, where the students are able to pause or rewind the video will assist them to grasp the knowledge shared by the educators with their own pace. This then followed by interactive quizzes and activities to test their understanding which can be automatically graded. The most important part of MOOC is the feedback which is provided by both the instructor and the peers. MOOC comes with one major problem, which is there are limited number of teachers to handle a large number of students. However, to deal with this problem, MOOC offers a simple solution, whereby the system lets the students to teach and grade each other. Peer-review can help to motivate and support the students by giving them chances to share knowledge and ideas thus improving their way of thinking in the process(Muzafarova, 2014). Plus, this technique can be useful for students in health sciences who mostly learn via Problem Based Education (PBL) and experiential sharing session.

In Malaysia, the government has already voiced up their support for MOOC which was highlighted in the Malaysia Education Blueprint 2015-2025 on 23rd February 2015. The blueprint acknowledges the contribution of learning technologies towards improving student outcomes and access to higher education. The government focus is to covert common undergraduate courses into MOOC and advocates the use of blended learning models for up to 70% from the total programs offered. This is to create a diverse set of educational options and greater emphasis on lifelong learning programs (Kelleher, 2015). In Eleventh Malaysia Plant 2016-2020 (RMK11), the MOOC development strategy is highlighted under the Six Strategic Thrust (ST). One the plan is to raise the quality of graduates and programs and strengthening research for innovation by promoting online learning opportunities through MOOC (The Economic Planning Unit, 2016).

RESEARCH PROBLEMS AND OBJECTIVES

The main attraction of MOOC is its characteristics; massiveness, openness, and connectivity.MOOC is inclusive as it offers access to huge numbers of people who cannot formally register for a full time course due to many factors. Initially, the ministry has introduced four pilot courses for MOOC via OpenLearning® platform which are *Tamadun Islam danTamadun Asia* (TITAS) course, *HubunganEtnik*course, Introduction to Entrepreneurship course and ICT Competency, and language courses which also contributed by UiTM. However, none of these courses are the major courses for radiographers and other healthcare professionals. As MOOC can be very useful for healthcare professionals to pursue further in their career, justification on the need to develop related MOOC courses for them as part of Continuous Medical Education (CME) strategies is really crucial. Their awareness and readiness towards MOOC can indicate whether offering such course can be really beneficial to them. The evaluation about the radiographers' readiness toward MOOC was conducted so that the data retrieved by this project can be useful for further development and improvement of MOOC system in UiTM and other universities that offer Health Science Program in Malaysia. Evaluation and comparison were also done between different demographic variables such as gender, age, working experience and academic qualification and between different background on mobile devices and their understanding on blended learning and MOOC to justify specific differences.

METHODOLOGY

This research is a prospective, cross-sectional study involving quantitative method using a set of validated questionnaire as the main tool. The questionnaire is based on a few themes or categories that represent the readiness towards MOOC based on blended learning which are Flexible Learning (FL), Online Learning (OL), Study Management (SM), Technology (T), Online Interaction (OI) and Classroom Learning (CL). The respondents were selected based on random sampling and disseminated to a convenient sample of respondents and contacts**.** The questionnaire were disseminated to all qualified radiographers who are currently practicing medical imaging or radiography in Malaysia via online survey using *Google Form*®. The

link for the self-administered questionnaires was initially send via email between mid of January 2017 to end of April 2017, but the response was very low as most of the target respondents were not regularly engaged through the email. Thus, the survey then was distributed through Facebook page related to the profession including the Medical Imaging Malaysia and Medical Imaging Student Association (UiTM) that pool majority of the radiographers and alumni from UiTM. Plus, majority of the target group use Facebook as their main tool for communication and discussion. A total of 102 respondents completed the questionnaire and submitted it back via thee-survey. "Qualified radiographers" are meant for the ones who are within the accepted qualifications. The respondents must be currently working in Malaysia with a minimum diploma in Medical Imaging or radiography from any universities or institutions recognized by Malaysian authority. As the survey was shared among the target group, the possibility of getting feedback from respondents who are not considered inclusive for this study can be avoided. Plus, the survey also required the respondents' to state their level of education and working experience in Medical Imaging or radiography. The respondent samples were randomly selected via *GoogleForm*®. The data collected from the survey were processed and analyzed using Statistics Software, SPSS version 22.

RESULTS AND DISCUSSION

Demographic Data

Table 1: The Frequency and Percentage of the Demographic Data

Demographic		Frequency	Percent
Gender	Female	79	77.5
	Male	23	22.5
Age	18-20 years old	1	1.0
	21-25 years old	47	46.1
	26-30 years old	27	26.5
	31-40 years old	23	22.5
	Above 40 years old	4	3.9
Working experience	1-5 years	69	67.6
	10-15 years	16	15.7
	16 years and above	6	5.9
	6-10 years	11	10.8
Academic qualification	Degree	34	33.3
	Diploma	67	65.7
	Master	1	1.0
Prior Learning Institution	IPTA	43	42.2
	IPTS	29	28.4
	KKM	16	15.7
	KSKB	13	12.7
	Overseas	1	1.0
Mobile devices	Android based phone	80	78.4
	iPad	4	3.9
	iPhone	17	16.7
	Tablet	1	1.0
	Total	102	100.0

Table 1 summarizes the overall demographic data in this study. The result shows that female was the higher respondents which is 79(77.5%) as compared to male which is 23(22.5%). This figure correlates to the ratio female and male radiographer in Malaysia. In term of age, the result shows that out of 102 respondents, only 1(1.0%) respondent was between 18-20 years old, 47(46.1%) respondents were between 21-25 years old, 27(26.5%) respondents were between 26-30 years old, 23(22.5%) respondents were between 31-40 years old and 4(3.9%) respondents were above 40 years old.

The result also shows that 69(67.6%) respondents are between 1-5 years working experience, 11(10.8%) respondents are between 6-10 years working experience, 16(15.7%) respondents are between 11-15 years working experience and 6(5.9%) respondents have 16 years and above working experience. Based on this, most of the radiographers in the study population have working experience between 1-5 years, followed by 11-15 years, 6-10 years and lastly 16 years and above.

Justifying the academic background also is necessary as to evaluate if there is any different perspective towards MOOC. The result shows that out of 102 respondents, 34(33.3%) are with Degree qualification, 67(65.7%) are with Diploma qualification and only 1(1.0%) is with Master Degree qualification. Based on the result, we can see that most of the respondents have Diploma qualification, followed by Degree qualification and lastly only one with Master Degree qualification. From this, a total of 43(42.2%) were from local public institutions (*IPTA*), 29(28.4%) were from private institutions (*IPTS*), 16(15.7%) were from Ministry of Health (MOH) sponsored colleges, 13(12.7%) were from *Kolej Sains Kesihatan Bersekutu* (*KSKB*) and 1(1.0%) from an oversea institution.

The data for age, working experience and academic qualification were consistent to each other. Majority of the respondents' age were between 21 to 25 years old, as this is the normal range for the radiographers who have qualified with diploma. Plus, majority of them also have less than 5 years experiences as they newly graduated with diploma (65.7%), started working as a radiographer as majority of them were between 21 to 25 years old.

MOOC Readiness

Based on the result obtained, it indicates that Malaysian radiographers are ready for the implementation and application of MOOC as it shows that most of the respondents agree with the questions in all sections given which proved that they are ready with MOOC. All of the finding in every section of the MOOC readiness questions are almost the same and does not differ from the overall which is the sum of data of all sections as shown in Table 2. Thus, this shows that the radiographers in Malaysia have equal readiness in term of learning flexibility, online learning, study management, technology, online interaction and classroom learning. The study conducted by SitiFairusz, Fesol and Salam (2016) proved a similar result to this study as both studies agreed that the respondents have positive attitude towards learning flexibility, positive attitude towards online learning, positive feedback towards technology and positive attitude towards online interaction reflect a high readiness toward MOOC.

Table 2: Mean, Standard Deviation, Median, Mode and Skewness Value for All Themes and Categories

		Overall	Flexible Learning(FL)	Online Learning(OL)	Study Management(SM)	Technology(T)	Online Interaction(OI)	Classroom Learning(CL)
N	Valid	102	102	102	102	102	102	102
	Missing	0	0	0	0	0	0	0
Mean		3.9902	4.2451	3.8529	3.5686	4.0490	3.8529	4.1961
Median		4.0000	4.0000	4.0000	4.0000	4.0000	4.0000	4.0000
Mode		4.00	4.00	4.00	4.00	4.00	4.00	4.00
Std. Deviation		.47710	.72353	.49547	.68231	.73629	.65093	.70415
Skewness		-.030	-.410	-.310	.033	-.381	-.066	-.469
Std. Error of Skewness		.239	.239	.239	.239	.239	.239	.239

There are a few factors contributing to these finding. One of the factors identified was due to range of respondents' age. As majority of them were between 21 to 25 years old, they are more IT literate and exposed to technology. Considered as gen Y, their way of learning are different as compared to earlier generation. Thus, engaging online learning and the usage of gadget were not a problem for this age group (SitiFairusz, Fesol& Salam, 2016). Plus, majority of the respondents were considered as newly

graduated based on age and working experiences, thus suggested that they may had an initial experience in online education and exposed to the usage of digital resources during learning process (Shakya, 2016). These in addition preparedthemselves for MOOC based on the survey criteria. Although this finding is encouraging, the result can be constructively refer to the specific age group as majority of the respondents were between 21 to 25 years old. This age group can be easily approached via various social media including Facebook®, Instagram® and others, unlike the older respondents as only 4% of the respondents were above 40 years old. Detail survey distribution of the survey to the specific age group can be initiated for better evaluation and further improvement.

Table 3: The Frequency and Percentage on Each Attitude Category for Overall Data

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Completely disagree	0	0	0	0
	Strongly disagree	0	0	0	0
	Somewhat agree	12	11.8	11.8	11.8
	Strongly agree	79	77.5	77.5	89.2
	Completely agree	11	10.8	10.8	100.0
	Total	102	100.0	100.0	

Based on total scoring to represent readiness, most of the respondents were ‘Strongly Agree’ which bear the frequency of 79(77.5%), followed by ‘Somewhat Agree’, 12(11.8%) and ‘Completely Agree’, 11(10.8%). Figure 2 and Table 3 summarize the results.

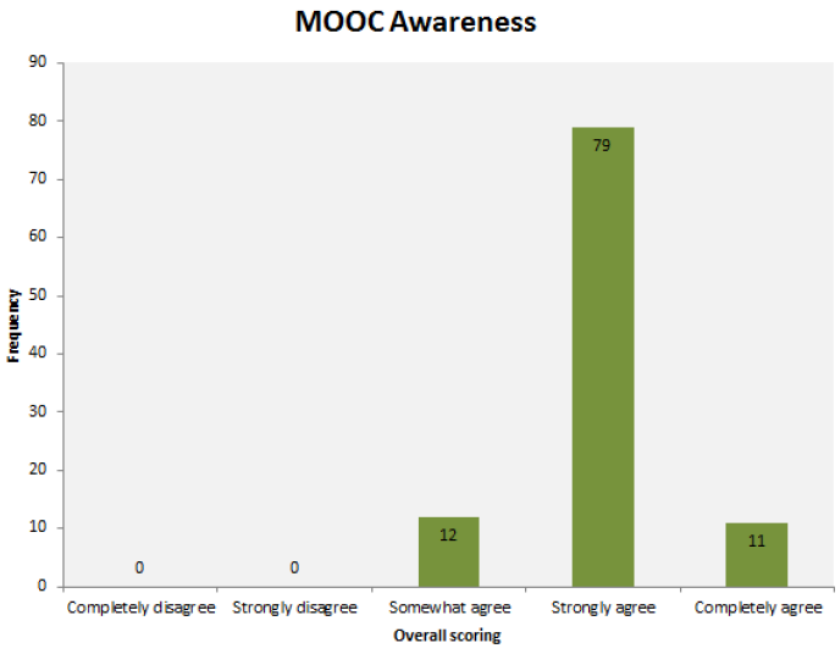

Figure 2: Illustrate the Distribution of Attitudes among 102 Respondents for Overall Data

MOOC Awareness

Figure 3 and Table 4 summarize the result on answers distribution for MOOC awareness objective question. The result shows that most respondents answered "No", 78(76.5%) and the rest answered "Yes", 24(23.5%). The result indicates that most respondents among the radiographers in Malaysia were not aware about MOOC. This is understandable as MOOC implementation in Malaysian universities and college are still new and underdeveloped. The fact is proven as it has been stated that the first MOOC was just implemented in Malaysia in 2013 and for the other local universities and colleges, 2014. The time interval from the current year of this research which is 2017 with the time MOOC was implemented in other local learning institutions is too short for MOOC to become popular and well developed. Furthermore, it also has been stated that the only usable MOOC platform in Malaysia is only OpenLearning® which shows how underdeveloped and unpopular MOOC is in Malaysia (Fadzil, Abdol, Tengku, &Munira, 2015).

In Malaysia, majority of the courses in radiography and medical imaging is developed by UniversitiKebangsaan Malaysia (UKM) and UniversitiTeknologi MARA (UiTM) as these universities are the public universities that offer the radiography courses. However, there is no related courses open yet for the public. Based on the result from Figure 3, most of Malaysian radiographers who claimed that they were aware with MOOC did understand the meaning of MOOC. Most of them manage to describe the MOOC correctly as they describe MOOC as "online study", "study at your own pace", "no attendance limit", "virtual classroom" and "teaching and learning online" which correspond with the definition stated by HOME, OpenupEd, and ECO (2015) as well as Mcauley, Stewart, Siemens, and Cormier (2011).

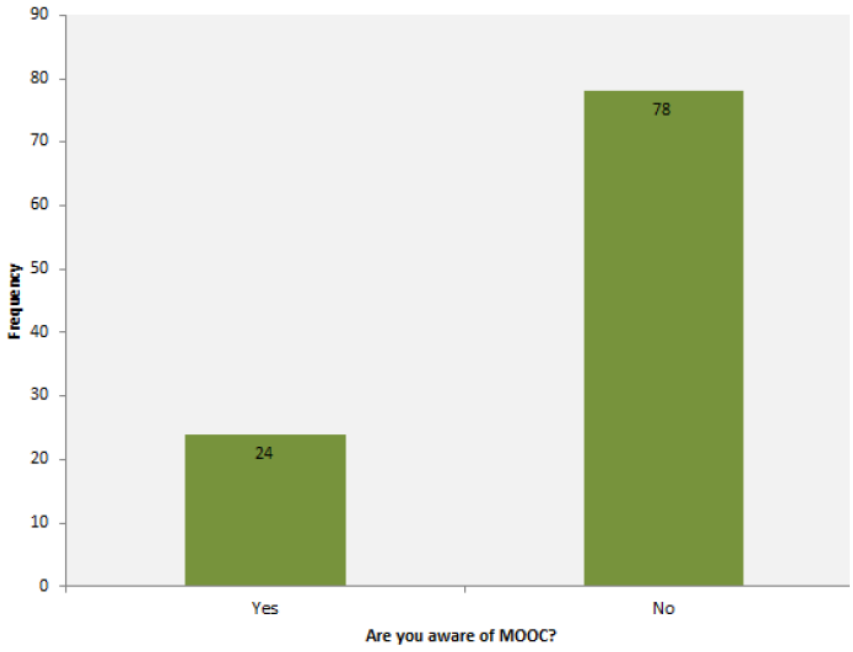

Figure 3: Illustrate the Distribution of Answers for MOOC Awareness

Table 4: The Frequency and Percentage for MOOC Awareness

		Frequency	Percent	Valid Percent	Cumulative Percent
Awareness	Yes	24	23.5	23.5	23.5
	No	78	76.5	76.5	100.0
	Total	102	100.0	100.0	

Awareness and Readiness based on Demographic Data

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of What is your gender? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.150	Retain the null hypothesis.
2	The distribution of What is your age? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.357	Retain the null hypothesis.
3	The distribution of Years of working experience? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.702	Retain the null hypothesis.
4	The distribution of Academic qualification? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.619	Retain the null hypothesis.
5	The distribution of Which type of university or college you are from? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.758	Retain the null hypothesis.
6	The distribution of What kind of mobile device do you use? is the same across categories of Are you aware of Massive Open Online Courses (MOOC)?.	Independent-Samples Kruskal-Wallis Test	.288	Retain the null hypothesis.

Figure 4: The Result Obtained after Kruskal-Wallis One Way ANOVA being done by Comparing MOOC Awareness Variable with Demographic Variables, Understanding on MOOC and Mobile Device Background

Based on the result from Figure 4, it shows that comparison between the MOOC awareness variable with demographic variables and have significant differences more than 0.05($p>0.05$) which concludes that the null hypothesis is retained, suggesting that there was no significant difference on MOOC awareness with different respondents' demographic data. Respondent's age, gender, qualification, working experience does not effect on the MOOC awareness. However, for awareness on MOOC based on blended learning understanding, the comparison showed significant difference as the p is less than 0.05($p<0.05$), thus concludes that the null hypothesis is rejected. Understanding on blended Learning does affect the awareness on MOOC among respondents.

CONCLUSION

The purpose of this study is to evaluate the awareness and readiness of Malaysian radiographers toward the new learning system, MOOC. From this study, we found out that Malaysian radiographers are ready for any online learning such as MOOC but are still not aware about its availability. We also found out that there is significant relationship between MOOC awareness and understanding on blended learning.

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The Significance of Online Quizzes and Gamification inEnhancing Students' Motivation in Diploma in Nautical Studies

Shamsul Rizal bin Haji MohdRosedi, PhD.
(Corresponding author)
Pre-Sea Nautical Studies Department
Akademi Laut Malaysia (ALAM)
shamsulrizal@alam.edu.my

MohdAsri bin Md. Sap
Pre Sea Nautical Studies Department (ALAM)

Captain Mazlan Hamid bin Hamzah
Advanced Nautical Studies Department (ALAM)

Captain Fariq Fadhli bin Abdul Malik
Pre Sea Nautical Studies Department (ALAM)

Ayu Rita binti Mohammad
University of Selangor (UNISEL)

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ABSTRACT

This study focuses on the use of online quizzes and gamification in enhancing students' motivation at the AkademiLaut Malaysia (ALAM), particularly for Diploma in Nautical Studies programme. This exploratory study aims to reap the benefits of using learning technologies such as the online quizzes and gamification in maritime education and training. As the International Maritime Organisation(IMO) Standards of Training and Certification for Watchkeeping(STCW) syllabus covers vast areas of sea navigation, seamanship, safety and shipping (maritime knowledge and competencies), it is timely to promote digital learning methods in classroom especially those that could increase students' motivation in learning. The results of quantitative study on 152 respondents of first year nautical cadet officers showed that online quizzes and gamification were the preferred delivery

methods in classroom compared to other methods used. Finally, the results of study also proved that online quizzes and gamification were significant in enhancing students' motivation. This has a significant impact on current policy and teaching and learning strategies for Maritime Education and Training (MET).

Keywords: *Online quizzes, Gamification, Motivation, Learning technologies, Nautical studies*

INTRODUCTION

The advent of technology in information and communication has tremendously impacted human being nowadays. The world has witnessed vast improvements in all fields especially in the last decade. Today, the Information and Communication Technology (ICT) has also brought wonders in the educational field especially in lesson delivery, teaching facilities, teaching repository, learning resources (the internet) and etc. Hence, the concept of electronic learning has already taken place either to complement or to replace traditional learning. Nevertheless, the aspiration of this paper is to complement the existing learning with innovative learning applications such as online quizzes and gamification.

There have been extensive studies on gamification and online quizzes in the world and in Malaysia to date; but none focuses on the maritime industry especially the Maritime Education and Training (MET). It is timely now for MET to embark on such a study so as to utilize the full advantage ICT in education. The International Convention for Standards of Training and Certifications for Watchkeeping(STCW) for seafarers have already mandated the ICT in its venerable model courses. These model courses provide minimum guidelines or standards for comprehensive training courses to all seafarers worldwide.

LITERATURE REVIEW

Learning is an active process and requires motivation to begin, continue and complete the process (Glover, 2013). Even though motivation is ever-present in young, vibrant learners, it can diminish according to several factors. Among these factors is the monotonous learning regime as a result of long routine process. The emergence of new information and communication technologies has made educationists and educators to make breakthroughs in teaching and learning. According to Bidder et al. (2015), one of these breakthroughs is the development of online or electronic learning applications that enhance students' motivation.

Researchers such as Buckley, Doyle and Doyle (2017), Enfield (2016), Huang et al. (2016), Chang (2016) and Hashim, Tan and Rashid (2015) discovered that web-based applications such as online quizzes and gamification have increased student motivation, engagement and interests. These web based tools are developed as learning interventions which provide alternative ways to achieve learning goals in classrooms. In conjunction with this, Harandi (2015) reported that these e-learning or web based applications are "*elements that affect student'smotivation*" (p.423). This is due to the fact that new technologies have potentials to modify instructions and these modified instructions should be fully exploited to enhance motivation, generate interests and thus maximize learning. From this point onwards, in this study, these new technologies are referred to as online quizzes and gamification. The following paragraphs shed lights on the previous studies' findings in the significance of online quizzes and gamification in higher education, particularly in enhancing students' motivation.

Salas-morera, Arauzo-azofra, andGarcía-hernández (2014) integrated online quizzes as a teaching and assessment tool in the general program of thesubject Proyectos in the third course of IngenieroTécnicoenInformática de Gestión over five consecutive years. The results showed positive influence on students' motivation and academic performance. The survey also revealed that students preferred to use online quizzes in course instruction. Cann (2014) examined the possibilities for increasing students' engagement with the simplest tools available in any standard virtual learning environment and available to all, which are the online quizzes. Results which were obtained from a large student cohort indicated that online quizzes were able to achieve high levels of student satisfaction and motivation.

Gamification, on the other hand, involves using game-based mechanics, aesthetics and game thinking to engage people, motivate action, promote learning, and solve problems as discovered by Kapp (2012). Accordingly, Cheong, Cheong, andFilippou (2013) stated that by engaging the students with learning activities in gaming can help improve the quality of learning and motivation. Questionnaires were used after the activity was made using a gamified multiple-choice quiz which was implemented to undergraduate IT-related course. The results showed some degrees of engagement and enjoyment. The majority of participants (77.63%) reported that they were engaged enough to complete the quiz and 46.05% stated they were happy while playing the quiz. In terms of learning, the overall results were positive since 60.53% of students stated that it enhanced their learning effectiveness and motivation.

Buckley, Doyle, and Doyle (2017) explored students' perceptions of a gamified learning intervention deployed in a large undergraduate module and a small postgraduate module. Focus groups were carried out to develop understanding of the students' perceptions of a gamified learning environment. One of the themes emerged was motivation, besides the impact on learning outcomes, the importance of the stakes, group dynamics, gender and challenges that gamified learning activities present. The study evaluated students' perceptions of the effectiveness of gamification, providing guidelines for other practitioners deploying gamified learning interventions and identifying outstanding issues and questions that require further research.

Cheong, Flilippou, and Cheong (2014) in their studies, used gamification as a tool to improve learning environment as traditional approaches did not seem to be engaging with students earlier. A survey was done to 51 undergraduate IT students to obtain their perceptions on game elements, which were the building blocks of what made a game identifiable as such through a development of a game-like learning system. It was found that undergraduate students had a positive perception of systems that use game elements and were interested in its use for learning. In overall, students favouredsocial interaction, engagement, feedback, and increased learning, which concluded that gamification is suitable for learning approaches such as social constructivism. More importantly, the study revealed that gamification had enhanced students' motivation level.

The studies of Harandi (2015) concluded that there existed significantrelationship between e-learning applications such as online quizzes and gamification with students' motivation. The study highlighted that, students were more motivated when such e-learning tools were applied in classroom. In addition, "*when they were more motivated to learn, they were likely to beengaged; if they were engaged with lessons, they were more likely to achieve thelearning objectives*" (p.429). So it is highly recommended to use online quizzes and gamification as part of learning instructions in higher education.

METHODOLOGY

Respondents and Researchers

This study was conducted on 152 respondents from the AkademiLautMalaysia (ALAM), Kuala Sungai Baru, Masjid Tanah, Melaka. Their ageranged from 18 to 24 years old and they were undertaking Diploma in Nautical Studies in semester 1, 2 and 3. The subjects of focus were Business English, Maritime English, Malaysian Studies, Professional Ethics, Introduction to Chartwork, Introduction to Ship Stability and Meteorology. The respective researchers for this study were Dr. Shamsul Rizal bin Haji MohdRosedi for Business English and Maritime English, Mr. MohdAsri bin Md. Sap for Malaysian Studies and Professional Ethics, Captain Mazlan Hamid bin Hamzahfor Introduction to Chartwork and Introduction to Ship Stability subjects and Captain FariqFadhli bin Abdul Malik for Meteorology.

Online Quizzes

Online quizzes for the study were created by an online application website which can be accessed at https://www.qzzr.com/. This website offers free and user-friendly online quizzes for educators. Educators could create quizzes for their subjects within minutes via this website and there is minimal restriction in terms of the number of questions and features. The subjects specificallyinvolved with online quizzes in this study were Business English and Maritime English.

Gamification

Gamified quizzes for the study were created by one of the most popular applications for gamification, Kahoot! The application is well-known for its game-like features which enhance the competitive spirits in classroom learning. Students shall compete among themselves in this rich gamification setting. The subjects involved in gamification were Maritime English, Project Paper, Malaysian Studies, Professional Ethics, Introduction to Chartwork, Introduction to Ship Stability and Meteorology.

Research Design and Instrumentation

Class experiments on online quizzes and gamification were conducted over a month period in which researchers conducted the experiments at the end of each target lesson so as to provider a quick review of the lesson proper. Respondents were asked to bring along their own device (BYOD=Bring Your Own Device) and use them to access the links which then directed them to the respective quizzes and gamification sites. Data collection was conducted at the end of the experiment month where all 152 respondents were asked to answer an online survey containing self-administered questionnaire which provided quantitative feedback to the author and researchers. The survey questionnaire set consisted of 23 self-constructed questions and it was divided into 3 sections, Section A, Section B and Section C. Section A used multiple choice format for obtaining demographic data from respondents through 2 questions. Section B had 8 multiple-choice questions that focused on online quizzes and gamification while Section C had 13 questions on online quizzes and gamification with students' motivation. All 13 questions in Section C used 5 point *Likert Scale* ranging from *1) Strongly Disagree, 2) Disagree, 3) Neutral, 4)Agree and 5) Strongly Agree.*

Accordingly, a reliability test on all questions was conducted by using *Cronbach coefficient alpha* of the SPSS software. The *Cronbach coefficient alpha*value was obtained at 0.756 for all 23 questions. Nunally (1978) proposed the value of 0.7 as the basic reliability for research questionnaire. Hence, it can be summarized that for this study, there is an acceptable level of reliability in all self-constructedquestions used in this research. Table 1 below depicts the Alpha value for the survey questionnaire.

Table 1: Reliability Statistics

Cronbach's Alpha	N of Items
.756	23

Data Analysis

All collected data were analyzed by the SPSS software version 22. Descriptive analysis was performed on all questions to obtain means and standard deviations. Pearson Product Moment Correlation test was also performed to calculate the correlation between online quizzes and gamification with students' motivation in this study.

Research Questions

The research questions of this study have been formulated as follows:

1. What is the level of students' preference for online quizzes and gamification if compared with other types of learning methods?

2. What are the advantages of online quizzes and gamification in learning?

3. Do online quizzes and gamification motivate students to perform better?

RESULTS AND DISCUSSIONS

Respondents' Profile and Experience in Using Online Quizzes and Gamification

Table 2 indicated that the majority of respondents were male (96.1%) in the age group of 18 to 24 years old. This corresponds with the fact that the number of male cadets enrolling at the AkademiLaut Malaysia (ALAM) far exceeds the number of female cadets (3.9%) for junior cadets. Moreover, the number of female cadets has been steadily fixed at 5% of intake annually. Semester 1 cadets were the majority in this study with 50.7%, followed by Semester 3 cadets (36.8%). The minority group of respondents was the Semester 2 cadets with only 12.5%.

For the frequency of doing online quizzes and gamification per subject, suffice to mention that majority of respondents (75.7%) had done it between 3 to 4 times per subject in both experiments (online quizzes and gamification). Altogether, there were 7 subjects in this research as stated earlier in this paper. Meanwhile, 17.1% of respondents had done it between 5 to 7 times per subject and only 4.6% did it more than 7 times of online quizzes and gamification per subject. It is also noted here that 2.6% of respondents did both experiments in only 1-2 times per subject and this was the minority group in this category. From Table 2, it can be summarized that all respondents in this study had been sufficiently exposed to online quizzes and gamification before they attempted the survey questionnaire.

Table 2: Respondents' Profile

	Item	%
Gender	Male	96.1
	Female	3.9
Age	18 – 24	100
Semester	Semester 1	50.7
	Semester 2	12.5
	Semester 3	36.8
Frequency of doing online quizzes and gamification per subject	1 - 2 times	2.6
	3 - 4 times	75.7
	5 - 7 times	17.1
	More than 7 times	4.6

To discuss further, Table 3 below shows respondents' feedback on the other two questions in Section A and B that focused on online quizzes and gamification. It is also noted that the level of students' preference was very high for both statements. The respondents strongly agreed that the online quizzes and gamification have made them more interested in their lessons. The mean score obtained for the statement, "*Online quizzes and gamification made me moreinterested in lessons*" was 4.49. Moreover, they also agreed that both web based tools were helpful in their studies. The mean score obtained by the statement, "*Online quizzes and gamifications are helpful in my studies*" was 4.20. Both findings give the indication that online quizzes and gamification have potential in maximizing learning. Hence, they should be integrated in more significant ways in teaching and learning process at ALAM.

Table 3: Respondents' Feedback on Online Quizzes and Gamification Mean SD

	Mean	SD
Online quizzes and gamification made me more interested in lessons	4.49	.587
Online quizzes and gamification are helpful in my studies	4.20	.838

Analysis on Research Question One: What is the Level of Students' Preference for Online Quizzes and Gamification if Compared with the Other Types of Learning Methods?

Table 4 below shows the means and standard deviations of 5 questions in Section B which specifically focused on students' preference of online quizzes and gamification in comparison with the other methods of learning applied atALAM. These 5 questions were included to evaluate further respondents' preference of online quizzes and gamification as part of teaching and learning at ALAM. The findings showed that the overall mean scores obtained by all statements ranged from 3.65 to 4.60. Even though the scores obtained were considered high, three statements received mean scores below 4.00 (*meanscore<4.00*) while two statements received mean scores of more than 4.00(*meanscore>4.00*). The three statements which represented the learning methods that received means score below 4.00 were *lecture* (3.79), *textbook & course notes*(3.65) and *presentations & discussions* (3.91). On the other hand, the two statements that obtained mean scores of more than 4.00 were *class activities &practical sessions* (4.26) and *online quizzes & gamification* (4.60). In Table 4, all the statements were listed according to the highest mean score received. To summarize the findings in this section, it is noted that majority of respondents preferred online quizzes and gamification more than the other 4 types of learning methods used. This can be seen from the highest mean score obtained by online quizzes and gamification in comparison with the other types of learning methods.

Table 4: Respondents' Preference on Types of Learning Methods

	Mean	SD
State the level of preference on each of the learning methods below:		
Online quizzes & gamification	4.60	.518
Class activities & practical sessions	4.26	.750
Presentations & discussions	3.91	.841
Lecture	3.79	.866
Textbooks and course notes	3.65	.930

Hence, to answer Research Question 1, it can be stated here that the online quizzes and gamification were the most preferred types of learning by respondents in this survey. This was followed by class activities and practical sessions, presentations and discussions, lecture and lastly, textbooks & course notes.

Analysis on Research Question Two: What are the Advantages of Online Quizzes and Gamification in Learning?

It is also essential for every research to find out the advantages of subject which is being studied. Hence, this paper is not complete without highlighting the advantages of online quizzes and gamification. It is also hoped that the findings of this study could confirm other studies' findings which highlight the benefits and potentials of these two web-based tools. Hence, in Section C, 8 questions/statements had been constructed to obtain respondents' feedback on the possible advantages of online quizzes and gamification. These questions were placed in sequence in the questionnaire for better identification by respondents. Statements which received high mean scores i.e. mean scores of more than 4.00 (*mean score>4.00*) shall be considered as advantages of online quizzes and gamification for this study. Table 5 below lists down these statements for better discussion.

Table 5: Statements that Indicate Advantages of Online Quizzes and Gamification

	Mean	SD
Online quizzes & gamification help me to review my lessons.	4.43	.697
Online quizzes & gamification motivate me to study harder.	4.67	.471
Online quizzes & gamification promote healthy competition in getting the best academic results.	4.53	.680
Online quizzes & gamification help me find out what I don't know so I can learn it.	4.55	.669
Online quizzes & gamification make me want to read more or refer to my course notes on the specific lesson.	4.56	.638
Online quizzes & gamification increase my interest in the lesson.	4.44	.688
I pay more attention in classes that use online quizzes & gamification.	4.48	.754
I learn faster and better in classes that uses online quizzes & gamification.	4.53	.680

From Table 4, it is obvious that all statements obtained very high mean scores and this makes them the best possible advantages of online quizzes and gamification as perceived by respondents in the study. All of them obtained high mean scores of more than 4.00 which ranged from 4.43 to 4.67. Therefore, it can be concluded that all 8 statements are indication of the advantages of online quizzes and gamification as they *help students to review lessons, motivate them tostudy harder, promote healthy competition, help to identify weak topics, makethem to read their notes further, increase level of interest in lessons, pay moreattention in class and lastly learn faster than traditional methods of delivery*. The most preferred advantage as indicated by this study is "*motivate students to studyharder*" (mean score = 4.67) while the least preferred is "*help to review mylesson*" (mean score = 4.43).

From these identified advantages, it can be therefore concluded that online quizzes and gamification are significant in learning to students of Diploma in Nautical Studies at ALAM. But it is important to note here that these 8 advantages are not all the advantages of online quizzes and gamification. There have been numerous studies on online quizzes and gamification that have resulted in more and different advantages to date.

Analysis on Research Question Three: Do Online Quizzes and Gamification Motivate Students to Perform Better Academically?

To address Research Question Three, a two-tier analysis was conducted so as to be more objective in discussion. The first tier involves the listing down of mean scores of the statement that is most suitable to represent the concept of 'motivation' in association with online quizzes and gamification. The identified statement is listed in Table 6 below. The statement, "*online quizzes &gamification motivate me to study harder*" is the best statement to answer the research question in this section for the first tier analysis.

Table 6: Statement That Indicate Motivation and Its Association with Online Quizzes and Gamification

	Mean	SD
Online quizzes & gamification motivate me to study harder	**4.67**	**.471**

From the mean score obtained by the statement, respondents have indicated that the online quizzes and gamification had motivated them to work harder, academically. This can be further supported by the other two statements in the questionnaire which were also related to the statement, "*Online quizzes &gamification motivate me to study harder."* The two statements are "*onlinequizzes & gamification make me want to read more or refer to my course notes onthe specific lesson*" and "*online quizzes & gamification increase my interest in thelesson*". From these, it can be said that the research question has been partially addressed. The second tier of analysis involves the use of correlation matrix in obtaining the correlation between online quizzes and gamification with student motivation. For this purpose, Pearson correlation is among the best methods in determining the correlation or association. Table 7 presents the Pearson correlation matrix between online quizzes and gamification with students' motivation for better discussion and conclusion.

Table 7: Correlation Matrix between Online Quizzes and Gamification with Motivation

		GMF	MTV
GMF	Pearson Correlation	1	.626**
	Sig. (2-tailed)		.000
	N	152	152
MTV	Pearson Correlation	.626**	1
	Sig. (2-tailed)	.000	
	N	152	152

**. Correlation is significant at the 0.01 level (2-tailed).

The Pearson correlation shows that the relationship between online quizzes and gamification and students' motivation was found to be positively and strongly related ($r= +0.626$, $p<0.001$). Hence, Table 7 confirms that there is a statistically significant correlation between these two variables. Therefore, it can be concluded that online quizzes and gamification have enhanced students' motivation in this study. The mean scores obtained by the statements and the Pearson correlation matrix confirm this relationship.

CONCLUSION AND IMPLICATIONS OF STUDY

This study focuses on the significance of online quizzes and gamification in enhancing students' motivation for Diploma in Nautical Studies at the AkademiLaut Malaysia (ALAM). From the results obtained, it is obvious that there exists a significant relationship between online quizzes and gamification with students' motivation. Moreover, besides motivating students, both e-learning tools have found to bring advantages such as helping students to review lessons, motivating them to study harder, promoting healthy competition, helping to identify weak topics, making students to read their notes further, increasing level of interest in lessons, paying more attention in class and lastly, learning faster than traditional methods of delivery. These findings are important as applying e-learning tools such as the online quizzes and gamification in learning requires careful consideration. This shall make maritime educators and educationists to plan and have more engaging yet effective teaching and learning approaches so as to have more motivated students and better academic results.

This study paves way for more research on ALAM students' motivation and e-learning applications in maritime education and training. It is also timely now to consider these e-learning applications as part of the strategies in Maritime Education and Training (MET) institutions so as to have more effective and engaging learners. These effective and engaging learners are not only responsible for their learning but also are empowered to shape the learning process which defines the achievement of learning objectives in wider perspectives. Encouragements should also be given to maritime educators and educationists to conduct more extensive studies on digital technology applications in teaching learningsuch as flipped classroom, Multimedia Learning System(MMLS), blended learning, mobile learning and augmented reality. Indeed, the standards of training as emphasized by the STCW need to be complemented with powerful tools of electronic learning so as to produce competent seafarers who are not only motivated, skillful and knowledgeable, but are also technology savvy.

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Interactive eLearning System (IeLS) for Learning and Teaching of ICT Coursein Higher Secondary Level in Bangladesh

Abu Sayed Md. Latiful Hoque, Golam Md. Muradul Bashir

Department of CSE, BUET, Dhaka, Bangladesh
asmlatifulhoque@cse.buet.ac.bd, murad98csekuet@yahoo.com

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ABSTRACT

Introducing ICT course at higher secondary level has created new challenges for computer education in Bangladesh. The challenges are: the crisis of experienced teaching staffs, insufficient laboratory facilities, Internet accessibility and appropriate course materials. So it has become very difficult to provide proper ICT education at higher secondary level. If the ICT education cannot be achieved in these levels, it will have a negative impact to the study of Computer Science and Engineering (CSE) at tertiary level as well. Problem Based e-Learning (PBeL) is the integration of eLearning with Problem-Based Learning, a new paradigm of learning of programming languages and ICT education. In this paper, we have presented an Interactive eLearning System (IeLS) based on Problem-Based eLearning (PBeL) for learning and teaching of the ICT course. The system has been implemented as per syllabus of National Curriculum and Textbook Board of Bangladesh. There are two types of contents in the course: textual and programming. Students can learn the textual contents of the course interactively and measure the learning outcome by self-evaluation. The learning and evaluation process is continued iteratively until the learner is satisfied. The programming contents of the course are HTML, C programming and Database Management System. We have implemented the programming contents as per PBeL model. In the PBeL model, the main component is the problem-bank that has been designed in a hierarchical fashion such that the content coverage problem of traditional PBL is removed. So transition from traditional to PBL is easy. The system

has been used by the students and teachers of different colleges in higher secondary level. The result has been found to be very much satisfactory.

***Keywords**: PBeL, ICT Course in Higher Secondary Level, eLearning of HTML, Interactive eLearning, eLearning of C Programming, eLearning of Database*

INTRODUCTION

Introducing ICT course at higher secondary levels have created new challenges for computer education in Bangladesh. These challenges are the crisis of experienced teachingstaffs, insufficient laboratory facilities, Internet accessibility and appropriate course materials. So proper ICT education at higher secondary level is very difficult to achieve. If no proper ICT education can be provided in these levels, it will have a negative impact to the study of Computer Science and Engineering (CSE) education at tertiary level as well.

Problem Based e-Learning (PBeL) is the integration of eLearning with Problem-Based Learning, a new paradigm of learning of programming languages and ICT education in Bangladesh. It has been found that introducing Problem Based e-Learning (PBeL) in the learning of Database course in the Department of Computer Science and Engineering (CSE), Bangladesh University of Engineering and Technology (BUET) has been found to be quite effective [1]. With this experience, it is highly desirable that the same will be true in learning and teaching of ICT course in the higher secondary education and the challenges mentioned above can be solved.

In this paper, we have presented an Interactive eLearning system (IeLS) based on Problem-Based eLearning (PBeL) for learning and teaching of ICT course in higher secondary level. The use of this system removes the fear of the students to study the newly introduced ICT course in higher secondary level by the design and development of the course content in an interactive manner. This system has been implemented as per the syllabus of National Curriculum and Textbook Board [2] for ICT course content in HSC level. It makes the learning easy by developing the content in such a way that the students can get help instantly. The content has been organized in a cycle of learning and self-evaluation mode byintroducing e-evaluation

of different types. As a web-based system, it is easy for the teachers to grasp and a thorough understanding of the course content within a short period of time even for the teachers not studying computer science. So this will solve the instructor crisis problem of the country. The content and the problem-bank are accessible by using smart phones as well. Hence, Internet accessibility problem has been reduced to some extent.

A process has been proposed for continuous improvement of the system for better learning and teaching outcome by using a usage statistics and users feedback mechanism. The programming contents of the course are HTML, C programming and Database ManagementSystem. Problem-Based eLearning model [2, 3] has been implemented for the learning and teaching of the three programming parts. PBeL model has been implemented in three modes: solutions with hint, solution without hint and full solution. So students can learn self or with peers as pair-wise learning method having minimum interaction with the instructor. The effectiveness of the system has been measured by organizing workshops for the ICT course teachers and the ICT students. We have collected feedback from both teachers and students and found that the use of this system will solve the existing problems of learning and teaching of the course to a great extent.

RELATED WORK

Problem-based eLearning of HTML in ICT course of Higher Secondary level in Bangladesh has been described by Abu Sayed and Golam (2016). In this paper, the effectiveness of PBeL has been shown in part of the ICT course. The details about the PBeL model have been given in Golam and Abu Sayed's paper 2016a). In this paper, it has been described how can the PBL be integrated with eLearning to solve the content coverage problem and instructor workload problem of PBL be solved. PBeL has been applied in learning and teaching of PHP (Golam & Abu Sayed, 2016b) and SQL programming (Abu Sayed et al., 2012). The benefit and success of PBL revealed in many articles (Gallagher &Stepien, 1996; Hung, Bailey &Jonassen, 2003; Norman & Schmidt, 1992; Hung, 2006). PBL pedagogy applied on introductory programming course to accomplish performance evaluation and found PBL students results significantly better than traditional (Looi&Seyal, 2014, Soares, Fonseca & Martin, N.A.). Nuutila et al. (2005)

applied seven steps method of PBL on an introductory programming course. The seven steps method is widely used in medical education (Barrows, 1986; Schultz-Ross & Kline, 1999). The cognitive and affective requirements as well as contextual validity of programming problems and medical education are not similar. As a result, precisely application of seven steps method is less adapted with the programming problems types. However, the issues adjacent to the physical design of problems seem to have received little concentration. The PBL has been applied many other courses e.g., Analogue Electronics (Mantri, Dutt, Gupta &Chitkara, 2008), Software Engineering (Qiu& Chen, 2010), Signal Processing (Bhatti & McClellan, 2011) and the study of Microprocessor (Kim, 2012). These systems do not provide any guidelines how can the transition from traditional to PBL be done smoothly, the traditional contents can be covered in PBL and the reduction of instructor workload.

SYSTEM ARCHITECTURE

We have divided the content of the course to six modules as per the syllabus provided by NCTB (N.A.). The modules are as follows:

1. Information and communication technology: World and Bangladesh Perspective

2. Communication System and Networking

3. Number System and Digital Devices

4. Introduction to Web Design and HTML

5. Programming Language

6. Database Management System

Analysis and Design of Content

The content has been analyzed and decomposed in such a way that support the development of the system. Figure 1 shows the detailed decomposition diagram of the system. In the decomposition diagram, it is shown that the first three modules, there are texts, graphics and Multiple Choice Questions (MCQ). The learning process starts with earning the contextual knowledge by studying the content. After acquiring a certain amount of contextual knowledge, students go through an MCQ to judge his knowledge, to remove the fatigue and monotony and increase students' participation in learning. The learning process runs iteratively as shown in Figure 2.In the decomposition diagram, it is shown that the last three modules contain the PBeLas the components of IeLS. In these modules, there are programming parts and for learning and teaching of programming, PBeLs have been incorporated in the IeLS.

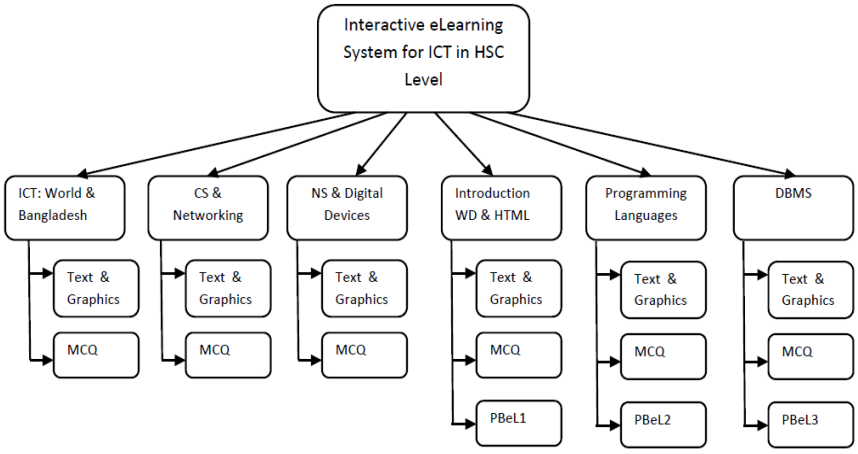

Figure 1: Decomposition Diagram of Interactive eLearning System for ICT Course in HSC Level

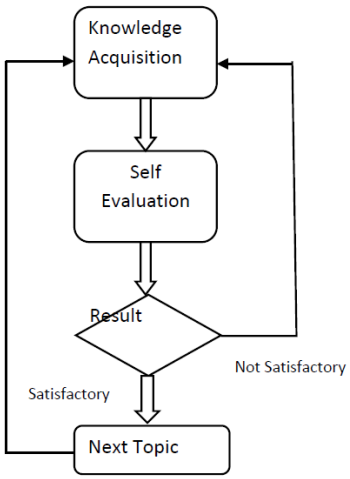

Figure 2: Knowledge Acquisition Cycle for Acquiring Contextual Knowledge System Architecture for IeLS

Figure 3 shows the system architecture for IeLS for ICT course at HSC level. There are six system modules for the management of interactive contents of six chapters, the problems and solutions management for blended synchronous learning covering the content and supporting lifelong learning. In a classroom in blended learning environment, the progresses of all of the students are not the same. The progresses of some students are very fast and the progresses of some students are very slow. It is a challenging problem for the teaching and learning community to maintain the class room environment attractive, interactive and interesting for all levels of students as mentioned.

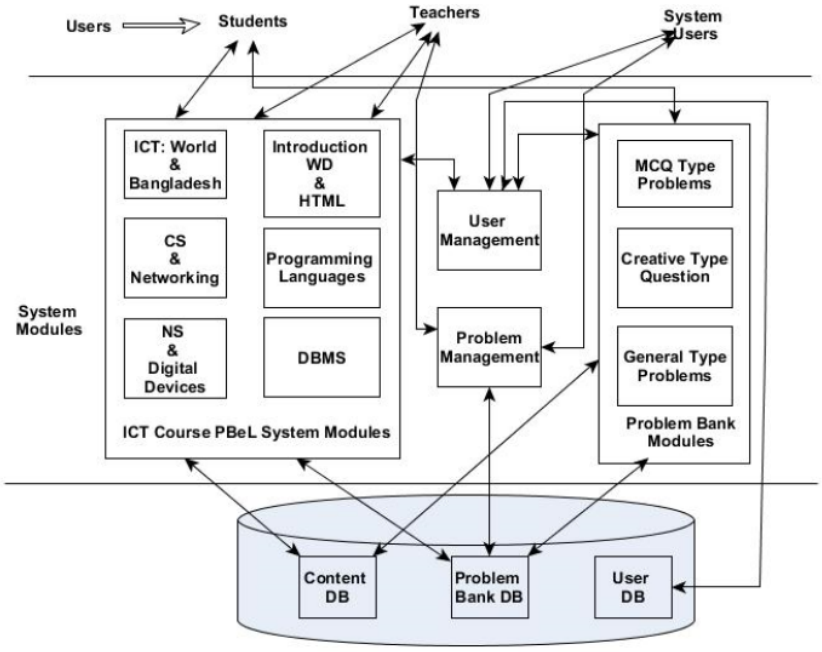

Figure 3: System Architecture for IeLS for ICT Course at HSC Level

In this system, this challenge has been addressed by designing the problem bank in a hierarchical fashion as discussed by Golam and Abu Sayed (2016a). Each problem is a part of a big real-life problem. The higher the level of the problem, the difficulty of the problem is also higher. The lowest level problems are designed in such a way that they cover the entire content of the course. The users of the system are students, teachers and system users. The students interact with six modules of ICT course PBeL system for learning purpose in different mode. The students also interact with problem-bank modules for appearing online examinations for self-evaluationor evaluation by the instructor. The teachers interact with the PBeL system modules for inserting the content into content database as per design of the content database, updating the content as per necessity and insert problem to the problem-bank integrating the content with the problem.

In the problem-bank module, there are three types of problems as suggested by NCTB (N.A.) and the course experts. These are the different

types of Multiple Choice Questions (MCQ), Creative Type Questions (CTQ) and General Type of Questions (GTQ). Problem-bank is used for multiple purposes e.g., learning and teaching in PBeLenvironment, self-learning, self-evaluation and the evaluation by the instructors. There are examinations held in different times for different levels of students in all colleges. The teachers can prepare the question-set of all types from the problem-bank. Question set can be prepared by selecting different questions by the teacher or it can be prepared by running question-set preparation algorithm.

The system users interact with the user management module and the problem management module. Student users have only one role of learning and evaluation. The teacher's roles are submission of questions as question setter, moderation of questions and preparation of question-set for different examinations.

IMPLEMENTATION OFIELS

The open source web programming language PHP has been used for the development of the web-based system and MySQL has been used for the database. A problem-based eLearning (PBeL) System for structured programming language C for Higher Secondary level has been shown in Figure 4. Using this module, the students can learn the content of C programming language as per NCTB (N.A.) syllabus. They can also write C programs, execute it and see the results interactively.

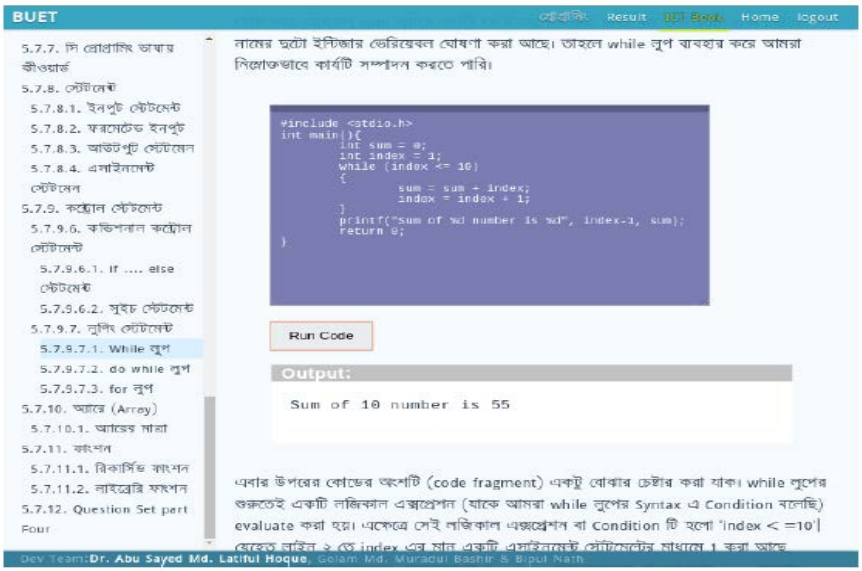

Figure 4: Interface for Interactive Learning Module for C Programming Language

We have developed a PBeL module for the learning of web development and HTML. Figure 5 shows a sample interface for this module. In this module, real life problems like the home page of ICT Division, government of Bangladesh, CV of a famous person etc. have been used for the interactive learning purpose. We have considered three options for learning: learning from the scratch, learning with hint and learning with example (complete solution). There are different levels of problems. The top level (root) problem is the full real-life problem. The root level problem has been decomposed into lower level smaller problems. Level 1 problems are mostly atomic problems those covers a single topic or concept of traditional course content.

Figure 5: Interface for Interactive Learning Module for HTML

The interface for the PBeL system for learning and teaching of DBMS part of ICT course has been given in Figure 6. The theory part can be learnt according to the learning cycle described in previous section. For the PBeL part, several database schemas have been given and on the basis of schema, SQL problems are set.

Figure 6: Interface for Interactive Module for Database Management System

RESULT AND DISCUSSION

Table 1 shows the questionnaire for the evaluation of IeLS. For the evaluation of the system, we have considered seven aspects: personal satisfaction, personal belief, desire, technological, learning, problem solving and student engagement. The participants were 48 students of one leading college, Dhaka College.

Figure 7 shows the performance evaluation by HSC students of medium type college. The evaluation question Q4 is grading the system according tolikert scale for the statement “the addition of the system with traditional class will improve the HSC student’s understanding level”. It

shows that almost 100% strongly agreed the statement. Figure 8 shows the evaluation result after using the system by HSC students of a leading College. Q10 was grading the system according to likert scale for the statement “the practical componentsof HSC level ICT course should be learnt in an interactive mode like the shown Problem based e-learning system”. It was also strongly agreed by almost 100% students.

The evaluation result shown in Figures 7 and 8 were taken during the early stages of the development of the IeLS where only the HTML part was completed.

Table 1: List of Questions for the Evaluation of IeLS

Q. No.	Question Title
1	The practical components of ICT course should be learnt in an interactive mode like the shown e-learning system.
2	You cannot concentrate your attention to traditional class of the college
3	You feel boring to learn in the traditional teaching method of the college
4	You are satisfied to use the shown system as learning assisted tool
5	You are satisfied to use the functions of the shown system
6	You are satisfied to use the learning contents of the shown system
7	You are satisfied with the instructions of the shown system
8	You are satisfied with interactive facilities of the shown system
9	You believe the contents of the shown system are sufficiently informative
10	You believe the shown system is a useful learning tool
11	You believe the contents of the shown system are useful
12	You intend to use the shown system for the HSC level
13	You intend to use the shown system as a self learning tool for the HSC level
14	The environment of the shown system will enhance students' problem-solving skills for the HSC level
15	The environment of the shown system will be more fruitful than the traditional system of learning/teaching of the HSC level
16	The system will be an attractive solution to motivate the students to self-learning for the HSC level
17	The addition of the system can improve the students understanding in class room learning for the HSC level.
18	The addition of the shown system can develop the problem solving capability of the students.
19	If you used the shown system in the HSC level, then you performed more HTML practical work
20	Addition of similar e-learning system for programming language will help more than traditional way of learning
21	Learning by problem solving like the shown system has developed your HTML knowledge more than traditional HSC level learning
22	The shown system will engage students for self learning than that of traditional learning.
23	Problem solving of the system inspired you for more learning
24	You feel confident using the given system.
25	You feel confident operating the functions of the system
26	The environment of the given system improves your thinking skills.
27	The environment of the given system enhances you problem-solving skills.

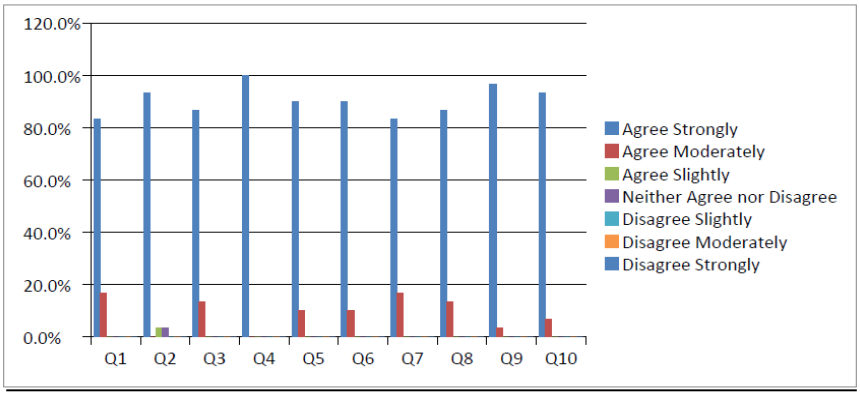

Figure 7: Performance Evaluation by HSC Students of Medium Type College

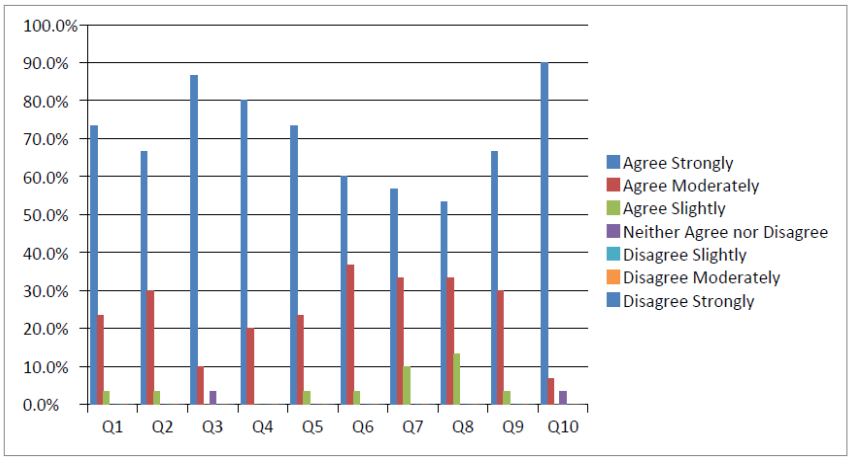

Figure 8: Performance Evaluation by HSC Students of Leading College

Figure 9 and 10 show the evaluation result after completion of the full IeLS system. There are 27 questions as givenin Table 1. As per Figure 9, question 12 "You intend to use the shown system for the HSC level" has the highest value of strongly agree. This shows the very positive impact of the system that can be used for learning and teaching. Out of 27 questions, there are 17 questions having "strongly agree" opinion more than 60 percent. These reflect the effectiveness of the system in learning and teaching.

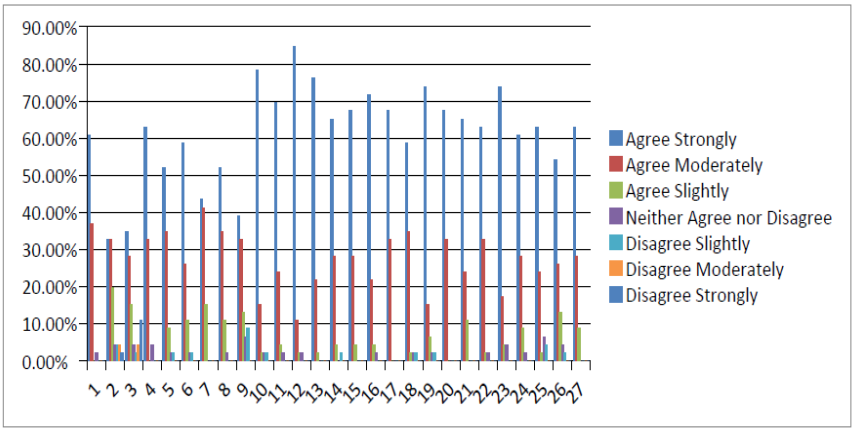

Figure 9: Students' Response about IeLS by HSC Students of a Leading College

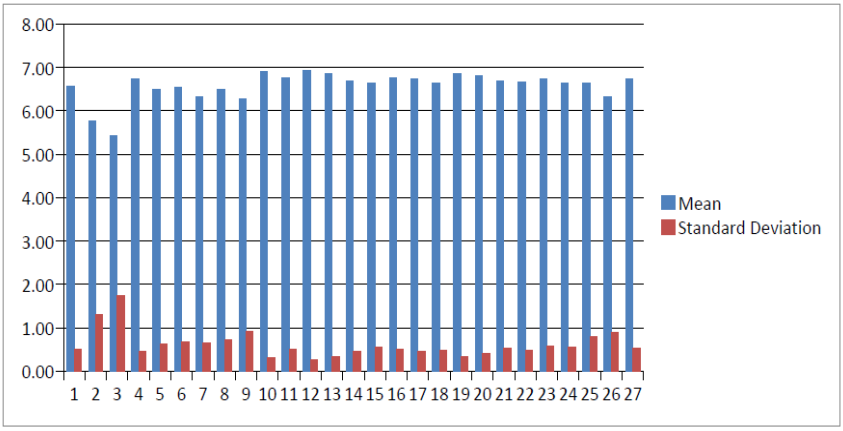

Figure 10: Mean and Standard Deviation of Student Response about IeLS

CONCLUSION

The problems and challenges for learning and teaching of ICT course in Higher Secondary level in Bangladesh are: the crisis of experienced teaching staffs, insufficient laboratory facilities, Internet accessibility and appropriate course materials. This research is an attempt to solve these problems by the

integration of eLearning with Problem-Based Learning, a new paradigm of learning and teaching.

In this paper, we have presented an Interactive eLearning system (IeLS) based on Problem-Based eLearning (PBeL) for learning and teaching of ICT course in higher secondary level. This system has been implemented as per the syllabus of National Curriculum and Textbook Board of Bangladesh for ICT course content in HSC level. There are six system modules as per the decomposition of the course content. We have presented a system architecture showing the interconnections of the modules, the content database and the problem-bank.

The programming contents of the course are HTML, C programming and Database Management System. Problem-Based eLearning model has been implemented for the learning and teaching of the three programming parts. The effectiveness of the system has been measured by the application of the system in a blended learning environment for ICT students. We have collected feed-back from both teachers and students and found that the use of this system will minimize the above mentioned problems for learning and teaching of this course. There are some scopes of improvement of the system as suggested by the participants of the workshops. These are the use of video, animation and graphics in contents that can be implemented in the future work.

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The Effects of Blended Learning Approach on Student Performance in The First Computer Programming Course: A Case Study at UiTM

Zulaile Mabni[1*], Noratikah Shamsudin[1], Sharifah Aliman[1], Rosmah Abdul Latif[2]

[1]Faculty of Computer and Mathematical Sciences, UniversitiTeknologi MARA, 40450 Shah Alam, Selangor, Malaysia
{zulaile,atikah,sharifahali}@tmsk.uitm.edu.my
[2]Faculty of Computer and Mathematical Sciences, UniversitiTeknologi MARA, Seremban Campus, 70300 Seremban, Negeri Sembilan, Malaysia
rose@tmsk.uitm.edu.my
**Corresponding Author*

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ABSTRACT

Learning programming for novice students is hard because students need to acquire a skill through an active construction process in programming. Previous researches done on teaching and learning programming have identified that programming requires problem solving and analytical thinking skills. Many approaches have been proposed in the literature to tackle the learning problems in computer programming. One of the approaches that have become more pervasive in higher education is blended learning. Thus, the purpose of this study is to investigate the effects of blended learning approach on students' performance in the first computer programming course at Faculty of Computer and Mathematical Sciences, UniversitiTeknologi MARA (UiTM). The blended learning approach applied for this study is by combining face-to-face learning and online learning using the Learning Management System (LMS) of UiTM named i-Learn. In this study, a cross-sectional population study with stratified sampling was conducted where a sample of 56 selected undergraduate students enrolled for the first programming course were involved. Prior programming background of these students during their diploma or matriculation program are taken into consideration in this study. Two-way ANOVA analysis revealed that,

the interaction between learning approach and programming background are significant. The mean score for students who have prior programming background and were taught using blended learning approach is much higher as compared to the mean score of students who were taught using the traditional face-to-face learning approach. On the other hand, the mean score for the students who do not have prior programming background and were taught using the traditional face-to-face learning approach, is much higher as compared to the mean score of students who were taught using blended learning approach. Thus, the finding of this study indicated that blended learning approach gave positive impact to students who have prior programming background towards their performance in their first computer programming course.

Keywords: *Blended Learning, Programming, Online Learning, Face-to-Face Learning, Learning Management System*

INTRODUCTION

Learning programming for beginners is difficult because students need to obtain a skill through an active construction process (Bergin & Reilly, 2005). The programming skills that are required for the students are problem solving and analytical thinking skills (Ismail et. al., 2010). The challenges of teaching programming are widely recognized since the failure and dropout rate is high in the introductory programming course (Mendes et al., 2012;Bati et al., 2014). One of the pervasive approach to tackle the learning problem in programming is blended learning approach. Thus, the purpose of this study is to investigate the effects of blended learning approach on student performance in the first computer programming course at Faculty of Computer and Mathematical Sciences, UniversitiTeknologi MARA (UiTM).

The blended learning approach applied for this study is by combining the traditional face-to-face learning and online learning using the Learning Management System (LMS) of UiTM named *i-Learn*. *i-Learn* is a learning management system for e-learning in UiTM which acts as a platform that supports the teaching and learning process in UiTM. The *i-Learn* system consists of many applications such as student records, user roles, courses application, tests and quizzes application, internal communication, and evaluation system.

To evaluate the effects of blended learning approach, we applied two different teaching approaches which are blended learning and traditional face-to-face learning to teach the first semester C++ programming course for the undergraduate students. Two groups of students were involved where one group was taught using blended learning approach and the other group was taught using the traditional face-to-face learning approach. For the face-to-face learning, students were taught using the traditional way of lectures, reading and practical session. Whereas, for the blended learning approach, students were taught using the combination of e-learning and face-to-face learning. The e-learning includes online activities such as online lecture notes, programming examples, programming solution, past exams, quizzes, evaluation, discussion and group collaboration. Prior programming background of these students during their diploma or matriculation program are also taken into consideration for this study. In addition to that, students' performance is evaluated based on their final examination scores. We compared the performance of the students who were involved in the blended learning approach to the students who received the traditional face-to-face learning approach.

The finding of this study indicated that blended learning approach gave positive impact to students who have prior programming background towards their performance in their first computer programming course.

RELATED WORKS

Many approaches have been proposed in the literature to deal with the learning problems in computer programming. The most common approach used is called "bricolage" (Pollack & Schertz, 2003). Using this approach,

students skip the analysis and design phases and implement computer programs directly on the computer. They develop their programs gradually by testing them on various examples of input. However, with this practice, these students are not able to explain their algorithms (Ben-David Kolikant& Pollack, 2004). As a result, they have difficulties to construct the algorithms and come up with mental or cognitive obstacles and misconceptions about computer programming.

Another approach is constructivist learning theory where, a learning theory is applied to computer programming (Hadjerrouit, 1999; Mead et al., 2006; Wulf, 2005). By using this theory, novice students need to construct a valid model of a computer to deal with the difficulties of learning programming. Moreover, students must acquire higher-order thinking skills, such as analysis, design, analogical thinking, reuse, evaluation, and reflection to be proficient in computer programming. However, only few educators have applied the constructivist theory to the learning of computer programming (Berglund et al., 2006).

Another solution is to use information technologies in the learning of programming. Using the information technologies, appropriate feedbacks on programming assignments can be given to students through the online programming systems, Web-based programming tutors, online learning systems, or any similar applications. However, there are few examples of online learning applications and Web technologies developed for computer programming. Thus, it is not possible to draw general conclusions about the effect of online learning systems and similar applications on computer programming (Conolly& Stansfield, 2007; Hadjerrouit, 2005; Schwieren et al., 2006). In addition, most applications focus on the aspects of technology rather than pedagogical aspects.

Finally, an attractive solution is using the blended learning models, which blends the traditional face-to-face learning and Web-based systems or any similar software (Bonk & Graham, 2006; Hadjerrouit, 2008). A related study on blended learning style was conducted to compare the advantages in terms of students' participation between blended learning style and pure virtual e-learning style (Dodero et al., 2003). The study indicates that information technologies can act as an incentive to improve students' participation during traditional classroom teaching. However, in

a completely virtual classroom, these technologies do not help to increase their participation.

According to Deperlioglu and Kose (2013), combining face-to-face and online learning can enhance learning and optimize seat time. They conducted a study on using blended e-learning model on acourse "Data Structures and Algorithms" given at the AfyonKocatepe University, Turkey. The findings showed that the realized blended learning model provided more effective and efficient educational experience rather than traditional face-to-face learning.Even though many researches have been done to solve the learning and teaching problem in computer programming, the problems and difficulties related to the learning of introductory computer programming remain to be researched.

RESEARCH METHODOLOGY

A case study approach is used to investigate the effect on applying the blended learning approach on the students' performance in the first programming course. The study conducted was a cross-sectional study which was done in the Faculty of Computer and Mathematical Sciences, UiTM.

Target Sample

The target population was the undergraduate students who enrolled for the first C++ programming course named *Fundamentals of Computer Problem Solving* in semester September 2016 until January 2017. By using stratified sampling, the target sample comprised of two groups of undergraduate students with a total of 56 students. 35 students were taught using the blended learning approach and 21 students were taught using the traditional face-to-face learning approach.

Data Collection

Data was collected from 56 students through email questionnaire using Google form. The questionnaires were distributed to all 56 students. The questionnaires comprised of demographic factor such as student's ID, program code, type of learning and programming background. In addition to the survey questionnaires, the final exam grades achieved by the students were collected to identify their performance of the subject taught.

Method Analysis

The data was analyzed using R program due to imbalance of datasets. Descriptive statistics was used to summarize all data, while two-factor ANOVA is used to test on the interaction between type of learning and prior programming background on the students' final examination score.

RESULT AND ANALYSIS

The analysis of the results indicates the correlation between students' performance and type of learning approach as well as prior programming background.

Descriptive Statistics

Programming Background and Type of Learning

Figure 1shows that 15 students and 6 students do not have prior programming background in traditional face-to-face learning and blended learning respectively. While the remaining of the students have prior programming background during their diploma or matriculation program.

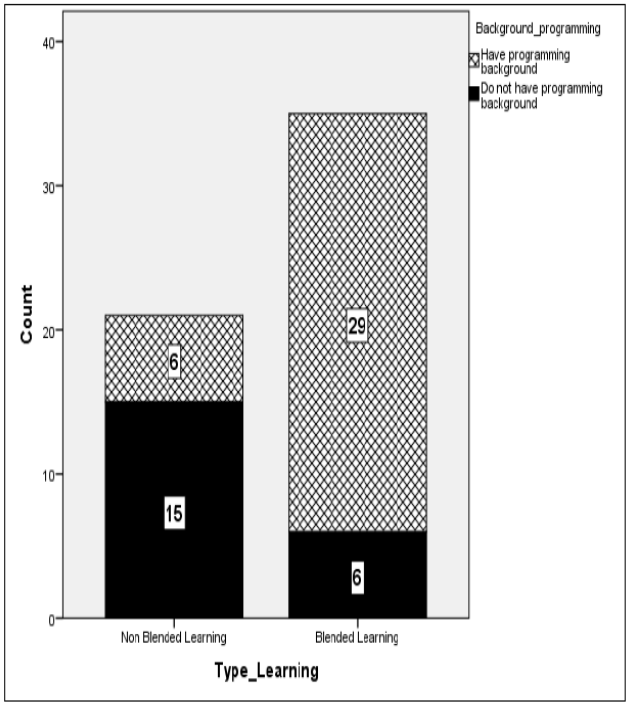

Figure 1: Stacked-bar Chart on Programming Background and Type of Learning

Table 1: Descriptive Statistics of the Final Examination Score

Variables		Background of programming		Types of learning	
		Yes	No	Blended	Non-Blended
Exam Score	Mean	75.800	70.524	75.886	70.381
	Skewness	- 0.010	- 0.520	-0.252	- 0.237
	Kurtosis	- 0.479	- 0.732	0.074	-1.404

From Table 1, in general, we could see that the mean test score for blended learning and haveprior programming background are higher as compared to the opposite. The value of skewness and kurtosis is used to indicate that the data is normally distributed according to each level of programming background and type of learning.

Final Examination Scores and Type of Learning

Based on the cluster bar chart in Figure 2illustrated below, graphically we could see that for blended learning, most of the students with prior knowledge of programming have earned good grades. This contrasted with non-blended learning where, the students without any prior knowledge performed better in the subject taught compared to those with prior programming background.

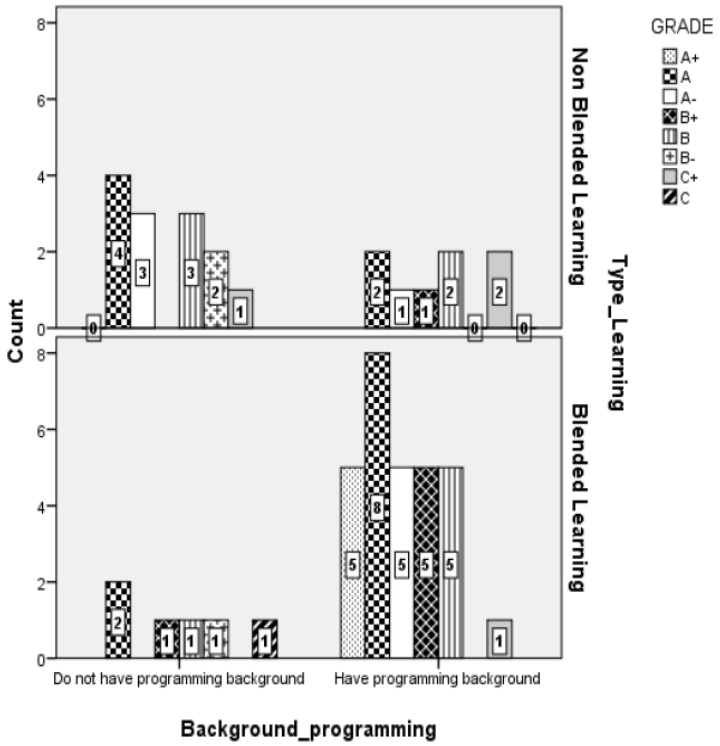

Figure 2: Bar chart on the Students' Final Examination Scores and Type of Learning

Two-way ANOVA

The assumption testing for normality of data, normality of error term and homoscedasticity was done using Shapiro-Wilk test, Normal P-P plot and Levene's test and both assumptions satisfied.

Table 2: Two-way ANOVA for Programming Background and Type of Learning

Variables	Source of variation	Sum of squares	*df*	Mean square	Stats.	Sig.
Final test score	Type of learning	397.719	1	397.719	4.265	0.044
	Background of programming	97.407	1	97.407	1.045	0.312
	Interaction	395.946	1	395.946	4.246	0.044
	Error	4849.141	52	93.253		
	Total	5740.213	55			

Table 2above indicates that the p-value for interaction is significant. This indicates that the interaction between both variable give an impact towards the students' final examination score. As for the main effect, we could see that only the type of learning itself have significant contribution towards the student's final examination score.

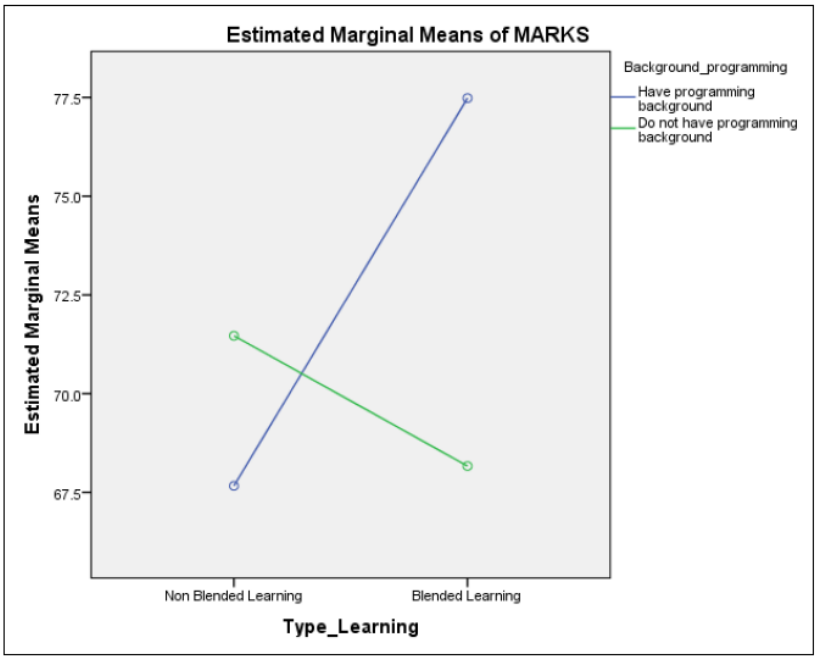

Figure 3: Profile Plot for Interaction between Type of Learning and Programming Background

Furthermore, Figure 3shows that that the mean score for students who have prior programming background and were taught using blended learning approach is much higher as compared to the mean score of students who were taught using the traditional face-to-face learning approach. On the other hand, the mean score for the students who do not have prior programming background and weretaught using the traditional face-to-face learning approach, is much higher as compared to the mean score of students who were taught using blended learning approach.

CONCLUSION

As a conclusion, blended learning approach give positive impact towards the students' final examination score including prior programming background knowledgefor this case study. In addition, as for traditional face-to-face learning approach, the mean score for students who do not have

programming background is much higher may be due to the convenient of the teaching style as students can approach their lecturers for any uncertainty in the subject taught. For further analysis, the sample size needs to be increased so that predictive analysis can be made in determining the most significant factor that may contribute towards students' performance in programming course.

ACKNOWLEDGEMENTS

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An Evaluation of a Novel Decision Aid - Mobile App in a Shared Decision Making for Patients in Dentistry

Tong Wah Lim[1*], Siti Nor Shazwani Binti Abdul Adzim [2], Maizatin Fitrah Binti Akbar [3], Siti Mariam Ab. Ghani [4], Teh Adilla Mustaza[5]

Faculty of Dentistry, Universiti Teknologi MARA,
Sungai Buloh Campus, Jalan Hospital,
47000 Sungai Buloh, Selangor, Malaysia
[1]limtongwah@salam.uitm.edu.my
[2]shazwani.adzim@yahoo.com
[3]maizatinfitrah@yahoo.com
[4]sitimariam783@salam.uitm.edu.my
[5]tehadilla@salam.uitm.edu.my
**Corresponding Author*

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ABSTRACT

The idea of Shared Decision Making (SDM) is well known in medical field but not well acknowledged in dental practices. It is an educational model for actively involving patients in clinical decision making process by providing patients with the best currently available clinical evidences regarding treatment outcomes, allowing for the clarification of patient and practitioner preferences. SDM need to be implemented effectively with the use of decision aids that provide evidence-based answers for patient questions and integrate the patient preferences. This study aimed to develop a novel Decision Aid – Mobile App (MA) for chairside used in the SDM process and to compare patients' dental knowledge, satisfaction and anxiety level by using MA and Standard Care (SC). The MA was developed by mobile app designer and researchers. The MA provides an evidence-based prognoses, benefits, risks and costs for various treatment options based on review by a group of prosthodontists. Thirty-four (34) participants were selected to participate in this study. Subjects were randomly assigned into two groups which were SC (n=17) and MA (n=17). Questionnaire regarding knowledge, satisfaction and anxiety was answered by the subjects after the treatment

options discussion in the students' clinic. From the results of this study, 26 questionnaires (76.5%) were completely answered and included in the study. Subjects in the MA group (n=13) demonstrated a statistically significant increase in knowledge (chi-square test; p<0.05) compared to the SC group (n=13). However, there was no significant difference between two groups with regards to their anxiety and satisfaction level (Mann-Whitney U-test; p>0.05). This study reported that the use of novel mobile app as a decision aid play an important role to facilitate SDM process in clinical dentistry. The result has reported a significant improvement in patient knowledge of prosthodontic treatment options.

Keywords: *Decision aid, Treatment options, Mobile app, Shared decision making, Fixed prosthodontics*

INTRODUCTION

The idea of Shared Decision Making (SDM) is well known in medical field but not well acknowledged in the dental practices. It is a model for actively involving the patients in the clinical decision-making process by providing patients with the best currently available clinical evidence regarding expected treatment outcomes, and allowing for the clarification of patient and practitioner preferences (Johnson et al., 2006). Besides, SDM does not only covers the inclusion of the ethical diversities involve in patient-centered care, but also the quality improvements in the decision-making process (Gyu et al., 2012). Therefore, it has been suggested that SDM is imperative for a routine dental patient care (Ng et al., 2013).

In the SDM concept, the patient and clinician will consider outcomes probabilities and patient preferences of a certain treatment where they will then come up with mutual agreement on appropriate healthcare decision. Few earlier studies have reported that most patients would want to be involved in making decision for their treatment plan (Barrat 2008; Frosch& Kaplan, 1999). It is an option to the paternalistic care model which was widely practiced for many years, where SDM can now help patients and clinicians to get afinal decision that satisfy for both patients and clinicians (Frosch& Kaplan, 1999; Towle& Godolphin, 1999). However, there are possible interferences or limitations for an effective SDM implementation

that requires further address including lack of communication skills from the clinicians, task complexity, lack of time and missing information (Barry 2002; Elwyn et al., 1999; Gravel et al., 2006). In Malaysia situation, an overview reported by Ng et al., 2013 revealed that very few clinicians implement SDM approach which was partly due toinadequate training, research and teaching of SDM in local undergraduate and postgraduate curricula and the lack of accurate and accessible health information.

A good and well-designed Decision Aid (DA) used by clinicians and patients may increase the effectiveness of SDM implementation (Barrat, 2008). The DA is an important tool in SDM as it facilitates patient and clinician to choose a suitable treatment option that can satisfy the patient's expectation (Charles et al., 1997) and share relevant and accurate information to patient with different needs of information (Johnson et al., 2006). It was reported that the usage of DA increases satisfaction with decision making, reduce anxiety, and improve knowledge and realistic expectations. The increase active participation in decision making by patients did reduce decisional conflict and the number of patients remaining undecided for their treatment options, and improve agreement between values and choice (O'Connor et al., 2003). DA also provides patients with personal and cultural utilities in understanding treatments, relevant alternatives, diagnosis, prognosis, and in reducing uncertainty as well as assist dentists in determining treatment options, cost effectiveness, and efficient patient care for improving oral health, successful outcomes, and personal self-care (Bauer et al., 2005).

Today, the dental profession is facing the effect of changing epidemiology, demographics transition, and the rapid development of science and technology. Therefore, dentists must be able to bridge the gap between media and the advances in research occurring during their professional plus they need to evaluate systematically the various methods of possible diagnosis and treatments, and apply them in practices to help patients to make a decision in respect to their concerns (McCreery& Truelove, 1991).

The hypothesis of this study is that the usage of newly developed DA in SDM approach will increase patient knowledge, higher patient satisfaction and may reduce anxiety level in comparison to the Standard Care (SC)

which is the standard discussion with informed consent. Therefore, the first objective of this study is to develop a novel chair-side Decision Aid - Mobile App (MA) that explains the treatment choices, benefits, risks, prognosis in single missing tooth replacement. The second objective of this study is to compare the patients' dental knowledge, satisfaction and anxiety level by different approach using MA and SC.

MATERIALS AND METHODS

This study was a Randomized Controlled Clinical Trial (RCT) to evaluate the use of decision aid in SDM process while making the best treatment option for their single missing tooth replacement. It was conducted among patients who were referred to the Centre for Restorative Dentistry Studies, Faculty of Dentistry, UniversitiTeknologi MARA (UiTM). Ethics approval was obtained from the Ethics Committee of the Institute of Research Management and Innovation UniversitiTeknologi MARA (Reference: REC/47/17). The informed consents of the 34 patients were obtained prior to start the study.

Development of the Mobile Apps Decision Aid

A draft of MA with content for SDM process was developed by the researchers. The MA draft was designed bilingually in Malay and English, and it was distributed to three Prosthodontists for their expert opinions and content verification. The contents of the DA included advantages, disadvantages, time, costs, and longevity for each treatment options for a single missing tooth replacement based on the current literature review. With regards to the estimated time and cost of the treatment option section, information was based on the average time taken for an undergraduate dental student to complete the treatment, and the costs were based on the current Faculty of Dentistry UiTM fee schedule. Animations and clinical pictures, consented by the patients,were embedded to provide patients with better understanding and visualization of each treatment procedure. Upon completion and verification of the content, the draft was sent to a mobile app developer for designing and installation in an Android mobile device. The MA was then made accessible to the public as shown in Figure 1 and 2.

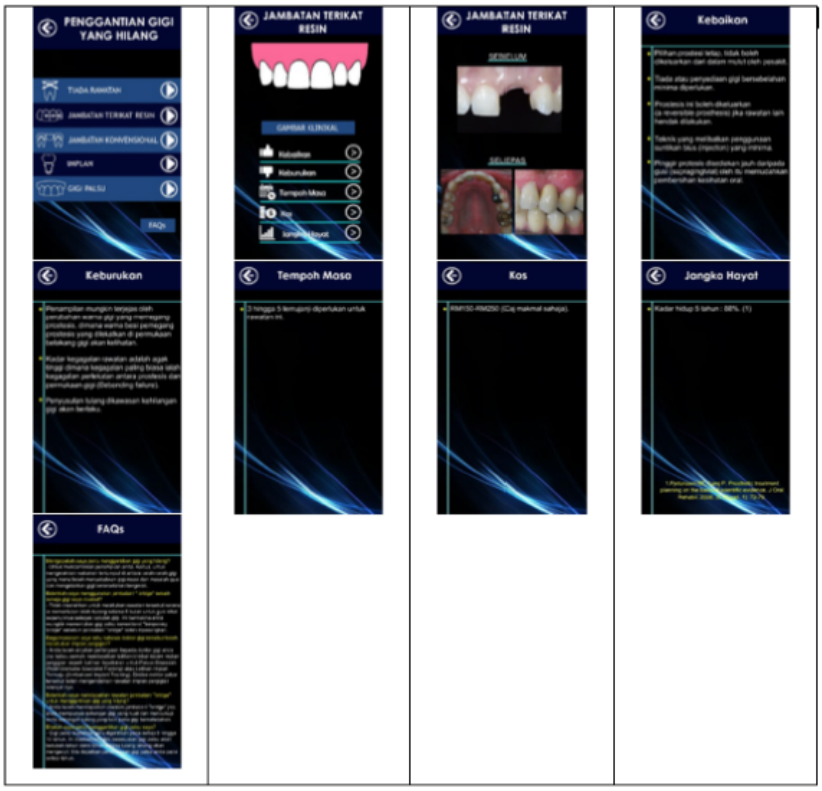

Figure 1: Final Mobile App Decision Aid (Malay version)

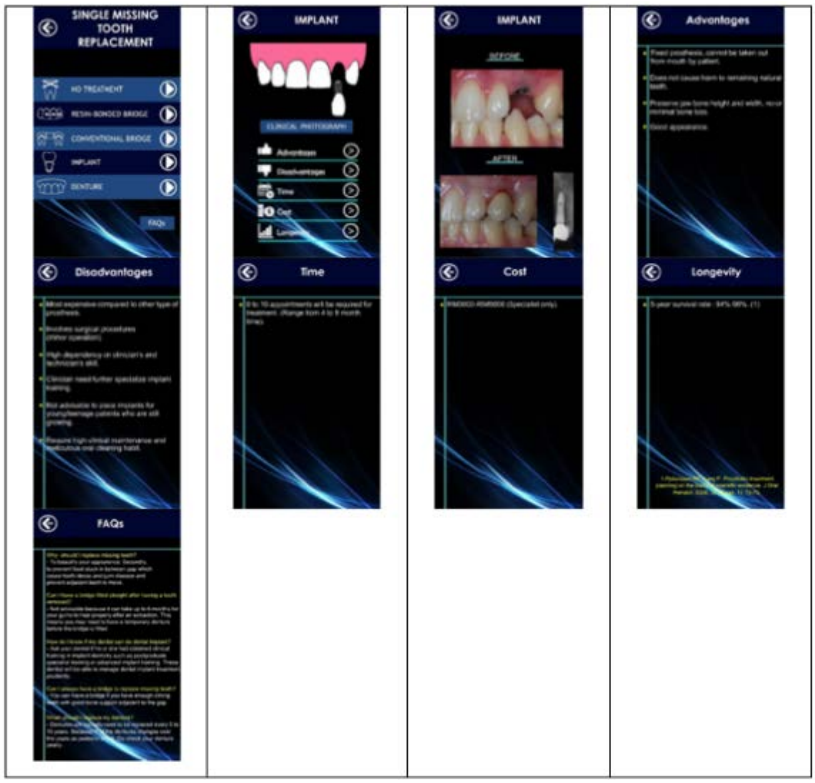

Figure 2: Final Mobile App Decision Aid (English version)

Preparation of Questionnaire

The questionnaire was adopted (Johnson et al., 2006) and modified for an evaluation of patients knowledge, satisfaction and anxiety level for a fixed prosthodontic treatment option of single missing tooth replacement. Five questions were prepared to assess the patient knowledge in the following topic: chance of success, treatment cost, benefits, risks and adequacy of information as shown in Figure 3. The satisfaction and anxiety level were both measured using a seven-point Likert scale as shown in Figure 4.

1. What is the approximate chance of success for your treatment? _____ %
2. About how much will it cost for all treatment associated with this tooth?

   RM_____
3. What do you consider to be the major benefit of your treatment?

   _____
4. What is/are the major risk(s) associated with your treatment?

   _____
5. Do you feel that you were given enough information to make the best treatment choice

   (circle one) ?

   YES NO

Figure 3: Questions to Assess the Knowledge in the Questionnaire

6. How satisfied were you with the explanation of your treatment options?

1 Very dissatisfied	2 Dissatisfied	3 Somewhat dissatisfied	4 neutral	5 Somewhat satisfied	6 satisfied	7 Very satisfied

6. Did the explanation of treatment options make you more or less anxious about the

   treatment?

1 Much less anxious	2 Less anxious	3 Slightly less anxious	4 No difference	5 Slightly more anxious	6 More anxious	7 Much more anxious

Figure 4: Seven-point Likert Scale to Assess Satisfaction and Anxiety Level

Sample Size Determination

The sample size was determined based on the previous similar study carried out by Johnson et al. (2006). They had determined the minimum sample size for the patient knowledge was seventeen subjects per group, while satisfaction and anxiety level was determined to be forty each group.

Inclusion Criteria

The inclusion criteria of the subjects participated in the study were:

1. Clinically presented with a single missing tooth that need replacement.
2. Patients who are not illiterate
3. Age 18 and above
4. Capable to make own decision with no advanced Alzheimer's disease, severe learning difficulties or Down's syndrome.
5. Understand Malay or English well

Study Set-up

As shown in Figure 5, thirty-four (34) consecutive subjects that met all the inclusion criteria were selected to participate in the study. They were recruited by the undergraduate dental students from the waiting list of patients referred to Centre for Restorative Dentistry Studies for missing tooth replacement. Researcher 1 (SNS) and 2 (MF) were well trained to use the mobile app and they were calibrated to perform the study, each of them in-charged of Standard Care (SC) and Mobile App Decision Aid (MA) respectively to avoid bias. Randomization was performed through drawing a labeled envelope from a box and all the subjects were randomly assigned into two groups: Group A (SC) with researcher 1, Group B (MA) with researcher 2. Thirty-four (34) patients were involved in this study after informed consent obtained. However, there were only twenty-six (26) questionnaires were useable due to eight (8) questionnaires were not properly completed and could not be evaluated. Both groups had undergone SDM process to discuss the advantages, disadvantages, time, costs and longevity

for each treatment option to replace missing tooth using standard care (SC) which is a normal discussion between clinician (researcher) and patient (subject); mobile app decision aid (MA), which the subject need to download it from the Google Play Store using their smart phone and subsequently discussed the same information with the researcher. After the discussion, all the subjects need to complete the questionnaires regarding the treatment option that they just chose. Then the researcher placed the questionnaire in a sealed labeled envelope and collected all for data analysis.

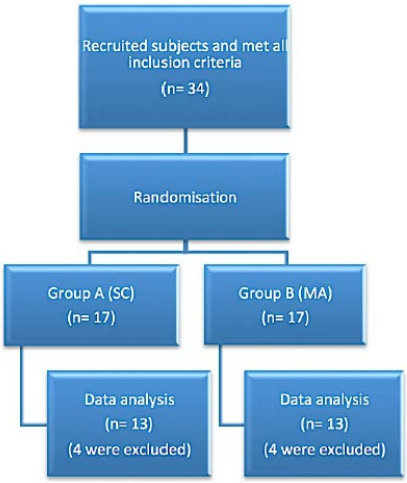

Figure 5: Study Set-up

Statistical Analysis

In this study, the patient knowledge, satisfaction and anxiety level were analyzed accordingly. Chi-Square test was used for group comparison with regards to their knowledge questions, while, the patient satisfaction and anxiety level were both analyzed using Mann-Whitney U-test. Statistical significance level was determined if $p<0.05$. All the statistical analysis was performed using Statistical Software (SPSS Statistics 21, IBM, Chicago, IL, USA).

RESULTS

Knowledge of the fixed prosthodontic treatment options was measured using a percentage showing the total number of correct answers to five questions. MA demonstrated a statistically significant increase in knowledge compared to the SC group (Chi-square; $p<0.05$). In general, all the knowledge questions were correctly scored higher in the MA group compared with SC group. The biggest differences between groups were found with question no 2 (38 percent), question 3 (38 percent) and question 5 (54%) as shown in Figure 6.

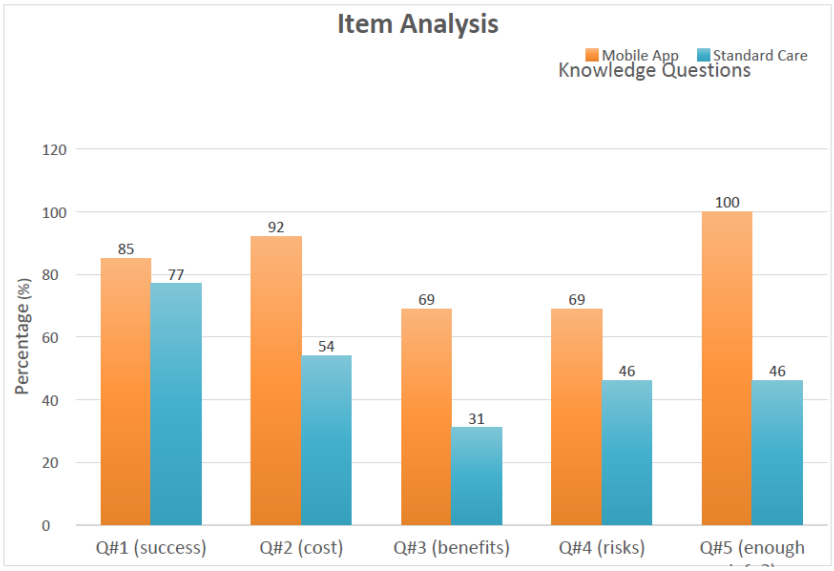

Figure 6: Comparison of the Percentage of the Correct Answer between Groups

With regards to the patient satisfaction, it was assessed by question 6 using a seven-point Likert scale as shown in Table 1. An increased scored of number indicated a higher level of patient satisfaction with the treatment options discussion. However, there was no significant difference between SC and MA using the Mann-Whitney Rank U-test. ($p>0.05$).

Table 1: Comparison of the Satisfaction between Groups

	1 (very dissatisfied)	2 (dissatisfied)	3 (somewhat dissatisfied)	4 (neutral)	5 (somewhat satisfied)	6 (satisfied)	7 (very satisfied)
Mobile Apps	0	0	0	0	4	6	3
Standard Care	0	0	0	0	4	7	2

Pertaining to anxiety level, it was measured by question 7 using a seven-point Likert scale as seen in Table 2. A lower scored of number indicated less anxiety about the treatment choice. Again, there was no significant difference between both groups using the Mann-Whitney Rank U-test ($p>0.05$).

Table 2: Comparison of the Anxiety between Groups

	1 (much less anxious)	2 (less anxious)	3 (slightly less anxious)	4 (no difference)	5 (slightly more anxious)	6 (more anxious)	7 (much more anxious)
Mobile Apps	6	5	1	0	1	0	0
Standard Care	9	4	0	0	0	0	0

DISCUSSION

Shared Decision Making with Mobile App (MA) as the Decision Aid (DA)

Medical Health care decisions can be grouped either “effective” treatment or “preference sensitive” treatment. “Effective” treatments are referred to when treatment advantages are significantly better compared to the disadvantages, thus improve the quality of life of the patients. On the other hand, the “Preference Sensitive” are treatments relying on patient values with uncertain treatment advantages and disadvantages. It is suggested that with the use of DA during decision making process, it will

give patients more insight information of the diseases and facilitate patients and clinicians to make a sensible decision especially for a preference-sensitive treatment (Levine et al., 1992). In Malaysia, it was reported that clinicians are still being dominant in making healthcare decisions with minimal involvement of the patients. One of the recommended protocol in the study to promote SDM approach among clinicians and patients was to incorporate SDM into research, clinical practices and teaching curriculum (Ng et al., 2013).

Today, generation Y or the millennial generation grew up in culturally diverse schools, are tech-savvy, enthusiastic, confident, well networked and learning oriented individuals. While, the other elder generations have also been exposed to all new technology especially smart phones. Therefore, utilization of MA to further explain the treatment options during the treatment planning stage might be the best methods to communicate with most of the patients. At present, MA currently provided nine thousand software related to medicine and fifteen thousand software for wellness (Marceglia et al., 2012). However, utilization of Apps in the dental clinics for patient education or SDM process in Malaysia is currently lacking (Mustaza et al., 2016). Hence, this newly developed MA is useful for the clinicians and patients during SDM process. It was designed into Malay- English bilingual which would be easily understood by most of the Malaysian and foreign patients. Besides that, incorporation of some dental animations using simple layout, clinical pictures and Frequently Asked Questions (FAQs) to further explain and provide patients with better idea regarding the offered treatment options, subsequently facilitate and improve the effectiveness of SDM process as it has shown in this study.

Increase of Patients' Knowledge and Satisfaction, Reduce of Anxiety Level

Thirty-four (34) patients were recruited in this study, but there were only twenty-six (26) questionnaires were useable. This study found that the differences regarding patient knowledge between the SC and MA groups was statistically significant, with the knowledge of chosen treatment option was scored higher in MA group. The result suggested that MA assisted the SDM approach more effectively regarding the prognosis and cost of the treatment and delivered adequate information to the patients (100%). At

the same time, the remaining two knowledge questions regarding benefits and risks were also scored higher in MA group, which were about 70% of subjects answered correctly. The positive increase might be contributed by the animation and photos embedded in the MA group which facilitate patients' understanding of the diseases and treatment options. Findings from the present study was consistent with one previous study (Johnson et al., 2006). With regards to the patient satisfaction and anxiety level, it has revealed that no statistically significant different between SC and MA groups. The score for satisfaction level question was similarly high for both groups, as 70% of the subjectsreported 'satisfied' and 'very satisfied'. On the other hands, the score for anxiety level question was low where more than 80% of the subjects reported they were 'less anxious' and 'much less anxious' in both groups. In comparison with related studies, this result was reported similar with Johnson et al., 2006 and by O'Connor et al., 2003. It was deemed that these findings might be associated with the well calibrated and informative clinicians conducting the study. Thus all subjects did rate high satisfaction and low anxiety level using MA and SC intervention.

Future Prospect of the Mobile App Decision Aid

From the results of this study, one could propose that further development of this MA to various dental problems would be appreciated. On the other hand, due to the significantly increase penetration of smartphones and tablets amongst the public, the continuous potential growth of this MA in dentistry could be a profitable business developments in the future.

CONCLUSION

This study reported the use of a novel mobile app as a decision aid to facilitate SDM process in clinical dentistry. Significant improvement in patients' knowledge of prosthodontic treatment options were established. On the other hand, high patients' satisfaction and low anxiety level were also achieved using both mobile app and standard care intervention.

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A Study on the Techno-Pedagogical Knowledge of Academics in a Malaysian Private University

Jasmine Jain[1], Logendra Ponniah[2], Johan @ Eddy Luaran[3]&Kandappan Balasubramanian[4]

[1,2]Faculty of Arts and Social Sciences, Taylor's University
[3]Faculty of Education, UniversitiTeknologi MARA
[4]Faculty of Hospitality, Food and Leisure Management, Taylor's University

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ABSTRACT

Techno-pedagogical Knowledge (TPK) is a framework encompasses two different types of knowledge, namely technological knowledge and pedagogical knowledge. As a fragment of the knowledge areas making up Techno-Pedagogical Content Knowledge (Mishra & Koehler, 2006), TPK is a staple skill for the 21st century educators. This is especially true when the educational landscape nowadays is overwhelmed with vast array of digital devices. There is also a need for educators to be creative in using their techno-pedagogy skills, referring to the ability of the teachers to make lesson interesting though technological and imaginative approaches. The study attempts (1) to study the current level of techno-pedagogical knowledge among lecturers of Taylor's University (2) to study how techno-pedagogical knowledge help lecturers in integrating blended learning into their teaching and learning processes. This quantitative study was carried out by distributing 21-item questionnaire to full-time academic staffs (n= 126) of Taylor's University. The main findings revealed that while the TPK competency of lecturers are rather high (mean=4.21), the "Motivation" and "Internet discussion" aspects remained low compared to the rest of the TPK components. It was also found that while the focus is to look at the integration of blended learning into the lecturer's teaching, it is interesting to note that the academics of this university still place much emphasis on face-to-face teaching, and prefer flipped model of learning rather than blended learning. This study provided further insights on the need to emphasize on

the techno-pedagogical skills and consequently, improve the current TPK courses available for lecturers.

Keywords: *Techno-Pedagogoical,educators, Pedagogical Content Knowledge*

INTRODUCTION

Malaysian Higher Education institutions are witnessing exponential growth of learners who are thriving for higher degree of knowledge hence promoting bigger number for enrollment each year. Despite the goal of getting more learners and training them to become skillful and knowledgeable workers in realizing Vision 2050, the outsourced facilities of universities can be a barrier to large enrollment. Consequently, the integration of technology into education has brought a different paradigm in viewing education in higher institutions, emphasizing blended learning as a panacea. Besides enabling learning through virtual communication and setting, educational technology provides numerous benefits.

Technology has been recognized as a powerful enabler, endowed with vast potential to innovate the education practices (Atkinson & Castro, 2008). Recent decades has recognized the need for learners to learn in the environment supporting their need to understand contents in animated, dynamic and unusual manner. One of the impetus resulting from this thinking is the development of various policies worldwide, including Malaysia, emphasizing on the provision of such assess to technologies. For example, the smart school initiative in Malaysia in 1997 was started with the aim to integrate ICT into education (MOE & MSC, 2010). Following that, all schools in Malaysia are equipped with computer labs and internet connection to foster technological literacy, eliminating the digital divide and build a community of technology users (MOE, 2009). However, the investment in placing computers did not yield expected outcomes for pedagogical change as it was later found out that teachers' ICT literacy competence is not equivalent to their technological pedagogy competency (Ala-Mutka, 2008). One factor of such shortcoming is because teachers simply cram and fit new technologies in the existing pedagogical structure instead of engineering a new model for more effective pedagogical framework (Bottino, 2003; Coldwell, 2003; Kwang, 2010).

The need for individuals to equip themselves with ample skills of technology also has been extensively emphasized, as mastering such skills allow them to use, manipulate and disseminate information in the sophisticated world. However, the real importance underlying the need for students to have technological skills is the lifelong learning it promotes; providing freedom for learners in shaping their own learning paths through collaborations and new technologies (Attwell, 2007). Hence, educators have to emphasize the use of technology to motivate learners to use and understand the potential for meaningful learning through digital platforms. Other than that, the developments of information, communication, knowledge and technology in the recent era have resulted in a different type of learners, compared to the traditional era. Pedro (2006) claimed that these learners are the cohorts growing up surrounded with digital media. He referred them as the "new millennium learners" associated with short attention spans, multi-tasking and non-linear ways in retrieving information. Hence, educators teaching the new millennium students need to attract and retain the attention of the students in different ways during the teaching and learning process (Ala-Mutka et al., 2008). This can be more challenging as students learn best differently and educators need to have a wide pedagogical coverage to cater for meaningful learning for each kind of learners.

Not limited only to the subject matter needed to be taught, the educators are also expected to have the pedagogical content knowledge in order for them to teach effectively, and creative enough to incorporate multiple approaches in teaching to suit various types of learners. While the common facet of assessment in educators' education courses emphasizes on the content knowledge and the pedagogical content knowledge, integrating ICT into educators' pedagogy has been under explored in the local setting. Studies conducted locally has insofar investigated on Smart School Project (Azizah Yaa'cob et al., 2005; Sharifah Maimunah Syed Zin, 2003; Ong & Ruthven, 2009), ease of use of technological gadgets (Moses et al., 2013; Samuel & Bakar, 2006) and on the readiness of teaching with ICT (Koo, 2008; Goh & Md. Wahid, 2006). These studies suggested that the competency of local educators to integrate ICT into education has been sidelined. Hence, educators' techno-pedagogical competency is placed under the focus in this study.

Another facet that was brought to the fore is the educators' creative teaching ability, referring to teachers' ability to manipulate and incorporate different approaches in teaching. It has also been reported that "one-size-fits-all" techno-pedagogy does not result in effective instructions as students learn differently (Oster-Levinz & Klieger, 2011). Hence, it is required them to be able to manipulate the technology in different ways to convey the lesson for various types of learners. While it is acknowledged that students are more dominant in a type of learning, multiple approaches in teaching methods benefits more students. For example, the creative way of teaching can blend all audio, kinesthetic and visual learning at once to benefit a wider range of learners with different learning preferences.

Problem Statement

Taylor's University takes pride in the use of technology in enabling effective and meaningful learning. With this, Taylor's University has established a department which oversees the technology-driven teaching and learning campus-wide, known as the e-Learning Academy (eLA). Among the many goals for eLA is to assist academics in integrating the use of technology which are consistent with their subject learning outcomes, to extend staff capabilities in the use of blended learning, as well as the provision of optimal learning spaces. Part of the provision is the technology-rich collaborative classroom, specifically designed for flexible formal learning spaces.

The unique seating design and the availability of fast Internet connection in the classrooms ensure better collaborative learning. Ideas can be easily shared and decisions can be made together more effectively throughout the learning session. It also enabled digitally animated presentation for learning, thus making learning session more interesting. Apart from that, the University has rolled out a policy in 2014 which calls for all academics to make all modules at least 30% blended learning, which is seen as consistent with the goal of the University in promoting 21st century learning. With all the strategies and provision of optimal infrastructure, there is a need to measure the current level of techno-pedagogical knowledge of the lecturers in Taylor's University, as well as take a closer look on how lecturers use techno-pedagogical knowledge to integrate blended learning into their teaching endeavor.

Research Objectives

Deriving from the problem mentioned, the objectives of this study are two-fold:

1. To study the current level of techno-pedagogical knowledge among lecturers of Taylor's University.

2. To study how lecturers use techno-pedagogical knowledge to integrate blended learning into their teaching and learning process.

Research Questions

The research questions for this study are:

1. What is the current level of techno-pedagogical knowledge among lecturers of Taylor's University?

2. How do lecturers use techno-pedagogical knowledge to integrate blended learning into their teaching and learning process?

Significance of the Study

Taylor's University educators' techno-pedagogical knowledge remained as an area under-explored. The needs to investigate these area are vital to ensure that the goals of inculcating ICT in education remain on track. A thorough research based on the data grounded in the Taylor's University can be helpful in developing a framework for the more effective training programs to develop the skills of integrating techno-pedagogical approach in education among the lecturers. In a way, understanding teacher's techno pedagogical knowledge contributes to a new knowledge, specifically in the field of teacher-education.

LITERATURE REVIEW

The exponential growth of technologies has propelled various transformations in life and foster dynamism in various walks of life. The need for individuals to equip themselves with ample skills of technology has been extensively

emphasized, as mastering such skills allow them to use, manipulate and disseminate information in the sophisticated world. However, the real importance underlying the need for students to have technological skills is the lifelong learning it promotes; providing freedom for learners in shaping their own learning paths through collaborations and new technologies (Attwell, 2007). Information, communication, knowledge and technology in the recent era have resulted in a different type of learners, compared to the traditional era. Pedro (2006) claimed that these learners are the cohorts growing up surrounded with digital media. He referred them as the "new millennium learners" associated with short attention spans, multi-tasking and non-linear ways in retrieving information. Hence, educators teaching the new millennium students need to attract and retain the attention of the students in different ways during the teaching and learning process (Ala-Mutka et al., 2008). This can be more challenging as students learn best differently and educators need to have a wide pedagogical coverage to cater for meaningful learning for each kind of learners.

Reasons for Technology-enabled Teaching and Learning

Technology has been recognized as a powerful enabler, endowed with vast potential to innovate the education practices (Atkinson & Castro, 2008). Recent decades has recognized the need for learners to learn in the environment supporting their need to understand contents in animated, dynamic and unusual manner. One of the impetus resulting from this thinking is the development of various policies worldwide, including Malaysia, emphasizing on the provision of such assess to technologies. For example, the smart school initiative in Malaysia in 1997 was started with the aim to integrate ICT into education (MOE & MSC, 2010). Following that, all schools in Malaysia are equipped with computer labs and internet connection to foster technological literacy, eliminating the digital divide and build a community of technology users (MOE, 2009). However, the investment in placing computers did not yield expected outcomes for pedagogical change as it was later found out that teachers ICT literacy competence is not equivalent to their technological pedagogy competency (Ala-Mutka, 2008). One factor of such shortcoming is because teachers simply cram and fit new technologies in the existing pedagogical structure instead of engineering a new model for more effective pedagogical framework (Bottino, 2003; Coldwell, 2003; Kwang, 2010).

Techno-Pedagogical Content Knowledge

It is vital that every lesson intended to be delivered in class is well-planned for. Scrivener (2005) mentioned that lesson planning is important as it help the teachers to cater for more different learning styles of their learners, and provides the educator with more coherent framework for efficient teaching. Hence, developing a good plan for a particular lesson needs both sound knowledge of content and pedagogy. However, Shulman (1986) pointed out that these two knowledge are usually treated as separate concerns in teacher education trainings, and introduced the term "Pedagogical-content Knowledge" (PCK) that reflects the interrelated components for effective teaching. Extending from this notion, Hughes (2000) added technology as another component of educator's knowledge, articulating the need for technology to be blended into the teaching in the 21st century. As mentioned previously, effective usage of technology enables effective teaching and learning and hence, the rationale for the knowledge of effective integration of technology into a lesson.

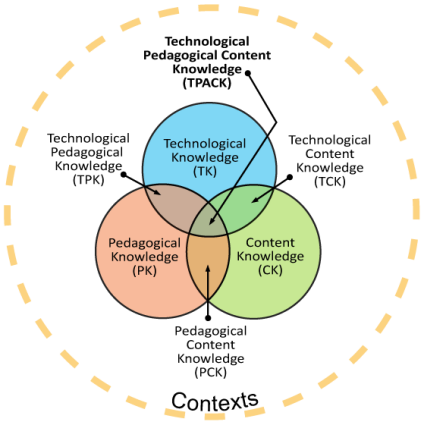

Figure 1: Framework for TPACK (Koehler & Mishra, 2009)

In the TPACK framework, there are three primary knowledge for an educator which is focused upon, namely Technological Knowledge, Content Knowledge and Pedagogical Knowledge. These three are not to be viewed in isolation, but it reflects the complex interplay of all knowledge essential for teaching with technology, positioned at the heart of this framework.

The concept of TPACK goes beyond the blend of Content, Technology and Pedagogical knowledge where another four knowledge base arise from the intersection of any two. These four knowledge bases are Pedagogical Content Knowledge (PCK), Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK). The intersection of all three circles is the Technological Pedagogical Content Knowledge (TPACK). Quoting Koehler and Mishra (2009, para. 8), "An understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies".

While the common facet of assessment in teacher's education courses emphasizes on the content knowledge and the pedagogical content knowledge, integrating ICT into educator's pedagogy has been underexplored in the local setting. Studies conducted locally has insofar investigated on Smart School Project (AzizahYaa'cob et al., 2005; Sharifah Maimunah Syed Zin, 2003; Ong & Ruthven, 2009), ease of use of technological gadgets (Moses et al., 2013; Samuel & Bakar, 2006) and on the readiness of teaching with ICT (Koo, 2008; Goh & Md. Wahid, 2006). These studies suggested that the local educators' competency and knowledge on techno pedagogy has been sidelined. Hence, educator's techno-pedagogical competency is placed under the focus in this study.

The Technology Integration Planning Model

The choice of whether or not to integrate technology into the classroom is up to the educator, but usually with little understanding on the impact and the strategies for technology integration during decision-making. To address the issue of integrating technology effectively into teaching, a model called Technology Integration Planning (TIP) was developed which guide educators to make good decision about integrating technology into their teaching (Roblyer&Doering, 2013), and subsequently result in successful teaching and learning outcomes.

The model outlaid three different phases for technology integration into teaching, namely Phase One: Analysis of needs, Phase Two: Planning for integration and Phase Three: Post instruction analysis and revisions.

Phase One involves the educator to reflect on the strategies that they have used or planned to use and how technology can help address the issues raised. There is also a need to review on whether the technology is necessary to be integrated or not. This is because technologies, which are used blindly or ineffectively, will only cause more burdens to the students, in understanding how both content and technology work. Besides that, the element TPACK was made an important part of the model as teaching is a complex combination of what the educator is teaching, how to teach the content in the best way, and the knowledge on the tools for them to carry out their lesson plans. Phase Two of the TIP model on the other hand, consists of more specific learning planning and products where the educators should know the skills that he or she wants the students to learn through the lesson, the strategies that will work best in achieving that aims, and if the essential conditions for technology integration are present for the technology to support the lesson successfully. The third and last phase of the TIP model involves post-instruction analysis where the educators reflect critically on the execution of the lesson planned. Educators should constantly reflect on the outcome data and be informed of the technology-integrated methods that can be successfully implemented in the future lessons.

Scenario in Malaysian Higher Educational Institutions

With the expansion of global education and globalization, many higher educational institutions took up the initiatives of offering more diverse programs and courses, thereby increasing the need for institutional partnership, both local and international. Students' profile in HEI also witness significant changes, with more foreign students enrolled for the courses offered. The difference in geographical and demography rationalized the need for HEI to implement the use of technology in it teaching and learning process, resulting in vast investment for ICT infrastructure to support blended learning, distance education and in a larger scale, Massive Open Online Courses (MOOC).

However, a study conducted by Raja Maznah (2004) revealed that it's a norm for most HEI to provide ICT infrastructure but lack of plan to implement technology effectively. In another view, the ICT infrastructure is to only support online learning and not to enhance teaching and learning process. Enhancing more on the online learning and technology-

enabled teaching and learning was also seen as a panacea to the proliferating number of students that caused limitation in classroom availability in many HEIs (Farahiza, 2010).

METHODOLOGY

Research Design and Sampling

This study is descriptive in nature and was intended to collect quantitative data on the current TPK level of the lecturers, as well as to inform the strategies used by the lecturers in integrating blended learning into their teaching endeavor. Lecturers in Taylor's University is the target population of this study, with 468 active staffs as per September 2017 when the data collection commenced. Lecturers were chosen via cluster and systematic sampling according to their faculties. There are five main faculties in Taylor's University, listed as follow:

1. Faculty of Business and Law
2. Faculty of Built Environment, Engineering, Technology and Design
3. Faculty of Health and Medical Sciences
4. Faculty of Hospitality, Food and Leisure Management
5. Faculty of Arts and Social Sciences

Cluster sampling means the list of faculties in each stream will be chosen randomly. The lecturers in the faculties selected will then be selected using systematic sampling. The sample involved in the actual study was 126 from all the faculties.

Instrumentation

This study utilized the "Techno pedagogical content knowledge" (TPACK) Survey as developed and refined by Schmidt et al. (2009). The data was piloted to 25 lecturers prior to the actual data collection of this study. From the analysis to determine the reliability of the items in the piloted instrument, it was found that 2 sub-items were not reliable and were omitted from the instrument for the actual data collection. The Cronbach's Alpha generated from the pilot was 0.921, inferring that the items with the two mitted sub-items has excellent internal consistency (Nunnally, 1978).

Analysis of Data

Data gained was analyzed using the descriptive and inferential statistics, where the descriptive analysis describe the frequency, percentages, means and the standard deviation of the demographic details. The inferential statistics such as ANOVA, Pearson Correlation and Post Hoc tests are also used to determine the relationships between competencies and other variables.

FINDINGS AND DISCUSSION

Demographic Findings

The respondents of this study were representative lecturers from 5 faculties in Taylor's University. A total of 126 lecturers participated in this study which consist of 49 (38.9%) males and 77 (61.1%) females. A summary of respondents in this study is as illustrated in Table 1 below.

Table 1: Respondents according to Gender

Gender	Respondents
Male	49
Female	77
Total	126

In terms of age, a majority of the lecturers were of age 30-39 consisting of 46 (36.5%) lecturers, 40 (31.7%) lecturers of age 40-49 years old, 29 (23%) lecturers were of age 50-59 years old, 10 (7.93%) lecturers of age 60 and above. There was only 1 (0.8%) lecturer whose age is between 25 to 29 years old. Table 2details the percentage of the age groups.

Table 2: Percentage of Respondents' Age Groups

Age Group	Percentage of Respondents (%)
25 - 29 years old	0.8
30 - 39 years old	36.5
40 - 49 years old	31.7
50 - 59 years old	23
60 years old and above	7.93
Total	126

In terms of the highest qualification, majority of lecturers have Masters (61.9%) consisting of 78 people and PhD (33.3%) consisting of 42 lecturers. There rest were Bachelor Degree holders (2.28%) consisting of 3 people and another 3 (2.38%) of professional qualification. There are none for diploma holders. Table 3 shows the percentage of highest qualifications by lecturers.

Table 3: Percentage of Lecturers and Their Highest Qualification

Highest qualification	Percentage of Respondents (%)
PhD	33.3
Masters	61.9
Bachelor Degree	2.38
Diploma	0
Professional Qualification	2.38
Total	126

In terms of designation, there were 58 (46%) senior lecturers, 57 (45.2%) lecturers, 7 (5.56%) professors, 3 (2.38%) associate professor and 1 (0.8%) tutor. Table 4 shows the percentage of designation of lecturers in this study.

Table 4: Percentage of Designation of Lecturers

Designation	Percentage of Respondents (%)
Lecturer	45.2
Senior Lecturer	46
Associate Professor	2.38
Professor	5.56
Tutor	0.8
Total	126

In terms of faculties, the largest participation in this study were lecturers from the Faculty of Arts and Social Science with 32.5%. Another 21.4% of respondents in this study were from Faculty of Built Environment, Engineering, Technology and Design, followed by Faculty of Business and Law and Faculty of Health and Medical Sciences, both at 15.9%. Finally, there was 14.3% of lecturers from Faculty of Hospitality, Food and Leisure Management who participated in this study. Table 5 depicts the percentage of respondents who took part in this study according to their faculty.

Table 5: Percentage of Respondents according to Faculties

Faculty	Percentage of Respondents (%)
Faculty of Business and Law	15.9
Faculty of Built Environment, Engineering, Technology and Design	21.4
Faculty of Health and Medical Sciences	15.9
Faculty of Hospitality, Food and Leisure Management	14.3
Faculty of Arts and Social Sciences	32.5
Total	126

In terms of years of teaching experience, majority of respondents were lecturers with 6-10 years of experience (39.3%) consisting of 35 people and lecturers with less than 5 years of experience (23.6%) consisting of 21 people. Meanwhile, the rest consist of 13 (14.6%) lecturers with more than 20 years of experience, 11 (12.4%) lecturers with 16-20 years of experience while only 9 (10.1%) lecturers with 11-15 years of experience. Table 6 shows the percentage of lecturers' years of teaching experience.

Table 6: Percentage of Teaching Years

Years of teaching	Percentage of Respondents (%)
5 years or less	27
6-10 years	22
11-15 years	31
16- 20 years	19
More than 20 years	27
Total	126

a. Current Level of Techno-Pedagogical Knowledge

The current level of Techno-pedagogical knowledge (TPK) of lecturers was gauged through their responses given in seven different aspects, namely i) Technology access, ii) Online skills relationship, iii) Motivation, iv) Online audio and video, v) Internet discussion, vi) Supporting element and lastly vii) ICT abilities. The overall level of the lecturer's TPK will be discussed after the presentation of findings for each aspect which are constituting to their TPK.

Techno-Pedagogical Knowledge: Technology Access

The items below are to find out the current level of Techno-Pedagogical Knowledge. Table 7 presents the respondents' techno-pedagogical knowledge on technology access. Item 1 has the highest mean which is 4.86 with standard deviation of 0.468 while item 3 is the second highest with mean 4.39 with standard deviation of 0.769. The lowest mean is item 2 at 4.10 with standard deviation of 0.954.

Table 7: Technology Access

No	Item	Mean	Standard Deviation
1	I have access to a computer with an Internet connection.	4.86	0.468
2	I have access to a fairly new computer (e.g., Faster RAM, speakers, CD-ROM).	4.10	0.954
3	I have access to a computer with adequate software for teaching and learning (e.g., Microsoft Office).	4.39	0.769
	Average	**4.45**	**0.730**

Techno-Pedagogical Knowledge: Online Skills

Table 8 shows the techno-pedagogical knowledge on online skills and relationships. Item 3 has the highest mean which is 4.81 with standard deviation of 0.39. Item 5 has the middle mean which is 4.88 with standard deviation of 0.325. Item 7 has the lowest mean, 4.09 with standard deviation of 0.849.

Table 8: Online Skills

No	Item	Mean	Standard Deviation
1	I have the basic skills to operate a computer (e.g., saving files, creating folders).	4.77	0.423
2	I have the basic skills for finding my way around the Internet (e.g., using search engines).	4.68	0.484
3	I can send an email with a file attached.	4.88	0.325
4	I think that I am comfortable using a computer in an IT-related courses.	4.37	0.787
5	I think that I would be able to communicate effectively with others using online technologies (e.g., chat).	4.44	0.614
6	I think that I would be able to express myself clearly through my writing (e.g., emotions, humor available in online tools).	4.27	0.742
7	I think that I would be able to use online tools to work on assignments with students in different places.	4.09	0.849

8	I think that I would be able to schedule time to provide timely responses to other students and/or the instructor.	4.19	0.777
9	I think that I would be able to ask questions and make comments in clear writing.	4.21	0.730
	Average	**4.43**	**0.630**

Techno-Pedagogical Knowledge: Motivation

Table 9 is the respondents' responses regarding techno-pedagogical knowledge on motivation. Item 1 has the highest mean which is 3.91 with standard deviation of 0.82 while item 2 and 3 obtained mean of 3.87 with standard deviation of 0.933 and 1.109 respectively.

Table 9: Motivation

No	Item	Mean	Standard Deviation
1	I think that I would be able to remain motivated even though my students are not online at all times.	3.91	0.820
2	I think that I would be able to complete my work even when there are online distractions (e.g., friends/ colleague sending emails or Websites to surf).	3.87	0.933
3	I think that I would be able to complete my work even when there are distractions in my home (e.g., television, children, and such).	3.87	1.109
	Average	**3.88**	**0.950**

Techno-Pedagogical Knowledge: Online Audio/Video

Table 10 shows items that answer the question on the respondents' response regarding techno-pedagogical knowledge on online audio/video. Item 2 has the highest mean, 4.24 with standard deviation of 0.698. In the middle is item 1 with mean 4.14 and standard deviation of 0.766. Item 3 has the lowest mean which is 4.08 and standard deviation of 0.744.

Table 10: Online Video/Audio

No	Item	Mean	Standard Deviation
1	I think that I would be able to relate the content of short video clips (1-3 minutes typically) to the information I have read online or in books.	4.14	0.766
2	I think that I would be able to integrate video in my teaching	4.24	0.698
3	I think that I would be able to explain course related information when it's presented in video formats.	4.08	0.744
	Average	**4.15**	**0.730**

Techno-Pedagogical Knowledge: Internet Discussion

Table 11 shows the respondents' response on the techno-pedagogical knowledge on Internet discussion. The highest mean, 4.13 with standard deviation of 0.780 is item 1. The second highest mean is item 3 with 3.77 with standard deviation, 0.997. Item 2 has the lowest mean of 3.61 with standard deviation of 1.020.

Table 11: Internet Discussion

No	Item	Mean	Standard Deviation
1	I think that I would be able to carry on a conversation with others using the Internet (e.g., Internet chat, instant messenger).	4.13	0.780
2	I think that I would be comfortable having several discussions taking place in the same online chat even though I may not be participating in all of them.	3.61	1.020
3	I think that I would be able to follow along with an online conversation (e.g., Internet chat, instant messenger) while typing.	3.77	0.997
	Average	**3.83**	**0.930**

Techno-Pedagogical Knowledge: Supporting Elements

Table 12 describes the respondents' techno-pedagogical knowledge on supporting elements. Item 1 has the highest mean which is 4.59 with standard deviation of 0.597. This is followed by Item 3 has the middle mean which is 4.43 with standard deviation of 0.599. Item 4 on the other hand has the lowest mean which is 4.21 with standard deviation of 0.823.

Table 12: Supporting Elements

No	Item	Mean	Standard Deviation
1	Quick technical and administrative support is important to the success in online course.	4.59	0.597
2	Frequent participation throughout the learning process is important to the success in online course.	4.37	0.735
3	I feel that prior experiences with online technologies (e.g., email, Internet chat, online readings) are important to the success with online course.	4.43	0.599
4	The ability to immediately apply course materials is important to the success with online course.	4.21	0.823
	Average	**4.40**	**0.680**

Techno-Pedagogical Knowledge: ICT Abilities

Table 13 shows the respondents' techno-pedagogical knowledge on ICT abilities. Item 1 has the highest mean which is 4.74 with standard deviation of 0.509. Item 7 has the middle value of mean which is 4.40 with standard deviation of 0.682. Item 5 has the lowest mean which is 3.60 with standard deviation of 1.187.

Table 13: ICT Abilities

No	Item	Mean	Standard Deviation
1	I have regular access to a computer or laptop each week for my course(s) (4 to 5 times a week).	4.74	0.509
2	I have regular access to the internet each week for my course(s) (4 to 5 times a week).	4.71	0.507
3	I have access to a printer.	4.49	0.701
4	I have access to headphones or speakers for courses that may have video conferences or require student-recorded presentations.	3.83	1.132
5	I have access to a microphone for courses that may have video conferences or require student-recorded presentations.	3.60	1.187
6	I am able to use a web browser/search engine to navigate the internet (e.g., Mozila Firefox, Safari, Internet Explorer, Google Chrome etc.).	4.60	0.621
7	I am proficient typing on a keyboard.	4.40	0.682
8	I have experience using software such as Microsoft Office (e.g., Word, PowerPoint, and Excel)	4.62	0.519
9	I have experience downloading/installing programs or plugins (Such as Java, Adobe Reader, Quick Time, etc.).	3.97	1.138
10	I am proficient at sending/receiving emails.	4.67	0.470
11	I am proficient at sending/receiving emails with attachments.	4.67	0.470
	Average	**4.39**	**0.720**

In essence, it can be inferred that the lecturer's current TPK level in Taylor's University is rather high, with every area of TPK achieving above 3.80 mean. Most of the lecturers agree that they have ample access to technology, however, the motivation on staying and working online appeared to be a challenge for most of them. The following Table 14 illustrates this.

Table 14: Average Mean for Lecturer's Current TPK Level

Aspects of TPK level	Mean
Technology access	4.45
Online skills relationship	4.43
Motivation	3.88
Online audio and video	4.15
Internet discussion	3.83
Supporting element	4.40
ICT abilities	4.39
Average	4.21

b. The Use of TPK to Integrate Blended Learning into Lecturer's Teaching and Learning Process

In the second part of the finding, this report aims to provide insights on how lecturers use TPK to integrate blended learning into their teaching and learning process. Blended learning view teaching and learning process as being done in two different realities- both physical and virtual. Hence, the questions asked in the survey were looking for lecturer's preference on f2f and online environment, their use of technological tools as well an example on how they have integrated technology in their teaching.

Lecturer's Preference on Face-to-face (f2f) vs Online in a Blended Learning Environment

Table 15 presents how much of face-to-face (f2f) vs online respondents' prefer in a blended learning environment. Majority of the respondents (35.7%) preferred to have 70% of f2f and 30% online. This is also in-line with the University policy on making each module online by 30%.

There is also a high number of lecturers (19%) who felt that they are ready to increase the portion of online learning for their students, on indicating their preference for f2f 50% and online 50%. Another 15.9% of the lecturers preferred f2f 60%: online 40%, 12.7% of lecturers on f2f 80%: online 20% and 11.9% lecturers preferred f2f 90%: online 10%. A minority of the respondents chose a highest spectrum of online environment, with 1.6% each for f2f 40% and f2f 30%, and 0.8% each for f2f20% and f2f 10%.

The percentage of face-to-face model in a blended learning environment being higher than the online environment seemed to be the preference of the lecturers in Taylor's University. Although there are a small portion of the respondents who feel that they are ready to teach with gradual decease of personal meetings with their students, the majority of the respondent are comfortable to only meet the required policy which is 30% online. There is a steady response on keeping the teaching process face-to-face too, with online portion going as low as 10%.

Table 15: Blended Learning Models

No	Mode	Percentage
1	f2f 90 %: Online 10 %	11.9
2	f2f 80 %: Online 20 %	12.7
3	f2f 70 %: Online 30 %	35.7
4	f2f 60 %: Online 40 %	15.9
5	f2f 50 %: Online 50 %	19
6	f2f 40 %: Online 60 %	1.6
7	f2f 30 %: Online 70 %	1.6
8	f2f 20 %: Online 80 %	0.8
9	f2f 10 %: Online 90 %	0.8
	Total	100

Integration of Techno-Pedagogical Knowledge into Teaching

The item in this part were asking about the lecturer's beliefs on using Web 2.0 tools as compared to the traditional whiteboard and marker. The excerpts given were the responses given by the respondents, indicated by the alphabet R, followed by the random number assigned to the respondents. For example, R1 means Respondent 1.

Majority of respondents said that the traditional way of teaching is incomparable with teaching with technology. The main reason is due to technology's flexibility and higher effectiveness in elevating the overall teaching and learning tool and experience, making learning more meaningful. Furthermore, using technology would also cater to millennial students who has their own 21st century skills and preference. As one respondent shared,

"Technology aids to augment teaching and learning through a more interactive means of communication." (R46)

"Millenials and Gen Z needs constant engagement and digital immersion to sustain the learning experience. Digital immersion is also second nature to this generation of learners and therefore it would only be natural to teach them it the way they choose to learn. No whiteboard/marker and teacher centered learning pedagogy will achieve the same intended outcomes." (R124)

Another respondent too resonated with what has been mentioned by Respondent 46 and 124, by providing more detailed example. He mentioned:

"Personally I am relying on the technology including different mobile apps and instructional websites, and the devices a lot even in face to face classroom setting. It is hard to imagine that I will be able to conduct my lecture very effectively and lively without the assistance of technology nowadays, since those elements in class provide me and students with more accurate information and diverse materials in easy and faster way." (R89)

The respondents also agree that technology allows the educators to cater to the different learning styles of the students, as the traditional method would only cater well to auditory and visually inclined students, while neglecting other types of learners' learning style.

"...using technology we are able to cater the needs for diverse students' learning styles. There are limitations to what whiteboard and marker can be used to demonstrate and deliver the content knowledge to students." (R3)

However, some respondents emphasized on the advantages of conventional teaching methods over technology. One respondent argued that

"Nothing can beat F2F (Face-to-face) teaching. F2F teaching is preferred by students because they feel they get a personal coaching with more understanding." (R104)

"Physical presence is always better as it is interactive and it's easier to explain things face to face." (R15)

"In the physical space, the interactions can be instantaneous- we can see the students faces/expressions/behaviors directly and change/alter/remove /add stuff to our in-class work which we cannot do online." (R58)

A portion of the respondents also are adamant that the blended method is the way forward as the two different habitats allow for different accomplishment onto students' learning. For example, the following two responses focused on the instrumental nature of both online and traditional methods.

"Well I use both. And it's not entirely same. In class I use a whiteboard to draw and write instructions or emphasis a point, while online I provide information ask questions and give instructions from anywhere and anytime. While I suppose there may be similarities, I don't use them in the same way." (R49)

"I would prefer combining both. It is clearer when (slides are) projected and it grabs students' attention. Whiteboard is used to explain further. Plus, students these days have a short attention span." (R16)

Yet, several respondents noted that the tool used for teaching here is not the one which lecturers need to focus on. Rather, the lecturers need to first scrutinize how to meet the learning outcomes intended for their students and then only strategize on the tool to be used. Lecturers pointed out that it is important to focus on which tool would deliver the contents effectively to students' learning as they stated below:

"Whatever method to be used must be relevant to/ effective for the objective to be achieved."(R76)

"I would say as the person conducting the class/ facilitating the class is the most important element to ensure an engaging and meaningful session to take place." (R43)

Hence, majority of respondents who provided a variety of perspectives in response to teaching using just whiteboard and marker versus using technology felt that both method is dissimilar. From the analysis, their differed opinions may due to their teaching preferences orindividual teaching pedagogy. Further study need to be conducted in order to reveal other underlying reasons that may affect their stance in this topic.

Lecturers' Implementation of Technology

Over half of those surveyed reported that they agree on the importance of knowing how to utilize the technology to their advantages. They viewed technology as a tool to not only improve their teaching approach but also to suit their students' 21st century learning styles and skills. They shared a consensus that by having the adequate skills to use the technology would cater to their students' interest, lengthen their attention span and ensure an effective communication throughout learning process. Being comfortable in using and blending technology into teaching are inferred to be a facet of a competent lecturer. Few excerpts which supported this notion when asked about whether lecturers need to be integrate technology into teaching are as follow.

> *"Absolutely. The role of the lecturer today is facilitating students in acquiring knowledge. As there is an overload of information in the Internet, lecturers need to guide the students on which information is important and need to pay attention to." (R14)*

> *"Definitely. Regardless the student's expectation and learning preferences, I think the educators are expected to aware of the needs of fast-changing society. It would not be a real hassle for the educator because the implementation of the use of technology in teaching will be selective depending on the area of studies." (R45)*

> *"Yes. The current generation is more tech savvy and would prefer technological integration rather than conventional f2f teaching." (R66)*

There are also a portion of academics who believe they need to be kept abreast with technology, but require additional support to understand the use of tools and how to integrate them into their teaching.

> *"Yes, it is important for lecturers to be abreast with technology. However, lecturers who are from the old school generation (like me) would need support and sufficient training to be able to incorporate technology in the current teaching and learning." (R101)*

> *"Yes indeed. If blended, flipped and virtual learning environment were to be applied to achieve project-based and OBE (outcome-based education) learning outcomes, the facilitator/lecturer would need to be savvy." (R89)*

> *"Yes. Move with the times or risk being an outdated dinosaur and having students ridiculing you about your incompetence with technology. Adequate and consistent support and infrastructure is required to ensure the right conditions for lecturers to implement technology in the classroom. Older lecturers who are not well-versed in technology require patience as they build up confidence and competence in implementing technology in their teaching."(R125)*

> *"Yes. This is important for lecturers who are not digital natives (i.e. non Gen-Y lecturers) as more training should be provided to the senior members of the academic."(R3)*

It can be derived that majority of the respondents realized on the importance of implementing technology in their teaching and learning as it improves communication between lecturers and their students in class through effective use of technologies. However, there are lecturers who feel that it is not necessary for lecturers to use technology in their teaching. Most of them feel that the emphasis should be given to the context of learning, and not on the technology which acts as a tool.

> *"No, technology is just a tool, and lecturers should be given the choice to decide their mode of delivery." (R45)*

"No. It depends on the subject. Some modules are very practical/ skill-based and these subjects should be forced to adopt the same approach just for the sake of making all modules blended." (R66)

"Not necessary, it all depends on the contexts. Self- Regulated learning is important, but it can be achieved in multiple forms."(R14)

Few of the lecturers also mentioned that it is not necessary for all lecturers to use technology to increase the variation in the way teaching is done in the university.

"No. To put myself in the students' shoes, I appreciated that every lecturer uses different methods for teaching. If all lecturers employ similar techniques, it will be a commodization of teaching. Let's celebrate our differences."(R98)

"No. Some lecturers do better when they connect with the students in a face to face manner."(R106)

In summary, the majority of the lecturers agree that they need to include technology in their teaching for various reason, while there is a significantly lower number of lecturers who feel that technology-integrated teaching is not necessary.

Demonstrated or Modeled Teaching

In the final part of the survey, respondents were asked to describe one episode where they effectively demonstrated or modeled combining technologies and teaching approaches in a classroom or lecture. Most respondents described their teaching method in class as an active user of technology. Whilst a minority mentioned that they have yet to fully utilize technology in their teaching, the rest have effectively used basic applications such as Powerpoint slides and videos or excerpts from movies and YouTube in their teaching.

Besides that, more than half respondents reported that they also used web 2.0 to collaborate and share information online with their students

through the use of social medias or other platforms such as Padlet, Socratic, Online forum platforms, Edmodo, Kahoot, Nearpod, Facebook, Instagram, Whatsapp. As one respondent commented,

> *"TIMeS (Taylor's Learning Management System) and Facebook was utilized to disseminate the lecture a few days before. In-class PowerPoint and the projector was used to run through the lecture (for those who may have not done the necessary reading before class). A forum question is posted on TiMES for students to answer. A discussion is conducted centered around the responses to the forum question. This is followed up with hands on exercises to be concluded in class. Students then utilized their academic blogs to document the entire process in a methodical manner and reflect on their experiences, make observations and articulate their findings. I am then able to view the respective student blogs and I derive common threads of confusion/dissatisfaction or successes." (R23)*

Another respondent mentioned on the use of Socrative and how it was helping him to assess student's understanding towards a particular topic, without having to explain much to them.

> *"I have used Socrative for one of my online quiz where I was able to control the pace of students answering the quiz and it helped in enhancing the understanding of the topic without much explanation."(R43)*

Other lecturers also shared about the creative ways on how they integrated technology in their teaching to achieve their lesson learning outcomes more effectively. For example,

> *"I am using Google drives most of the time, get students to respond through Google slides/doc, in some of the tutorial session. Instantly, we can include comments to improve the answer. The slides were shared. Other students were also able to edit to add their views/answers. After session ends, I am able to secure the answers to "can view only"."(R53)*

> *"I adopted augmented reality learning approach whereby the students are given an amazing race envelope and they are required to solve the clue in the first envelope in order to get a second envelope. The students will need to scan a poster put up around campus using their mobile phone and two-dimensional images will appear on the phones. The clues are given in the mobile phones and they will resolve the issue once they have acquired all amazing race envelope. The students did not know that they have actually conducted self-learning while trying to find the law in solving the issues given. They only realized after they have completed the activity. They also mentioned that they have learned how appreciate team members and appreciate the use of technology in law." (R73)*

Interestingly, a few of them noted on how comfortable they are in using technology, that their classes are now flipped and is one of the Massive Open Online Courses (MOOCs).

> *"The recording of my class a few years ago was properly edited and is now available in OpenLearning. Students watch that and come to class for Q&A and tutorial/workshop style activities/ exercises. I find students generally don't like this at the early part of the semester as they are not familiar with it but end up telling me at the end of the semester that the can learn more using such approach. Students who come prepared for the flipped classes generally would have already gain the basic knowledge as well as from question asked in the recorded video and they learned from each other's questions beyond what was recorded." (R78)*

For the second part of these findings, which focused on looking at how lecturers use TPK to integrate blended learning into their teaching, it was found that most lecturers are still comfortable in meeting their students at least once or twice a week and for a few, daily meet-up with their students. This shows that they are still not ready to have their teaching done in a blended mode, despite having good command of TPK. This finding is also supported by the percentage of lecturers preferring 70% face-to-face teachings and 30% online. The reasons were well justified by the lecturers where they mentioned that there are benefits of meeting student in-person,

such as creating more authentic communication and catering to the different learning styles of the students. The 30% online are shared through their responses on the last item which looked at an example of how the lecturers have utilized technology. It was found that technology were used in creative ways, for example, utilizing 'augmented reality' and turning a class lesson into the format of the "Amazing Race" (R73). Majority of the responses also stated that they normally get the students to view and understand the teaching materials first before coming to class, so that class time can be used for deeper intellectual discourse. This model of flipped classroom seemed to be the preference for the lecturers while blended learning remains unpopular.

Overall, these results suggest that all respondents associated their experience in combining technologies and teaching approaches in class as a positive. It is shown through their comments on their students' positive feedback and enhanced teaching and learning process. On the other hand, although respondents were reported to be an active user, they are varied from basic to proficient user of technologies which suggest that further exposure on how to integrate technologies in teaching approaches might be in line with their needs.

CONCLUSION AND RECOMMENDATIONS

Technology has been recognized as a strong tool that can be used to innovate the education practices. However, to utilize it, individuals need to be equipped with ample skills of technology to allow them to use, manipulate and disseminate information in the sophisticated world. Besides that, the educators are expected to have pedagogical content knowledge so that they can teach creatively and effectively to integrate various approaches in their teaching to suit the needs of the learners. Educators also have the responsibility to emphasize to the learners, the use of technology to motivate them to use and understand the potential for meaningful learning through digital platforms.

In the first part of the findings, it was found that the lecturers have well access to the technology (mean: 4.45) which is well-understood due to the provision of collaborative classes like X-Spaces, a comprehensive Learning Management System, the high speed internet and personal computer to each

and every academics. The lecturer's online skill relationship also score a high mean with 4.43 suggesting that the lecturers are competent in using internet and retrieve materials which are related for their teaching. However, the lowest mean scored for Motivation suggests that there is more to be done to increase lecturer's motivation in using technology for teaching purposes. This is vital as motivation keeps the lecturer abreast with the advancement of technology in years to come and make their teaching relevant to the learners who are wired differently from them (Prensky, 2006). This also inject some ideas about the type of professional development courses that the university can design for the lecturers. The courses, while focusing a lot on the new technology and how to integrate them, do not seem to help much in increasing the motivation of using technology in lecturer's teaching and learning.

Besides that, the "internet discussion" aspect also received an average lower mean compared to other aspects in TPK competencies (mean: 3.83). This finding is rather congruence with the finding from the second part of the analysis where lecturers are more comfortable in using flipped model for their teaching, rather than embracing blended learning. As the nature of materials parked online are more of one-directional, meaning the learner do not have to communicate much with the lecturer online but rather in the class, this aspect remains low compared to the rest in the TPK competencies of lecturers.

On the second part of the analysis which sought to understand the implementation of blended learning in relation to lecturer's TPK, it can be seen that majority of the respondents have access to the technology as well as basic knowledge to integrate it into their teaching. However, it appears that trainings and encouragement should be given to the lecturers so that they can explore and experiment with variety of approaches and methods to get their students to participate in the lessons. Besides that, findings show that majority of the lecturers prefer to have more time in face-to-face lesson rather than online lesson which can be implied that lecturers are not ready to integrate blended learning mode fully into their teaching. Hence, it is important for university to provide continuous support to the lecturers. It is hoped that these findings are able to provide further insights on the need to emphasize and integrate different parts of the techno-pedagogical skills and improve the current TPK courses available for lecturers.

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