International Journal On
E-LEARNING
And
HIGHER EDUCATION

INTERNATIONAL JOURNAL ON E-LEARNING AND HIGHER EDUCATION

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The Relationship between Readiness and the Usage of e-Learning among English Lecturers

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ABSTRACT

Nowadays, e-learning becomes useful to learning institutions worldwide, and because of that, an assessment of e-learning readiness is essential for the successful implementation of e-learning as a platform for learning. Success in e-learning can be achieved by understanding the level of readiness of e-learning environments. University of Kuala Lumpur already facilitate each campus with e-learning facilities and conducting workshop to the students and lecturers. Still, not all lecturers are ready to use e-learning in their teaching process. This study was carried out to examine UniKL English lecturers' readiness in the usage of e-learning. For this purpose, English lecturers of University of Kuala Lumpur will be given an online questionnaire on the usage of e-learning in their teaching process. For data collection, one set of online questionnaire was designed. The questionnaires were distributed to 51 English lecturers at UniKL but only 30 responded to the online questionnaires. The overall findings of this research shows that English lecturers prefer to use traditional way which is face-to-face medium to teach English, even though they are ready to embrace e-learning in their teaching process due to few constrains. The study revealed a positive relationship between the facilities of e-learning at the University of Kuala Lumpur and English lecturers' acceptance of using e-learning in their teaching process.

Keywords: *blended learning; e-learning*

INTRODUCTION

Since the recent years, the use of e-learning in the teaching and learning process in higher institutions in Malaysia has not been a new approach. It is used especially for private higher institutions because these private colleges/universities serve students who study part time. So, it is flexible for these students to get higher qualifications and at the same time working as they just use blended learning approach.

In most ESL classrooms, the lecturers always face the same problem, that is weak students unable to learn English. It is because of the perceptions of the students' themselves that English is difficult to learn. English lecturers play the main role in changing these perceptions. By using the technology like e-learning, English subject will be something interesting to the students. It is because lecturers can upload interesting videos related to the topic in e-learning and weak students can have a chance to learn English by using online tools personally with the help of the lecturer. Voogt and Knezek (2008) assert that e-learning is of strategic importance and is an effective method that should be blended into schools' learning mix. Besides that, lecturers should also be equipped with e-learning skills to manage e-learning environment. These skills are most effectively gained by learning with technology, rather than about technology (Broadley, 2012). This shows that to learn with technology, lecturers should have the desire to use technology as teaching aids.

Ng (2008) states that technology is not only an add-tool in teaching and learning process, but also to foster peer learning, so that learners may learn through a holistic approach in an experiential environment. It means that by using e-learning, students will develop critical thinking skills among them and at the same time they can also foster online collaborative learning in their learning process.

STATEMENT OF PROBLEM

Like other institutions, UniKL is one that starts to use e-learning in the teaching and learning process. Most of the UniKL campuses have been set up with the e-learning facilities. Besides that, the lecturers have also

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attended e-learning courses. In this course, all lecturers have been taught on how to use e-learning and Moodle. However, not all lecturers are ready to implement e-learning in their teaching. This will affect the use of the e-learning if the lecturers are not ready to use it. This paper therefore looks at the relationship on the readiness and the use of e-learning among UniKL English lecturers.

OBJECTIVE OF THE STUDY

The objectives of this research are as follows:

1. To investigate UniKL English lecturers' perceptions and readiness on the use of e-learning in teaching English subjects.

2. To determine the effectiveness of teaching English through e-learning at UniKL.

LIMITATIONS OF THE STUDY

This study focuses only on English lecturers at University of Kuala Lumpur. Therefore, thefindings of this study may not represent the whole population of UniKL English lecturers as only 30 respondents responded to the online questionnaire.

LITERATURE REVIEW

E-learning in Malaysia

The development of e-learning in Malaysian education system can be divided into two phases namely;

1. e-learning focuses on any form of electronic gadgets that are used as teaching aids to facilitate the teaching and learning process, and

2. phase two is closely linked to the Internet technology (Supyan, 2008).

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According to the statement above, in Phase 1, e-learning is considered as any form of electronic gadgets used as teaching aids to facilitate the teaching and learning process. At this phase, Internet is not part of e-learning. Teachers or lecturers use OHP (overhead projector), direct projector, video, cassette, and CD-ROM as part of e-learning. If the term "e-learning" in Phase 1 is related to the learning gadgets, in Phase 2, e-learning is related to the Internet technology. At this stage, learning through Internet in Malaysia has moved on a tremendous speed. Most of the colleges and universities in Malaysia, for example, UNITAR (Universiti Tun Abdul Razak) and MMU (Multimedia University) have been set up with hi-tech technologies to run online courses at the campus. Now, most of the colleges and universities in Malaysia run e-learning programs to cater for working adult learners. These students have a combination of face-to-face session with the lecturers and e-learning session. It is also known as blended learning. Hence, it will be easier for this group of learners to gain knowledge and certificate without leaving their work or positions.

Marlia (2006) found at that time, there were no policies in Malaysia that serve as a guide to Malaysian universities to integrate e-learning into their education system. However, now most of the public and private universities in Malaysia use e-learning as part of the teaching and learning process. The technology improves day-by-day, and now, the current medium of e-learning is Moodle. By using Moodle, lecturers can upload the video from You Tube or create their own video.

Lecturers' Attitude and Perception

It is very important to know lecturers' attitude towards e-learning because this will give the lecturers effort to teach using e-learning. Paraskeva, Bouta and Papagianna (2008) believe that teachers' perceptions and attitudes towards technologies influenced the effective use of these technologies in teaching and learning. If the lecturers have positive attitude towards e-learning, it will be easier for them to implement e-learning or blended learning in their teaching process.

The Benefits of E-learning in Teaching English

Teachers and students communicate virtually via e-learning and this is the predominant feature of learning process that is different from traditional

classes in which instructors and learners engage in face-to-face interaction (Teyebinik, 2009). It means that distance education using e-learning is a unique significance to the computer education and traditional approach. Having human interaction to online learning like live chat or forum, educators have considered human need for socialization, which in turn will help the process of learning (Sethy, 2008). This is very useful when the lecturers have weak students in the classroom. Instead of asking the weak students to come and see the lecturer after class, the students and the lecturer can have live discussion through e-learning. This is easier, comfortable and it saves time for both the students and lecturer. This is also known as blended learning. It means that students have face-to-face session with the lecturer in traditional setting classroom and having live discussions with the same lecturer through e-learning.

Another benefit of e-learning is students' eagerness for self-expression online. For example, when students produce something of extremely high quality, the lecturer can ask the students to post it in e-learning, so that the other students can do the same thing. It will also motivate the students as they try to produce something that has high impact on them (Bonk et al., 1998). In English subject, lecturers can ask the students to submit their assignment via e-learning. For those who have achieved high marks, the lecturer can publish their work in e-learning, so that the other students from other groups will try to produce good assignment or better than the published assignments.

The other benefit of e-learning in teaching English is the lecturer can use convenient medium of students' online assessments. English is a compulsory subject in all universities and colleges in Malaysia. Hence, the number of students per lecturer is always high. To make the lecturer easier to mark the test, they can conduct online assessment through e-learning. However, this assessment is only suitable for multiple choices, true or false or fills in the blanks in which the system will mark and calculate the students' marks according to the answer scheme in the system.

Framework of Measuring Levels of Readiness

In e-learning implementation, the most important component is human and technology. In this study, English lecturers are the people who will be

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measured in terms of their level of readiness in e-learning implementation. Figure 1 below shows a framework of the interactions between e-learning readiness factors towards e-learning implementation.

Adapted from Engholm (2001)
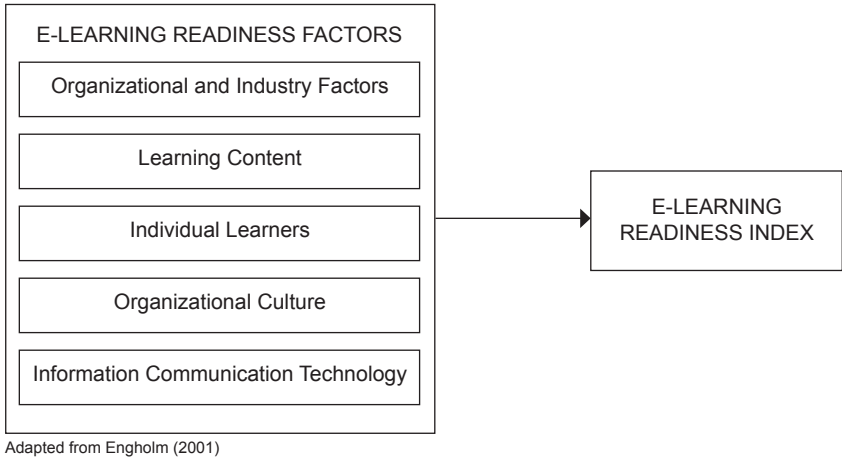
Figure 1: Framework on e-learning Readiness Factors (Engholm, 2001)

METHODOLOGY

Sample of the Study

The study was carried out on 51 UniKL English lecturers that have experienced in teaching English using e-learning method. However, only 30 respondents responded to the online questionnaire. Only respondents who had experience teaching English through e-learning in their teaching process were asked to respond to the questionnaire. This is to ensure that they will not be facing any problem when answering the questionnaire.

Research Design

As this research used the survey method, the instrument used was a structured online questionnaire. The design for this online questionnaire was based on research objectives and questions. The questionnaire has been adapted from the research on Students' Perceptions of a Blended Learning Environment: Advantages, Limitations and Suggestions for Improvement (Abdul Wahed et al., 2013).

The data obtained will be analyzed descriptively using simple percentage. The purpose of this questionnaire is to encourage English lecturers of UniKL to use e-learning in their teaching process. The information obtained will be used for research purposes only and all responses will be kept confidential.

Data Collection Procedure

Before the start of the study, all UniKL English lecturers will be informed through email that they have to respond to the online questionnaire. The lecturers will also be informed the purpose of distributing the questionnaire so that the English lecturers will be clear about the purpose of distributing the questionnaire. Then, the researcher will arrange the appropriate day and time to ask the English lecturers to respond to the online questionnaire.

On the arranged date and time, the online questionnaire has been disseminated among all UniKL English lecturers. E-mails have been sent to all UniKL English lecturers that inform them the aim of the study and instructions on how to respond to the online questionnaire given to them. They were given up to 10 days to complete the online questionnaire as most of them were busy preparing coursework marks for the students, so that they could answer the questionnaire freely, sincerely and accurately.

Data Analysis

The data collected will be classified into different sub-headings. The sub-headings consist of the perceptions of UniKL English lecturers about the usage of e-learning in teaching English and limitations on e-learning in ESL classroom.

To investigate the respondents' perceptions and readiness towards the use of e-learning in teaching English, I would like to distinguish the respondents' attitude towards e-learning. The data will be processed manually and presented in the form of percentage.

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FINDINGS

Overall Findings

From the responses of the respondents to the online questionnaire, it was found that most of the respondents prefer to use traditional approach which is face-to-face to teach English rather than e-learning in their ESL classroom. Analysis of data revealed two main categories:

1. UniKL English lecturers' perceptions and readiness of using e-learning in ESL classroom.

2. Limitations on the use of e-learning in ESL classroom.

UniKL English Lecturers' Perceptions and Readiness of using e-Learning in ESLClassroom

The perceptions of UniKL English lecturers' usage of e-learning in teaching English were reported based on the completed online questionnaire. Table 1 shown about the responses to the items on English lecturers' perceptions.

Table 1: Responses to Items on UniKL English Lecturers' Perceptions

Questions	SD (%)	D (%)	N (%)	A (%)	SA (%)
E-learning is more convenient for me than face-to-face learning.	3.3	46.7	30	13.3	6.7
E-learning improves communication between students and lecturers.	3.3	46.7	30	16.7	3.3
E-learning makes teaching and learning more effective; because it integrates all forms of media, print, audio, video and animation.	3.3	10	23.3	40	23.3
E-learning helps me to use time effectively.	6.7	13.3	43.3	23.3	13.3

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I think socially isolated when I use e-learning.	6.7	30	40	10	13.3
E-learning is difficult to handle and therefore frustrating to use.	6.7	16.7	16.7	6.7	53.3
I prefer to teach English using traditional way which is face-to-face rather than using e-learning.	3.3	6.7	26.7	36.7	26.7

The results above provide yet further evidence of the UniKL English lecturers' perceptions towards the usage of e-learning in teaching English subjects. These results provide some strong indications that most of the English lecturers at UniKL prefer to use traditional method which is face-to-face in their teaching process rather than using e-learning.

There is evidence that English could be more interesting if the lecturer use e-learning in the teaching process (23.3%) as e-learning makes teaching and learning more effective. Most of the English lecturers also feel that e-learning is difficult to handle and therefore frustrating to use as they think the university should equip more labs to cater with the number of students and face the technical problems first (53.3%). A total of 26.7% of UniKL English lecturers agree that teaching English using traditional way which is face-to-face is easier than using e-learning as lecturers just bring the textbook or notes to the class instead of waiting for the technician to come and fix the problem, such as technical problem or waiting for slow Internet connectivity when using e-learning.

Limitations on the Use of E-Learning in ESL Classroom

Table 2 shown responses to the items on limitations on the use of e-learning in ESL classroom.

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**Table 2: Responses to Items on Limitations
on the Use of E-Learning in ESL Classroom**

Questions	SD (%)	D (%)	N (%)	A (%)	SA (%)
The number of Internet labs should be increased.	0.0	0.0	20.0	23.3	56.7
All technical problems should be solved.	0.0	3.3	10.0	33.3	53.3
E-learning facilitates cheating and plagiarism.	3.3	16.7	40.0	23.3	16.7

According to the UniKL English lecturers, 56.7% agree that the number of Internet labs should be increased. This is due to the current number of students in UniKL that is increasing year by year. Meanwhile, 53.3% of the respondents agree that all technical problems and slow Internet connectivity should be solved in order for them to teach English using e-learning.

Lastly, based on the questionnaire, it is agreed that e-learning facilitates cheating and plagiarism (16.7%). It is because students can refer to the notes from the Internet or refer from the textbook when the lecturers use e-learning for online assessment. Other than that, students can also plagiarize when the lecturers ask them to submit the assignments through e-learning.

All in all, learning English using e-learning will be more interesting and fun because it will be more interactive, students-centered and it develop students' critical thinking skills. Nonetheless, the university should improve on the technical problems first to encourage more English lecturers to use e-learning in their teaching process. Otherwise, the use of e-learning will become a burden to the English lecturers as they have to face the technical problem and slow Internet connectivity in the campus.

CONCLUSION

E-learning is an active approach when it is used effectively. As a teaching approach, it is beneficial to the lecturers, especially when they are not around

the campus. Besides that, e-learning can also develop critical thinking skills, and also cooperative online learning between the students. However, not all English lecturers at UniKL prefer to use e-learning, as they think it is difficult to handle and at the same time the lecturers have to face technical problem such as slow Internet connectivity in the campus. Reluctant users are late adopters who are "suspicious of innovations and of change agents" (Rogers, 2003: 284). To achieve the benefit of using e-learning in ESL classroom, English lecturers need to change the perceptions of using traditional way together with e-learning approach. Administrators must ensure that English lecturers understand the principles behind the use of e-learning and recognize that they are participating in an effective teaching process, even if it is unfamiliar to some of them. English lecturers need to familiarize with the concept of e-learning to ensure the teaching through e-learning will be successful. Finally, administrators and the lecturers must consider the role that e-learning will play in their programme. Will it constitute the primary philosophical and pedagogical thrust of the programme, or will it serve as an alternative activity for lecturers to use in their classrooms? Careful consideration of these issues will increase the likelihood that e-learning will be successfully incorporated into an ESL programme with positive outcomes.

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Mobile Applications at the Dentist

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ABSTRACT

Utilization of Apps in the dental clinics for dental education in Malaysia is currently lacking, and serious transformation is needed to modernize dentistry to empower the dental community in this technological advanced era. The purpose of this study is to develop related Apps that are beneficial to be used in the dental clinics mainly for educational purposes, and to evaluate dental students' perception towards the usage of these Apps in the dental clinic. Two kinds of Apps were being developed; Apps for patients' dental education in an interactive educational game layout, and Apps for conducting oral health related quality of life survey. Subsequently, an online survey form was then used to gather undergraduate dental students' perception on using these Apps in the dental clinic. The developed Apps were successfully made available in the online market. 114 clinical year dental students of the Faculty of Dentistry Universiti Teknologi MARA participated in this study. The students' perceptions on the usage of these Apps were found to be positive. 67.5% of the students agreed that these Apps are useful in the dental clinic, 66.7% think that these Apps are beneficial to be downloaded and 68.4% will use these Apps if it is made available freely in the clinic. The willingness of most respondents to use these Apps made it a valuable tool for measuring the quality of dental health information and services being given to the community in a more robust and systematic way.

Keywords: *Dental mobile application, dental student perception, patient education*

INTRODUCTION

Mobile Applications (Apps) currently provide nine thousand softwares related to medicine and fifteen thousand softwares for wellness (Marceglia et al., 2012). However, utilization of Apps in the dental clinics for dental education in Malaysia is currently lacking. In the dental education field, most educational development is being focused for the students. Another important client in dental education; the general public, is always being forgotten and undermined by the professional dental education bodies leading to exploitation of information by manufacturing companies and opportunists that may lead to misleading information. Nowadays, the public have access to loads of information and misinformation about treatment options, materials, and alternatives (Logan, 1997). The Internet is considered to be a significant source of health information for the general public (McMullan, 2006) with more than 70,000 websites providing health information (Grandinetti, 2000).

Other current niche in dental public health apart from public dental education is the impact of dental treatment to the quality of life of the individual patients and general public. The most widely used tool to assess quality of life related to oral health is by using the Oral Health Impact Profile (OHIP) survey, which is globally accepted, validated and verified by the World Health Organization (WHO, 2011). OHIP was developed to gain accurate measure of self-reported dysfunction, discomfort and disability related to oral condition (Slade, 1997). Therefore, OHIP act as an adjuvant to conventional oral epidemiological indicators for clinical disease. Slade (1997) also explained that OHIP is focused on impairment and three functional status dimensions (social, psychological and physical), that account for four out of seven qualities of life dimensions proposed by Patrick and Bergner (1990). Moreover, OHIP aims to capture impacts that are related to oral conditions in general, not specific to certain disorders or syndromes (Slade, 1997).

Currently, there are limited Apps for patients' dental education available in the market. Therefore, the aims of this study are to describe the development of related Apps that are beneficial to be used in the dental clinics mainly for patient educational purposes and OHIP Apps, and to obtainthe undergraduate students' perception towards the usage of these Apps in the dental clinics.

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MATERIALS AND METHODS

Mobile Application Development

Two types of Mobile Apps were being developed; App for patients' dental education in an interactive educational game layout, and App for conducting oral health related quality of life survey.

App for patients' dental education was developed using App Makr (http://machine.infinitemonkeys.mobi – AppMakr c/o Infinite Monkeys, New Jersey, United States of America).This interactive educational App was made to educate patients regarding the most appropriate choice of dental treatment option and provide a peer reviewed validated information regarding the treatment choices to the patients and general public. This App was then, made to be downloaded freely from the App Maker Market Place (http://apps.appmakr.com).

The App for conducting oral health related quality of life survey include an offline survey and data collection App; Quicktap Survey, which was used to develop the OHIP survey; Malay language shortened OHIP with 14-items (Malay S-OHIP (M)). This survey is the current verified and validated OHIP survey approved by the World Health Organization (Saub et al., 2005). This OHIP survey App was made available online via the Quicktap Survey Mobile Application (http://www.quicktapsurvey.com - Quicktap Survey, Toronto, Canada).

Population and Sample

This study was conducted in the Faculty of Dentistry, Universiti Teknologi MARA (Malaysia), with a population of 160 clinical year students. Students were given the opportunity to use the developed Apps mentioned above on their patients in the dental clinics. After using both Apps, the students were then asked to respond to an online perception survey made with Google Forms as shown in Figure 1.

**Figure 1: The Online Perception Survey Made with Google Forms
(Google Inc., California, United States of America)**

Measurement and Data Collection

This study used a perception survey questionnaire for the purpose of data collection, which was guided by previously conducted students' perception survey on using Apps in the International Islamic University Malaysia (A. Karim et al., 2006). This survey questionnaire was created using Google Forms and was made accessible online, and was modified to collect data on respondent's demographic, their usage and awareness of the Apps, their view on other potential Apps for use in the dental clinics and also their perception on using Apps in the dental clinics.

The frequency of Apps use was measured in the form of categories in the sequence of "everyday", "few days a week", "once a week", "once a month', "if needed" and "never". The measurement of purpose of use was designed using frequency scale of 1 (never), 2 (seldom), 3 (sometimes), 4 (often), and 5 (always). Seven categories were selected for the purpose of use, which comprises these items:

1. To search information for my assignment
2. To view audio visual materials for my assignment
3. For religious purposes (eg: iQuran, Qiblat)

4. To know current global news
5. For social networking (eg: Facebook)
6. To record or manage personal lifestyle (eg: period calendar, noom coach)
7. For leisure activities (eg: games and jokes)

The questionnaire also includes students' responses towards the potential Apps uses in dental clinics that comprise:

1. Patient's personal details
2. Examination, diagnosis and treatment plan
3. Patient's treatment records
4. Patient's treatment appointments and reviews
5. Patient's satisfaction survey

The last variable is the perception on using Apps in dental clinics that was measured in the sequence of 1 (strongly disagree), 2 (disagree), 3 (mixed feelings), 4 (agree) and 5 (strongly agree). The questions are as follows:

1. Does the App being useful in dental clinic?
2. If the App is available in the online market, do you think it is beneficial to be downloaded?
3. Would you like to use the App if it is made available for you?

Data collected were analysed using descriptive statistical analysis. Descriptive statistics "helps to describe, show or summarize data in a meaningful way such that, for example, patterns might emerge from the data" (Laerd Statistics, 2013). Generally, it describes data in terms of measures of central tendency (in this study, mean) and measures of spread (in this study, standard deviation). The findings were presented in tables of mean and standard deviation as well as in percentages.

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RESULTS

Apps and Online Survey Form Development

Dental Treatment Choice and OHIP survey mobile Apps were developed as shown in Figure 2 and Figure 3. Both of these Apps were made to be compatible with mobile devices using iOS and Android operating systems.
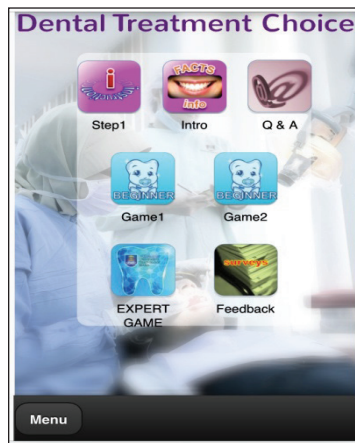
Figure 2: The 'Dental Treatment Choice' Mobile Application Made using Appmkr (Appmakr C/O Infinite Monkeys, New Jersey, United States of America)

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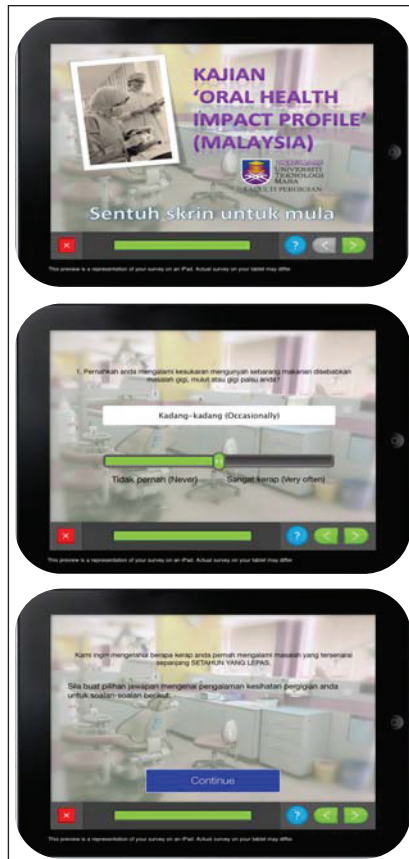
Figure 3: The Oral Health Impact Profile Survey; Malay Language Shortened OHIP with 14-Items (Malay S-OHIP (M) Mobile Application Made using Quicktap Survey (Quicktap Survey, Toronto, Canada)

Respondents' Demographic

A total of 114 respondents participated in this study as shown in Figure 4, with year 3 students (26%), year 4 students (27%), year 5 students (44%) and extended students (3%). The majority of them were female (81%).

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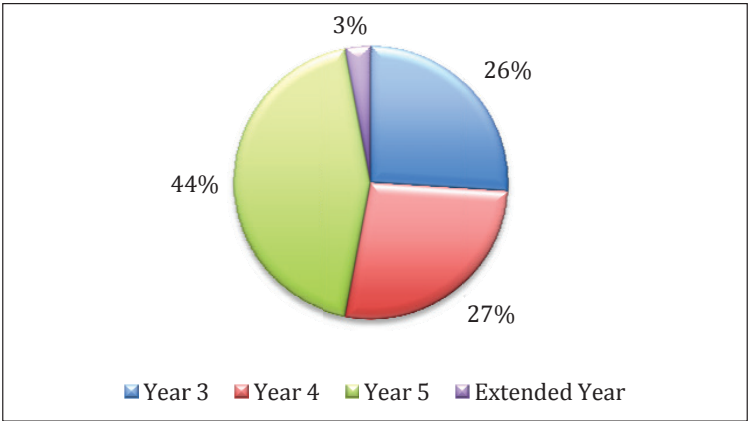
Figure 4: The Total Respondents who Participated in this Study

Apps Usage Experience

Figure 5 provides information on the purpose of Apps usage experience in several areas of students' daily life routine. The result showed that Apps was most commonly used for social networking. Other popular purposes were for searching information for assignment and leisure activities.

Figure 5: The Purpose of Apps Usage. Collected Through a Frequency Scale of 1 (Never) To 5 (Always). The Result is displayed in Terms of Mean Distribution and the Standard Deviation. The Closer the Mean of the Total Score to 5, the More Frequent the Usage of Tablet According to Respondents' Experiences

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Other Potential Apps to be used in the Dental Clinic

Figure 6 provides findings on the students' views regarding the potential Apps that can be used in the dental clinic. The most favorable Apps was used for patients' personal details record (83%), followed by patients' treatment record (76%), patients' treatment appointment (71%) and patients' examination, diagnosis and treatment plan record (69%).
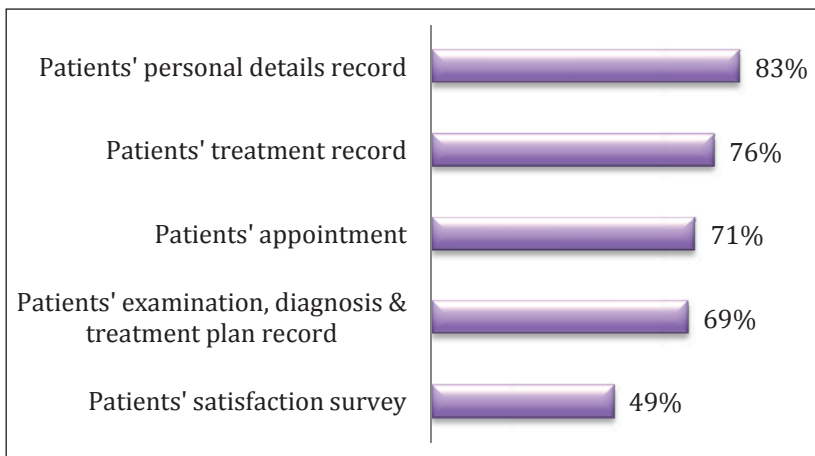
**Figure 6: The Students' Perception Regarding
the Potential Apps to be used in the Clinic**

Perception of Apps Usage in Dental Clinic

Majority of the students supported the idea of Apps implementation in the dental clinical setting as shown in Figure 7. As shown, more than 50 percent of total respondents support (strongly agree and agree) the implementation of Apps usage in the dental clinic. The mean score that fell within the range of 3.8 to 3.9 was considerably high, which indicated that the respondents were in favour of the Apps usage.

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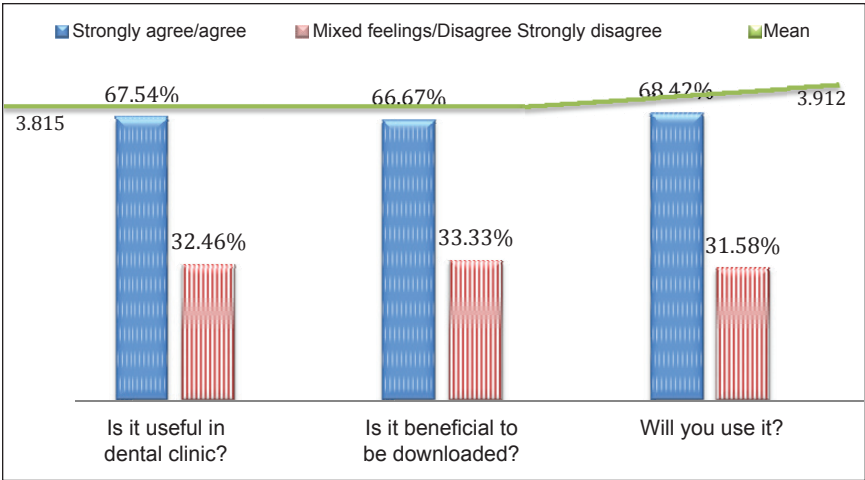
**Figure 7: The Mean and Standard Deviation of the Perception
on Apps Usefulness, Its Benefit to be Downloaded
and Will Apps Going to be used in Dental Clinic**

DISCUSSION

Apps and Online Survey Form Development

The main significance of the Apps development in this study is the implementation of technologies in the dental clinical setting that enables dental schools to use computerised system for data storage. Besides that, patients' records keeping procedure will also be eased. Apart from that, the Dental Treatment Choice App (Figure 2) can be a reliable and validated source of information for patients and general public regarding the most suitable dental treatment choice for specific dental problems. The OHIP survey App (Figure 3) can be part of information collected from patients to gather their feedback regarding quality of dental treatment received in the Faculty of Dentistry Universiti Teknologi MARA. This will enable the Faculty to gauge the competence of the students in clinical practices as well as monitor patients' oral health related quality of life in the community.

This study also used Google Forms for the students' perception survey (Figure 1) that enables auto data transfer to Excel for data collection and data analysis. This helps to reduce human error during data transfer.

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Besides that, this is a paperless study that used no paper for both Apps and perception survey online form that had reduced the cost, space needed for storage and misplacement of data collected.

Respondents' Demographic

The respondents of this study were among UiTM's clinical year dental students, with a population of 160 students. The number of respondents was unevenly distributed between the clinical year students (Year 3, Year 4, Year 5 and extended year) due to the different students' clinical time available to conduct this study. A small percentage of respondents were from the extended students because they were very small in number. The high percentage of the female gender was proportionate to the dental student population in the Faculty of Dentistry, Universiti Teknologi MARA.

Apps Usage Experience

The result showed that Apps was commonly used for social networking, searching information for assignment and leisure activities. These findings maybe due to the respondents' age where they are the 'millennial generation' students. This generation that grew up in a culturally diverse schools, are tech-savvy, enthusiastic, confident, well networked and learning oriented. Millennial learners develop critical thinking through experimentation, active participation, and multitasking with rapid shifts between technological devices.

Other Potential Apps to be used in the Dental Clinic

The results indicated that the students preferred all the medical and dental records of the patients to be in electronic record and paperless. Prazeres (2014) did a study on the adaptation of general practitioners to electronic keeping and he reported that 80.4% of respondents preferred the electronic health records and no negative implications to medical consultations were observed. It is widely accepted that electronic record keeping is convenient and accessible to the clinicians at all time.

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Perception of Apps Usage in Dental Clinic

Health Apps has been widely used and various studies have found that the prevalence of usage were high and acceptable by patients. As shown by this study, most of the students agreed to the Apps implementation in the dental clinical setting. Singh et al. (2014) also reported that prevalence of smartphone and apps use in urban pediatric populations is high with increased interest in mobile health, patient education and disease management. While Lee et al. (2014) found that even the elderly patient of age 60 years old were interested in health games and mHealth technology specific to their warfarin medication management.

Future Prospects of the Mobile App

From the results of this study, one could propose that further development of this Mobile App to various dental specialties 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 Mobile App in dentistry could be one of the most profitable business developments in the future. Another similar study focusing on obtaining patients' perception towards the usage of this Mobile App in the dental clinics is still ongoing now.

CONCLUSION

Although Mobile App has not yet been implemented for everyday use in the Faculty of Dentistry, Universiti Teknologi MARA, responses from this study indicated that majority of the respondents were willing to accommodate the use of Apps in the dental clinic. The willingness of most respondents to use these Apps made it a valuable tool for measuring the quality of dental health information and services being given to the community in a more robust and systematic way.

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Course Note Delivery on Mobile Facebook

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ABSTRACT

The present study reports on a longitudinal research which sought to explore how Facebook on smartphones could be used to replace an institutional learning management system. A review of the literature revealed that very little articles had been published on the incorporation of both technologies in education. A grounded action research method was employed over a period of one and a half year in three French as a foreign language courses. The action research implementation was two-fold as it included the delivery of course notes and the sharing of learner-created documents. Data collection was conducted through online observations and interviews. A systematic grounded theory approach was used during the six cycles of analysis. Findings revealed issues with the implementation which were corrected over time. Overall, students positively responded to the new platform of delivery. A working model describing learning a foreign language with Facebook on smartphones was constructed, and best practices guidelines were identified. These are discussed in the perspectives of mobile assisted language learning, task-based learning, and social networking learning.

Keywords: *Action research; grounded theory; language learning; m-Learning; SNS-Learning; critical review*

INTRODUCTION

This article relates how a study was conducted to incorporate Facebook on smart phones in order to resolve issues faced with an institutional learning management system (LMS). Indeed students reported that the university's LMS was slow, it did not provide them with notifications, and it could not be accessed on their mobile phones. Gabarre and Gabarre (2009b)suggested that these issues could be resolved by using mobile Facebook to replace the LMS. A critical review of the literature revealed that very little research had been conducted on this topic. The Methodology section describes how a grounded action research was conducted to evaluate the delivery of lecture notes on mobile Facebook. Findings are reported and discussed in accordance with this qualitative method.

STATEMENT OF THE PROBLEM

A study conducted in the same institution by Gabarre and Gabarre (2010b) revealed that students viewed their university LMS as a platform which only served the purpose of pushing learning material to them. Students explained that they would only access the system whenever their lecturer would inform them that a new course note had been posted. Three main issues, which the present study sought to resolve, were identified. First, students explained that navigating through the different pages of the LMS in order to access the course note was a painstakingly slow process. Although it was originally believed that poor access to the Internet was the reason for this issue, initial investigations revealed that access to other websites was not similarly affected. Second, students remarked that unless they were informed by their lecturer during the class of a new activity on the LMS, they would need to randomly access the platform to check for new postings. To a certain extent, this requirement to inform the students through a face-to-face channel defeated the purpose of using a blended mode of teaching. Third, students explained that the LMS which was used to host their course could not be readily accessed on their mobile devices. With the growing popularity of smartphones, it has been observed that such devices have become the students' first source for in-class reference to learning material. Depriving the students of access to the LMS while in-class diminished the function of the lecture course notes in favour of information garnered from

the Internet. In order to resolve these issues, a reflection on past experiences with social networking sites (SNS) and mobile devices was conducted. It was envisioned that delivering course notes through Facebook on mobile phones could offer a solution to these three issues. Three questions reflecting the exploratory nature of the research need were formulated: (1) How can a mobile Facebook implementation improve the students' learning experience in terms of course material delivery? (2) What processes do foreign language learners go through when using a mobile Facebook setup? (3) What are the difficulties encountered in a mobile Facebook scenario? The formulation of these three questions prompted a qualitative approach as will be described in the Methodology section.

THEORETICAL AND CONCEPTUAL FRAMEWORK

In this study, two theories were employed to address the delivery of lecture course notes on a mobile SNS. Sharples, Taylor and Vavoula's (2007) theory of mobile learning was employed to describe the concept of course note delivery on mobile devices. Vygotsky's (1934/1962) social constructivist theory was selected for its ability to describe the learning process within a group. Even though this group would at time meet in a virtual online learning context, as is the case with an SNS, social constructivism remains a valid theory. Six concepts (task-based learning, exposure to foreign language, ubiquitous access to lecture notes, learner created document sharing, familiar environment, and peer-learning) derived from these two theories and from recent literature (Kukulska-Hulme & Bull, 2009; Ros i Solé, Calic, & Neijmann, 2010; Wang, Wiesemes, & Gibbons, 2012) on Mobile Assisted Language Learning (MALL) formed the basis of the conceptual framework. This conceptual framework, illustrated in Figure 1, was used to implement the action research study which was conducted over the course of three semesters with one cohort of students learning French.

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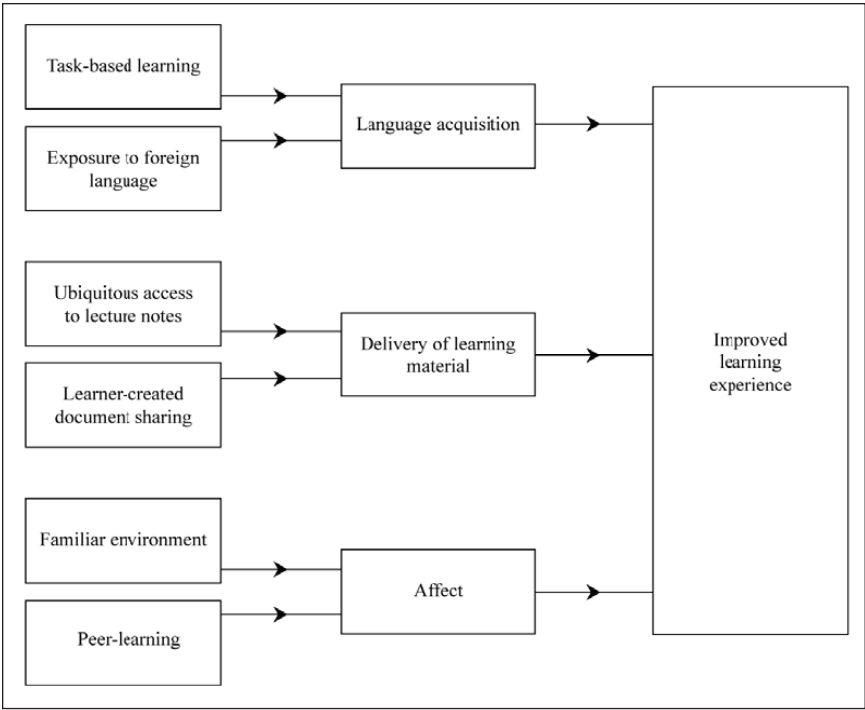
Figure 1: Conceptual Framework

OPERATIONAL DEFINITION

The operational definition of course content delivery is provided here in order to clarify the use of this term throughout this article. Delivery of course content can be articulated around two directions of movement: push and pull. Within the field of mobile technologies, push refers to the movement of data from the service provider to the user. As such, the user does not request each segment of information which the mobile operator seamlessly delivers to the mobile device. When used in m-Learning, this term also describes the delivery of information to the students. The instructor pushes learning material to each student's mobile phone using SMSs, multimedia messages (MMS) or e-mails without them initiating the request (Traxler & Riordan, 2003). This type of movement follows the instructor to learner direction, and consequently leaves less initiative to the students.

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Logically, pull is the converse concept of push. Mobile technologies refer to pull as a user initiated demand. Likewise in m-Learning, the concept of pull refers to a request which originated with the students. This can take multiple forms, such as direct request for information through SMS and emails, or even retrievals from online depositories. In the latter example, students access remote servers where learning objects are located. Pull is marked by a student initiated request which answers a specific learning need. Consequently, the responsibility of exchanges is placed on the learners' side. The use of both push and pull mobile exchanges can concurrently occur within the classroom during formal learning (Lindquist et al., 2007; Wang, Shen, Novak, & Pan, 2008), or outside with the freedom offered by mobile technologies (Gabarre & Gabarre, 2009a). In this article, delivery of course content is defined as the distribution of course content initiated through both push and pull.

LITERATURE REVIEW

A literature review seeks to describe the current knowledge pertaining to a particular domain. Such a review can be conducted linearly by first dividing the main topic into different segments and by addressing each issue sequentially. Guzzo et al. (1987) argued that this narrative review of the literature could be subjected to bias from the researcher as a selection of articles is always a personal interpretation of relevance. Alternatively, they proposed that a critical review of the literature could be performed in order to categorise the existing understanding on a specific subject. According to Rosenthal and DiMatteo (2001) a critical review offers undeniable advantages as it grants social science researchers a clear view of all research findings in their specific area through a critical review. Furthermore, conducting a critical review incites researchers to adopt a rigorous survey and review of all available documents. By combining research findings obtained from various paradigms and methodologies, the critical review offers a richer picture of the subject that is being investigated.

Critical Review of the Literature

Guzzo et al. (1987) as well as Egger et al. (1997) recommended approaching the task of conducting a critical review in the same fashion as a

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quantitative study. As such, the three steps to be followed are "formulation of the problem to be addressed, collection and analysis of the data, and reporting of the results" (Egger, et al., 1997, p. 1533).

The primary reason for conducting the present critical review was to investigate the extent of the current knowledge on learning a foreign language with social networking sites on mobile phones. By pursuing the analogy presented by Egger et al. (1997), the problem that is addressed was formulated with the following question: to what extent do recent and respected publications deal with the theme of learning a foreign language with social networking sites and mobile devices? This question can be divided into five different variables: (1) recent publications, (2) respected publications, (3) learning a foreign language, (4) learning with social networking sites, and (5) learning with mobile devices. These five variables were used to categorise the articles that were selected in the critical review.

For Guzzo et al. (1987), all reviews of the literature should be exhaustive and at the same time "deal with a bounded domain of studies" (Guzzo et al., 1987, p. 418). As such, a thorough search of all pertinent articles was conducted before these were subsequently selected for relevance. In doing so, keywords related to the theme of SNS, m-Learning, and language learning with technology, were used to find articles on four online services: the ERIC database, the EBSCO server, the JSTOR service, and the Google Scholar website. Furthermore, articles were also sourced from seven publishers' website: Elsevier, Emerald, Routledge, Sage, Springer, Taylor & Francis, and Wiley. When a relevant article was located in a journal, the researcher searched systematically through archival issues to identify additional articles. Although a systematic method was established to review a maximum of relevant articles, the possibility that some publications escaped this process remains.

From the five variables retained to classify the selected articles, learning a foreign language, learning with social networking sites, and learning with mobile devices are self-explanatory. On the other hand, recent publications and respected publications require some clarification. First, the recent publication variable was addressed by excluding all publications prior to the year 2010. Klavans and Boyack (2007) noted that the time frame used to analyse new scientific literature should reflect the stability

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of science in that particular field. A long time frame assumes that science is stable, whereas a short one presupposes that the field is rapidly evolving. The decision to filter out all articles which dealt with older technologies was made in light of the rapid changes that occur in the domain of mobile phones and SNSs. This decision was based on Ceruzzi's (2005) remarks that the pace of development of information and communication technologies followed an exponential path.

Second, the respected publication variable was ensured by only including articles published in journals referenced by the Institute for Scientific Information (ISI) or Elsevier's Scopus. This decision was taken to ensure a constant level of quality in the articles. Although Google Scholar offers a convenient way to access online papers, the quality of the results remains inconsistent, as noted by Falagas et al. (2008). On the other hand, Butler (2003) confirmed that publications indexed by ISI were generally viewed as a benchmark to measure performance in scientific publications. Although it could be suggested that limiting the critical review to include only two indexing services risks distorting the view of the current literature, Klavans and Boyak (2007) noted that both ISI and Scopus indexed publications were representative of the scientific literature.

As can be seen in Table 1, a total of 59 articles were selected for the review of the literature. The first finding that is reported in this critical review relates to the lack of articles dealing with all three aspects of the current research: mobile learning, SNS-Learning, and language learning. At best, articles reported findings on two of these aspects (27% of all articles), but the majority focused on only one. This clearly represents a gap in the current knowledge of learning a foreign language with these two technologies.

Table 1: Critical Review of the Literature

	Authors	Year	Journal	ML	SL	LLT	MY	Country
1	Başoğlu, Akdemir	2010	Turkish Online Journal of Educational Technology	✓	✓	✓		Turkey
2	Ros i Solé et al.	2010	ReCALL	✓	✓	✓		UK
3	Stockwell	2010	Language Learning & Technology	✓	✓	✓		Japan
4	Wong, Looi	2010	Journal of Computer Assisted Learning	✓	✓	✓		Singapore
5	Chang, Hsu	2011	Computer Assisted Language Learning	✓	✓	✓		Taiwan
6	Hayati et al.	2011	British Journal of Educational Technology	✓	✓	✓		Iran
7	Huang et al.	2011	British Journal of Educational Technology	✓	✓	✓		Taiwan
8	Nah	2011	Computer Assisted Language Learning	✓	✓	✓		Korea
9	Wong et al.	2011	Journal of Computer Assisted Learning	✓	✓	✓		Singapore
10	Chen et al.	2012	Australasian Journal of Educational Technology	✓	✓	✓		Taiwan
11	Hsu	2012	Computer Assisted Language Learning	✓	✓	✓		Taiwan
12	Hwang, Chen	2011	Computer Assisted Language Learning	✓	✓	✓		Taiwan
13	Kondo et al.	2012	ReCALL	✓	✓	✓		Japan
14	Oberg, Daniels	2012	Computer Assisted Language Learning	✓	✓	✓		Japan
15	Beckmann	2010	Distance Education	✓				Australia
16	Daher	2010	Australasian Journal of Educational Technology	✓				Israel
17	Du et al.	2010	Journal of the American Society for Information Science and Technology	✓				NA
18	Gupta, Koo	2010	International Journal of Information and Communication Technology Education	✓				NA
19	Isham Shah Hassan et al.	2010	Turkish Online Journal of Educational Technology	✓			✓	Malaysia
20	Mifsud, Mørch	2010	Journal of Computer Assisted Learning	✓				USA / Norway

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	Authors	Year	Journal	ML	SL	LLT	MY	Country
21	Coulby et al.	2011	British Journal of Educational Technology	✓				UK
22	Goh et al.	2011	British Journal of Educational Technology	✓				New Zealand
23	Kert	2011	Turkish Online Journal of Educational Technology	✓				Turkey
24	Looi et al.	2011	Journal of Computer Assisted Learning	✓				Singapore
25	Shih et al.	2011	British Journal of Educational Technology	✓				NA
26	Boticki et al.	2012	Computer Applications in Engineering Education	✓				Croatia
27	Kinash et al.	2012	Australasian Journal of Educational Technology	✓				NA
28	Santos, Ali	2012	Education and Information Technologies	✓				UAE
29	Schepman et al.	2012	Computers in Human Behavior	✓				UK
30	Wang, Wiesemens et al.	2012	Computers & Education	✓				UK
31	Yen et al.	2012	British Journal of Educational Technology	✓				Taiwan
32	Elavsky et al.	2011	Learning, Media and Technology		✓			NA
33	Kabilan et al.	2010	Internet and Higher Education			✓	✓	Malaysia
34	Arnold, Paulus	2010	Internet and Higher Education		✓			USA
35	Baran	2010	British Journal of Educational Technology		✓			Turkey
36	Brady et al.	2010	Journal of Interactive Online Learning		✓			USA
37	Hung, Yuen	2010	Teaching in Higher Education		✓			Taiwan
38	Junco et al.	2011	Journal of Computer Assisted Learning		✓			USA
39	Mazman, Usluel	2010	Computers & Education		✓			NA
40	McCarthy	2010	Australasian Journal of Educational Technology		✓			Australia
41	Yu et al.	2010	Computers & Education		✓			Hong-Kong
42	Dominguez-Flores, Wang	2011	Journal of Academic Librarianship		✓			Puerto Rico

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	Authors	Year	Journal	ML	SL	LLT	MY	Country
43	Feuer	2011	Library Hi Tech News		✓			USA
44	George, Dellasega	2011	Medical Education		✓			USA
45	Goodband et al.	2011	Learning, Media and Technology		✓			UK
46	Hrastinski, Aghaee	2011	Education and Information Technologies		✓			Sweden
47	Lampe et al.	2011	Computer-Supported Collaborative Learning		✓			USA
48	Loving, Ochoa	2011	New Library World		✓			USA
49	Mills, Chandra	2011	Journal of Adolescent & Adult Literacy		✓			Australia
50	Chen, Bryer	2012	International Review of Research in Open and Distance Learning		✓			USA
51	Chen, Chen	2012	British Journal of Educational Technology		✓			Taiwan
52	Junco et al.	2012	British Journal of Educational Technology		✓			NA
53	Lambropoulos et al.	2012	British Journal of Educational Technology		✓			Greece
54	LaRue	2012	Teaching and Learning in Nursing		✓			NA
55	Ractham et al.	2012	Decision Sciences Journal of Innovative Education		✓			Thailand
56	Rambe	2012	Australasian Journal of Educational Technology		✓			South Africa
57	Veletsianos, Navarrete	2012	International Review of Research in Open and Distance Learning		✓			USA
58	Wang, Woo et al.	2012	British Journal of Educational Technology		✓			Singapore
59	Wood et al.	2012	Computers & Education		✓			NA

Articles were almost equally distributed between these two technologies with research on m-Learning accounting for 53% of all academic journals, while those on SNSs accounted for 47%. Unexpectedly, a large majority (93%) of articles which reported on language learning also dealt with mobile learning. Only one article described a study which used SNSs to investigate language learning. This finding highlights a second knowledge gap which strongly warrants additional research in this field.

The Asian continent figures prominently among the articles selected for the critical review with 52% of all publications where a geographical setting was identified. On the other hand, Northern America (20%) and Europe (18%) account together for just over a third of all articles. Additionally, the analysis of the literature revealed a scarcity of articles reporting findings from research conducted in Malaysia. Indeed, from a total of 59 articles, only two (3%) reported on the Malaysian context. As such, this finding represents a third gap in the literature.

The main implication that resulted from the critical review was the discovery of three gaps in the literature. These were (1) the absence of findings on learning a foreign language with social networking sites on mobile phones, (2) the virtual absence of research on language learning with SNSs, and (3) the scarcity of studies conducted in Malaysia with either of these two technologies. The following section will review findings from the 59 articles selected in the critical review to respectively report on the current knowledge on the delivery of learning material on mobile devices.

Mobile Phones as Delivery Tools

A mobile phone is first of all a device used to communicate without being fixed to any given location. Consequently, m-Learning scenarios which involve mobile phones may include a communicative dimension. This is not the case when the mobile devices used are not connected to a network, as was illustrated in Ros i Solé et al.'s (2010) experiment which made use of MP3 players to practise foreign language learning outside of the classroom. Although the vast majority of research on m-Learning is carried out with mobile phones (Wu et al., 2012), not all of them use the communicative dimension of these devices.

Studies which made an extensive use of mobile devices for their communicative features focused on specific aspects of the device. For example, Kert (2011) used the short message service (SMS) feature of the mobile phones to send the students lecture notes related to computer programming. In this research, the student who received the lecture notes via their mobile phones experienced higher academic achievements than the control group. In a comparable experiment, Goh et al. (2012) used SMSs to positively stimulate students in their academic activities. Similarly investigating the communicative dimension of mobile phones, Santos and Ali (2012) discovered that SMSs were prominently used in informal learning among students. However, SMSs are perhaps not the best way to deliver course content as highlighted by Wang and Shen (2012). They noted that students preferred to receive learning material in the form of short videos. Similarly, Gupta and Koo (2010, p. 82) discovered that students considered listening to lectures on their mobile devices "the most useful educational activity". However, rich multimedia documents might not always be compatible with all mobile phones, and furthermore, sending them may prove to be taxing on the network, thus causing delays in the delivery.

Richer than SMSs, the multimedia messaging service (MMS) offers the possibility of sending small documents and bypasses the need of browsing mobile Internet. This service was used by Hsu (2012) who explored in situ learning at the night market. In this study, students received instructions for their language learning task through their mobile phones, and subsequently sent their lecturer their completed work either by MMS or by using the 3G network. Throughout this assignment, all exchanges with the lecturer were conducted on the mobile phones, thus making full use of the mobility afforded by the devices.

Delivery of learning material can also be carried over the Internet and consequently is not restricted to the cellular networks used by mobile phones. Accordingly, other mobile devices can be used, such as the iPod Touch which was the focus of the research conducted by Oberg and Daniels (2013). In this experiment conducted in Japan, students were able to access a digitised version of their textbook which was available online. With this learning scenario, students were able to pull the information they required at the moment they needed it. However, since the iPod Touch is dependent on Wi-Fi, learning was confined to the classroom and thus full mobility was not explored.

Another study using iPads was conducted in Australia by Kinash et al. (2012). In this research, the students were given the opportunity to access their course's LMS through the iPads. Findings revealed that some students perceived the mobile device as an advantage over other forms of access such as computers, whereas others did not see any benefit to the tablets. Even though the iPads were lent to the students for use outside of the classroom, Kinash et al. (2012) did not report on the location where the devices were used and instead focused on the patterns of usage.

Also using mobile Internet, Isham Shah Hassan et al. (2010) conducted a study where architecture students could gain information related to the design process on a website. Although this feature facilitated access to information, Isham Shah Hassan et al. (2010) remarked that the high cost of mobile Internet could be a hindrance to the use of the service. Similar findings regarding the prohibitive cost of mobile Internet were also noted by Ally et al. (2007), Nah (2011), as well as Santos and Ali (2012). Consequently, the additional cost of using mobile Internet was taken into account in the present study.

METHODOLOGY

A grounded action research method was employed over a period of one and a half year in four French as a foreign language courses. The selection of this qualitative method resulted from two research requirements. First, an intervention was necessary in order to improve on the learning situation. Second, due to the novel nature of the technologies employed, an exploratory method was necessary. From the variety of grounded theory methods available, the systematic method of analysis presented by Strauss and Corbin (1990) was selected. This choice arose from the need to consistently analyse data during each cycle of the intervention, in spite of changes in the implementation. In the four courses where the implementation occurred, course notes were delivered through Facebook after having been converted to a mobile format. Data collection was conducted through online observations and interviews during the six cycles of implementation.

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Research Design

This research was planned to answer the research questions by following a qualitative paradigm and by analysing the data using a grounded action research method (Baskerville & Pries-Heje, 1999). During three university semesters, one cohort took part in a learning scenario where all the students accessed an SNS through their mobile phones. The three semesters were divided in six action research cycles as illustrated in Figure 2. Lessons learned from initial cycles guided the intervention conducted in subsequent cycles.

Figure 2: Six-Cycle Action Plan
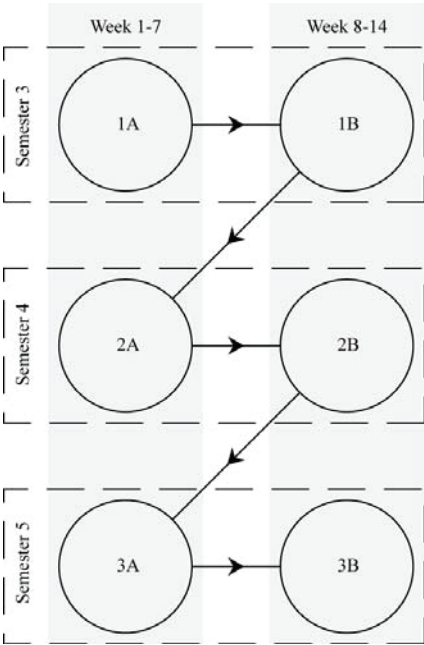
Sampling

As required in qualitative studies (Creswell, 2005), a purposive sampling method was utilised. In the present study, a theoretical sampling method was employed which was subsequently refined with a snowballing technique. Similarly to all nonprobability sampling methods, theoretical sampling assumes that not all respondents are equal. Indeed, the use of this

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sampling method implies that some respondents should be selected over others for their ability to provide relevant information at each step of the research. Such an approach was conducted by first inviting the whole cohort for group interviews. This cohort was composed of seventeen second year students pursuing a Bachelor degree in French studies in a Malaysian public university. The group interviews' analysis identified four students as expert informants due to the richness of their responses. These four students were subsequently invited for individual interviews, and were asked to propose other students from their cohort they viewed as knowledgeable on the use of social networking sites and mobile devices. The theoretical sampling method was applied in each cycle in order to respond to the evolution of the research. Consequently, a total number of ten students participated in individual interviews at various stages of the study.

Implementation

For each of the four courses in which this research was conducted, students had the opportunity to access course material and administrative information on the SNS. This use of the SNS as an LMS is similar to what Selwyn (2007), as well as Loving and Ochoa (2011) have described. Before course material could be delivered to the students' mobile devices through the SNS, it needed to be adapted. Previous surveys (Gabarre & Gabarre, 2009b, 2010a) of different cohorts of students' level of equipment had revealed that most mobile brought to the classroom were not able to open PDF files or Microsoft PowerPoint documents. As such these documents were converted to a format which could be opened by all mobile devices. A similar limitation encountered in a previous study (Gabarre & Gabarre, 2009a) was resolved by converting the course notes to animated images, as most phones were able to view them. The flaw of this designed resided in the students' lack of control over the animations. In the present study, the course notes were converted to images and organised in photo albums. These photo albums were uploaded to the SNS and organised according to the weekly progression of the French courses. Converting Microsoft PowerPoint files to photo albums was carried out in two steps. First, the presentation file was saved as a PDF document where each page of the document held one slide of the presentation. Second, the PDF document was converted to images in the JPG format. This was done from freely downloadable software such as Free PDF to JPG and on online sites such as pdf2jpg.net. When the newly

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created photo album was uploaded to the SNS, the students were informed of its availability through SNS notifications either on their computers or on their mobile phones when the relevant application had been installed.

Data Collection

The entire cohort of seventeen students was divided into four groups of four and five respondents. These groups were formed on the basis of students' affinity. Group interviews with the participants constituted the first source of information as they provided the researcher with rich data to answer the research question. Subsequently, and in an opportunistic sampling approach, four students were selected as participants for this research. They were selected on three criteria, (1) willingness to share their experience, (2) ability to clearly express their thoughts and opinions, (3) and capacity to bring insight on the research questions. The one-on-one interviews blended two techniques described by Flick (2009): semi-standardized interviews and expert interviews. By blending these two types of interviews, the researcher aimed to combine the advantages provided by each.

Data Analysis

As the study progressed through each cycle following the action research method selected, data was collected and analysed concomitantly. All data were analysed in light of the different challenges, setbacks, reflections and improvements encountered with mobile Facebook in each cycle. A two-level coding scheme adapted from Strauss and Corbin's (1990) grounded theory has been retained for the data analysis. To streamline the coding process the ATLAS.ti software was used. Open coding was the first step in data analysis after collection and transcription. It is at this stage that the researcher delved into the data and began to assign codes to segments of information. Different segments of data were analysed depending on the researcher's intent. Subsequent to open coding, axial coding was conducted on the data. Strauss and Corbin (1990) defined axial coding as "a set of procedures whereby data are put back together in new ways after open coding, by making connections between categories. This is done by utilizing a coding paradigm involving conditions, context, action / interactional strategies and consequences" (Strauss & Corbin, 1990, p. 96). The method of axial coding takes the codes created through open coding

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and networks them through relational links. As such, axial coding diagrams were constructed. These are presented in the Findings section along with description of the relevant themes which were identified.

FINDINGS

Findings revealed issues with the implementation which was corrected over time. Overall, students positively responded to the new platform of delivery. A working model describing learning a foreign language with Facebook on smart phones was constructed, and best practices guidelines were identified.

Findings are organised into four sections. The first section discusses the issues which were faced while implementing the new delivery system. The second section deals with mobile course material. The third section addresses delivery as an inherent function of m-Learning. Finally, the fourth section relates to delivery and the acceptance of technology. All four sections are illustrated with excerpts from the students' interviews. These excerpts are verbatim transcripts except for corrections to language use. All interview citations are presented with their ATLAS.ti references.

Issues with the Implementation

This study employed an action research method to root out problems in the implementation as they emerged. In the initial phase, issues with both mobile devices and the SNS were identified. Three problems were encountered with the smartphones. These were due to (1) network problems, to (2) the phones being too intrusive, and to (3) limitations of the devices. The issue of connecting to mobile Internet was reported as the main cause of problem to using the devices in the implementation. Students complained of poor 3G signals throughout the campus, and the unreliability of Wi-Fi signals. Such criticisms were in fact mentioned as pertaining to both laptops and mobile phones, since the former also mainly rely on these channels to access the Internet. To clarify this issue, several surveys of Wi-Fi and 3G signal strengths were conducted within the faculties, the residential halls and the canteens frequented by the students. Findings revealed inconsistent Wi-Fi signals throughout the campus, whereas 3G signals ranged from good to average. Such findings suggest that 3G should be favoured when a Wi-Fi

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signal is either not available or reliable. The theme of network problems is clearly depicted in this passage taken from the interviews:

> *And like they cannot like directly go online or maybe they need to find some area that has a Wi-Fi access… then… ah… it's a bit hard… But sometimes when we are in college… hmm… We don't have the… Wi-Fi.* **The Wi-Fi's line is terrible**. *We cannot go online.*
>
> <div align="right">(Valérie C1:4:197)</div>

Although this study aimed to understand how the implementation could improve the students' learning experience by harnessing the ubiquitous access to an SNS, it also revealed negative aspects of ubiquity. The ability to be contacted anywhere and anytime which the mobile phones provided was perceived by some students as too intrusive.

Issues of distraction in the classroom due to phones were reported. Students explained that they would be disturbed by others' phones whenever they would ring or even vibrate. Moreover, students complained of others replying to SMSs while in class. For them, this intrusion distracted their attention to the lectures. Such a theme was also identified by Campbell (2006) who advocated implementing classroom policies to regulate such issues. The following verbatim excerpts from the interviews illustrate the theme of mobile phones' intrusiveness.

> *Then… one of my friends,Nadège, her phone* **it keeps ringing and keeps vibrating for SMS**, *then suddenly… hmm… when the lecturer starts the lesson: "Okay, students we are going to start a new chapter", then ting-ting. The hand phone is ringing, then she answers very slowly, slowly, then… she starts… every time… she will… answer the SMS.*
>
> <div align="right">(Annaelle C1:1:83)</div>

The size of displays on mobile devices is not a new issue. Several authors (Kukulska-Hulme, 2007; Maniar, Bennett, Hand, & Allan, 2008) have reported on the difficulties of mobile learning imposed by the small screens available on mobile phones. Although a small screen is an inherent necessity for ubiquity, it poses a challenge to learning applications.

<div align="center">46</div>

Complaints were recorded that information downloaded from the Internetwas not always displayed as it was intended to on the phone's screen. On the other hand, computers did not exhibit the same flaw. Another argument in favour of laptops was the ability to easily install foreign language learning applications. Students complained of difficulties in finding mobile language applications for their studies.

> *I think the **display is too small** on the handset. I prefer it on the laptop.*
>
> <div align="right">(Henri C1:2:345)</div>

> *I still can log in, but then it's not everything… **I can't see everything** like what I see on the computer.*
>
> <div align="right">(Laurence C1:3:27)</div>

> *And sometimes **it's hard to find the application** for the language […] It's hard to find the right application. Then **it doesn't work**.*
>
> <div align="right">(Ariane C1:2:169)</div>

Mobile Course Material

Similarly to what has been demonstrated in other studies on MALL (Chinnery, 2006; Ros i Solé, et al., 2010; Uther & Ipser, 2012), mobile Facebook relies on smartphones to deliver learning content. However, instead of designing specific applications to deliver this information, an existing SNS is utilised. Facebook facilitates the delivery of course notes to the mobile phones, once they are converted in photo albums. The students' perception of this facet of mobile Facebook was extensively described during the interviews. An axial coding model was constructed by identifying the relationships between the themes identified at the open coding stage. This model describes the students' view of the delivery of lecture notes.

With the delivery of lecture notes in a mobile Facebook setup as the central phenomenon under investigation, the individualist learning theme was identified as the context. In the coding paradigm, the intervening condition was found to be the students' traditionalist learning view. As can be seen in Figure 3, the delivery of lecture notes caused the ease of access which had for consequence a perceived ease of learning. The themes used for the construction of this model are henceforth described.

<div align="center">47</div>
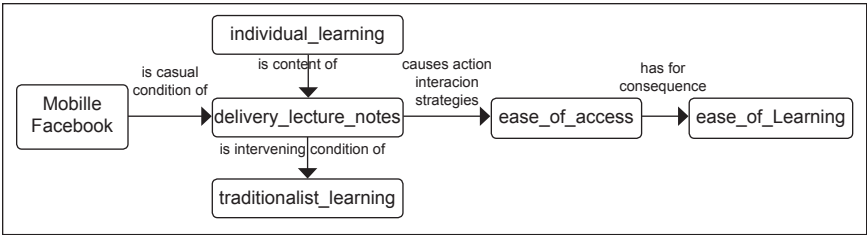
**Figure 3: Axial Coding Diagram of Delivery
of Lecture Notes in Mobile Facebook**

Individualist Learning

The data was first analysed through open coding to identify descriptive themes. These were subsequently combined into broader abstract themes. One such abstract theme was labelled as individualist learning which encompasses the themes of learning alone, learning with the Internet, and students' notes. This theme was identified as the context in which the delivery of lecture notes was conducted.

The learning alone theme was used to interpret all instances reported by the students of autonomous learning. In spite of the numerous instances where students reported enjoying studying with their peers to improve their French, five out of the seven students who were interviewed stated that they normally learned alone. The following excerpt depicts this tendency.

I learn best on my own, because I'm a very individualistic person. I don't know why. Maybe the situation and, and the students it's like that I don't know.

(Annaelle C2:2:133)

Grouped with the learning alone theme, the learning with the Internet describes the phenomenon where students source their information on the web. Under this label, this activity was conducted alone and served as an academic purpose. Students explained that they used the Internet to help them do their homework and to find information which helped them to learn French. For the students, the Internet is viewed as a primary learning tool. In this instance learning should be viewed in light of the learning/ acquisition distinction made by Krashen (2009). The following passage illustrates this theme:

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*Like conjugation sometimes it's pretty confusing, so there's **a site I found on Google**, like La conjugaison, and then everything is inside, so we just type in the word and everything will come out imparfait, conditionnel, everything.*

(Marie-Thérèse C2:7:138)

The students' notes theme was used to describe events narrated by the students when they compiled information from their lecture, from books, or from the Internet into their own notes. Although these notes are generally used to study prior to the exams, writing them also facilitates the process of memorising and understanding their content.

*My own notes is my notes after I understand all the things then I summarize it or do it in my own sentence, […] then **I jot down some important notes**, and then the days before exam… then I only revise again.*

(Nolwenn C2:1:214, 230)

Traditionalist Learning

The traditionalist learning theme stresses the importance of the course content provided by the lecturers as a means to learn. Similarly to the theme of individualist learning, this theme highlights an approach to learning which does not rely on the group. This theme was identified as the intervening condition which enabled the lecture notes to be viewed as essential to learning, notwithstanding their channel of delivery.

Within the traditionalist learning view, students rely on traditional methods and resources such as books and their lecturers. Students view the books as a reliable source of information which they value for the purpose of learning French. The following passage illustrates this view:

For general course, we always refer to the textbook if there's any.

(Sarah C2:6:182)

The learning formal theme was used to identify the phenomenon of learning in the classroom. Comforting the traditionalist learning view, this theme was used in instances where instruction was viewed as being predominantly provided by the lecturer. In this traditionalist view, the

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lecturer is viewed as the main source of information. However, students claim that for cultural reasons, they are often unable to request additional information from their lecturers. Consequently, questions are rarely asked. The following passage demonstrates this point:

> *Hmm, I'm not sure maybe the culture is like that. **We don't like to ask** […] Maybe **we feel shy** or maybe we're **scared of the lecturer**.*
>
> <div align="right">(Sarah C2:2:167-168)</div>

Moreover, in the traditionalist view of learning, questions were generally asked away from the group when the lecturer came to see individual students. A similar behaviour was observed by Bouvier (2003) and Shun-I Lui (2002) in traditional Asian settings. It is probable that students reproduced this cultural pattern on the SNS, and consequently, refrained from using the social media to post their questions. As a consequence, questions were not openly posted on Facebook. This is described in the following quote from a statement made by Annaelle:

> *Sometimes if they have a question, **they are not simply asking in Facebook**, right? They come to you, at your class, and then they will ask, right? Sometimes, I think that **we have to ask face to face not on Facebook**.*
>
> <div align="right">(Annaelle C2:2:104)</div>

Ease of Access

The ease of access which resulted from the mobile Facebook's delivery of lecture notes was highlighted during the interviews. Students justified this ease to the combination of mobile devices and the SNS. The portability of the mobile devices was a facilitating factor which enabled the lecture notes to be accessed anywhere. The following passages demonstrate this ease of access:

> *But I now just go online cause obviously I go to **Facebook every day** so whenever I go into Facebook and like this study week, I go to **Facebook and I study at the same time**.*
>
> <div align="right">(Marie-Thérèse C2:7:164)</div>

<div align="center">50</div>

Ease of Learning

The ease of access resulted in an ease of learning. As students could readily access their notes while in class, in the college or even while waiting for the bus, novel opportunities to learn appeared. Students explained that the delivery of lecture notes with the SNS on their mobile phones had made their learning experience easier. This is demonstrated in the following quotes taken from the interviews:

> *But, for these two courses it's **easier**, because **we just look at the slides** that are uploaded then we can just rely on these slides.*
> (Sarah C2:6:189)

Delivery through M-Learning

Following the seven weeks of mobile Facebook implementation, data from the interviews and the observations were analysed. During the open coding phase of the data, five themes related to m-Learning emerged. These were the location of use, the notion which distinguishes between the usage of laptops and mobile phones, recourse to the Monitor through the mobile device, the notion of ubiquity, and the theme of delivery of learning material. As can be seen in Figure 4, the theme related to choosing between a laptop and a mobile phone was related to location.
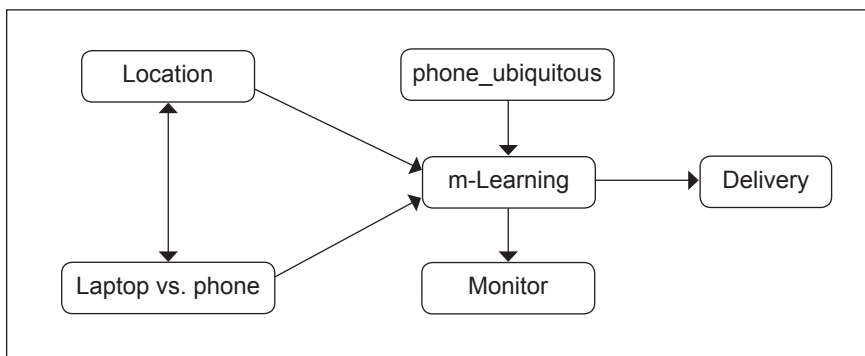

Figure 4: Open Coding Diagram of M-Learning in Mobile Facebook

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Location

It appeared that location was a determining factor in the choice of technology employed in m-Learning. Students reported that they would use their phones when in class, in transit to attend their class, or while in the cafeteria. Findings pertaining to location are in line with research conducted on m-Learning (Gikas & Grant, 2013). Undeniably, mobility is the key determinant distinguishing e-Learning from m-Learning. On the contrary, it was also reported that using smartphones to learn while on the bus was not feasible on campus due to the sheer number of passengers during peak hours. This is in contrast with the perception that commuting affords the opportunity to engage in phone related activities (Paragas, 2005). Moreover, the short commute time between the residential colleges and the faculties could justify the reported lack of prospects to conduct m-Learning activities while in the bus. Nevertheless, opportunities to access the lecture notes on the mobile phones presented themselves while students waited for their transport. This report does not infer that m-Learning was the sole activity which occupied students in these locations and moments. Indeed, students also used their phones to listen to music or play games. The importance of location is highlighted in the following excerpts from the interviews.

> *Every time I want to know about certain words, I would just use it… not necessarily in the class really, sometimes I was in the bus stop, and then I remember some words that I feel that I don't know the meaning, I will just search it.*
>
> (Zoé C3:1:246)

Selecting Between a Laptop and a Phone

Location is a key determinant for the choice of technology. Students explained that they used their laptops in the university's hostels. Due to the impracticality of carrying a laptop at all times, students resorted to leaving their computers in their rooms. In a research conducted across three universities in the United States, it was similarly reported that students find it "more convenient [and] hardly ever take [their] laptop to class"(Gikas & Grant, 2013, p. 21). As a matter of fact, impracticalities related to weight and finding a power outlet to recharge the device were justified as factors classifying laptops as portable rather than mobile. A majority of students

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return to their rooms whenever they have free time between classes. As such, this provides them with the possibility to access the SNS on a larger display. This information triangulates with previous findings from Cycle 1A pertaining to difficulties with mobile phones. However, the size of the screen was not the only issue as it was also reported that the photo album format for the lecture notes was not always practical on phones with a small memory capacity. On the other hand, new and contradictory information on the usage of mobile phones was brought forward during Cycle 2A. It was discovered that students such as Valérie and Annaelle, preferred to access the SNS and the course notes on their smart phones rather than on their computers. This is depicted in the following selected passages.

> *When revising for the test, I can lie on my bed and check with my phone. I downloaded all the notes to my hand phone so that I can just take it out and check on the notes and read them.*
> (Valérie C3:6:200)

> *I think for this semester I never used my laptop. To upload a video also, I'm using my telephone, it's very easy, and I don't need to look at the computer. For me, it's difficult if I'm using a computer, if I'm using a hand phone it's okay.*
> (Annaelle C3:8:64, 105)

The ease of using their mobile phones in several locations was related to the ubiquity of the mobile device. Moreover, due to the simplicity of accessing the course notes, students noted improvements in the way the course notes were delivered. Ariane explained that:

> *You open the pages for French, and you… open the presentation, and you read it, then you take note for it. Or you can download the presentation.*
> (Ariane C3:2:154)

Access to the Monitor

The third theme linked to m-Learning is access to the Monitor. This is directly related to Krashen's (2009) theory of second language acquisition and the Monitor hypothesis. Students reported using their mobile

devices to check on grammar rules and to verify the meaning of words in French. Recourse to the Monitor was not only executed by accessing the mobile course notes, but also by using the installed applications on the mobile phones. Students readily used the dictionaries and the conjugation application on their phones whenever they felt unsure of the correct French usage. Using dictionaries on mobile phones has long been identified as a prime activity in MALL applications (Godwin-Jones, 2005, 2011). The knowledge of the existence of a specific rule was a sufficient trigger to have recourse to the Monitor. This is seen in the reports offered by Valérie and Yolande:

> *Because sometimes, I will forget how to conjugate a verb like some irregular verbs which are not commonly used. I will forget it, so I will just* **check on it with my phone**.
>
> <div align="right">(Valérie C3:6:234)</div>

> *When we don't know automatically* **we will search the dictionary** *for the word that we don't know how to say in French. Then at the same time, we will improve our vocabulary.*
>
> <div align="right">(Yolande C3:7:173)</div>

Delivery and Technology Acceptance

The axial coding process was used to articulate several themes around the central phenomenon of delivery as presented in Figure 5. Delivery as a cause of mobile Facebook was observed in light of the difference between an LMS and an SNS. Students expressed their perception of these two methods of delivery. Consequently, issues pertaining to the features of the LMS were viewed as the intervening condition of delivery, whereas the phenomenon of compulsive SNS-Learning was identified as the context of delivery. Perceived ease of use was identified as the interactional strategy which had for consequence technology acceptance.
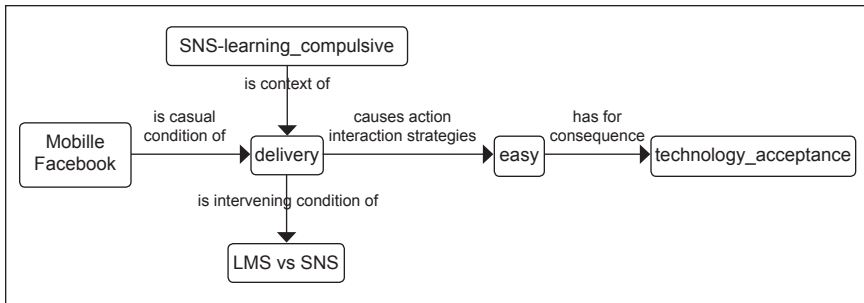
Figure 5: Axial Coding Diagram of Delivery and Technology Acceptance

LMS vs. SNS

As demonstrated in the literature review section, studies investigating the replacement of an LMS by an SNS emerged to compensate for the general shortcomings of the former. In several cases, an SNS was used to replace the LMS (LaRue, 2012; Meishar-Tal, Kurtz& Pieterse, 2012), while in others the SNS complemented the LMS (Chua & Choo, 2013; Kent, 2013). Although these studies revealed the imperfections of the SNS as an LMS, they demonstrated the feasibility of using an SNS in education in spite of such limitations. In the mobile Facebook implementation, data specifically pertaining to the LMS replacement with an SNS for course notes delivery concurred with these past studies. During Cycle 3A, students in the cohort were in their fifth semester. They had been exposed to the university's LMS from their first semester, and had expressed their dissatisfaction with its features on several occasions. These dissatisfactions were to some extent contributing factors in the genesis of the present study. The introduction of the mobile Facebook platform did not spell the end of these discontents, as students still used the university's LMS in their minor courses, in the university's compulsory courses, and in their other French courses which were beyond the scope of the implementation under investigation. The following passages relate the students' perception of the LMS as a delivery tool, and their comparison with Facebook.

*I think, the **LMS is not really functional**, because sometimes the lecturer posts something on it, and then **we cannot receive**. Everyone's got their own Facebook account, and then they almost*

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access to Facebook every day, so mostly they will download themselves, but not from the LMS.

(Valérie C5:3:151,156)

If I rate the speed, **Facebook is much, much faster than the LMS***, although there are a lot of applications, the speed is much better than the LMS.*

(Yolande C5:7:100)

Perceived Ease of Use

As remarked in the following passages, students revealed that they perceived the mobile Facebook platform as easy to use. These excerpts strengthen this theme which was first identified in Cycle 2A by focussing more specifically on issues of delivery. A continued perceived ease of use was expected, since the mobile Facebook implementation combined two delivery technologies which the students were already accustomed to using on a daily basis. In fact, the design of the mobile Facebook platform had been planned in order to incorporate tools which could emulate the features of the LMS without presenting the students with a steep learning curve. Perceived ease of use has been linked to both m-Learning and SNS-Learning. Liu et al. (2010) investigated the factors which determine the acceptance of m-Learning. They discovered that personal innovativeness, which is determined by a person's willingness to engage with a new technology, was a predictor of perceived ease of use. Through observations of the students' use of the mobile Facebook platform, it was assessed that from the cohort of seventeen students, only one student demonstrated a low level of personal innovativeness. This low ratio could in part justify the recurrence of the perceived ease of use theme in the data. With regard to the perceived ease of use of an SNS, the theme was encountered by Chang et al. (2014) in their study on Facebook. They discovered that "perceived ease of use was the primary factor that predicted whether users would continue using SNSs" (Chang et al., 2014, p. 1). Moreover, this theme was strongly correlated to usage attitude. Such findings comfort the observations conducted in the present study as well as the reports furnished by the students during the interviews. The following passage highlights the theme of perceived ease of use in relation to the concept of delivery:

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*I would say **it's more convenient and easy** for the students to use, because normally in LMS we have to download and it takes time, but if it's in **Facebook**, we can just click in the picture, then we can read. But with the LMS we have to download, and then we have to open.*

(Marie-Thérèse C5:2:176)

Technology Acceptance

Previous research on the technological acceptance model has linked perceived ease of use to the continued intention of using a technology (Venkatesh, Morris, Davis & Davis, 2003). As ease of use was sought in the design of the mobile Facebook platform, it was anticipated that students would readily embrace the personal tools which were already dear to them. However, in light of the connectivity problems and the numerous issues which had been identified in the first cycle, it was not expected that students would unreservedly favour the mobile Facebook platform over the university's LMS. Findings from Cycle 3A stress the students' technological acceptance of the mobile Facebook implementation over the LMS which they concomitantly used. These findings contradict Lui et al.'s (2010) report that ease of use was not correlated to the intention to use the technology. However, findings from the present study concur with the accepted models presented by Legris et al. (2003) as well as Li et al. (2008) which link perceived ease of use to technology acceptance. More specifically in the field of m-Learning, Cheng's (2014) findings concur that perceived ease of use is the main factor which predicts intent to use. The following passage provides evidence of this acceptance.

*Facebook, I can, I can, **I can access Facebook through my phone**, but the LMS, I cannot access through my phone, so **I think Facebook is better** than the LMS.*

(Ariane C5:10:159).

DISCUSSION AND CONCLUSION

Improving the students' experience with the distribution of learning material was one of the main purposes of this study. Findings illustrated in Figure

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3 and Figure 5 reveal the perception of delivery in the mobile Facebook implementation. In the first axial coding model, delivery is linked to both individualist and traditionalist learning behaviours. Delivery was interpreted in the context of individualist learning, as students accessed the lecture notes on a personal device. Traditionalist learning was interpreted as the intervening condition, as students valued information provided by their lecturers, as well as printed material. In the second axial model, delivery on the mobile devices is viewed in the context of compulsive SNS-Learning, and the intervening condition of using the SNS as opposed to the LMS. Compulsive SNS-Learning was identified as a process resulting from the notifications received on the students' mobile devices each time new lecture notes were uploaded. This caused the students to instantly view the lecture notes as soon as they were available. Such a system was frequently contrasted to the delivery of lecture notes on the LMS, where students were not aware of the availability of new material. In both axial models, delivery on the mobile devices facilitated access to the learning content as students deemed this channel easy and convenient. This resulted in perceived ease of learning, since access to the Monitor was simplified, and in the acceptance of the technology to learn a foreign language.

The first research question focussed on improvements in terms of distribution of learning material. Regarding distribution of learning material, the mobile Facebook platform served its purpose efficiently. As students compared the university's LMS with Facebook and their mobile devices, they noted the advantages of the new system over the previous one. Delivery was associated with a perceived ease of access, ease of learning, and the technological acceptance model as defined by Venkatesh et al. (2003). Notifications received on the students' mobile devices alerted them of changes on the SNS which they promptly accessed. Although issues were described pertaining to the delivery of multimedia documents, such complaints remained minor in comparison to the difficulties reported in accessing the LMS. During the interviews, it was noted that students mainly perceived the delivery of learning material as initiated by the lecturers. Although less frequently, students also initiated this delivery by sharing documents and links in the SNS. In the present study, learning material was not restricted to documents shared by the lecturers and the students. Indeed, learner-created material was shared and reviewed on the mobile Facebook platform. Students explained that they viewed videos created by their peers

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as documents which enabled them to improve their language proficiency. However, students did not assimilate the sharing of such documents with a form of delivery, even though they accessed them on their mobile devices. This view may be explained by the fact that the university's LMS did not enable students to upload documents to the platform. As such, students only perceived delivery as a feature which could be associated with the previous LMS.

The second research question sought to identify the processes which foreign language learners underwent as they used the mobile Facebook setup. Several processes were identified as the students used the mobile Facebook platform. These may be divided into conscious language learning processes and unconscious language acquisition processes. One learning process reported included when students deliberately switched the environment's language of their SNS. Student reported that by immersing themselves in the language, they would benefit from additional exposure to French. A study on the impact of the environment's language of an LMS revealed that using the target language did not have a significant impact on learning (Melton, 2006). Nonetheless, students claimed that by navigating Facebook in French they were able to learn new terms related to the SNS. Increased exposure was not the sole reason for switching the environment's language. Students explained that as French language students they wanted to have as many items in their lives which would be related to France and its language. This was achieved by purchasing phone cases featuring the Eiffel tower, carrying bags and wearing clothes with French text on them, and having Facebook in French.

Another process which the students reported on several occasions was related to learning while having fun. Students explained that using Facebook to learn French was entertaining. Consequently, the use of the SNS was widely accepted in the French language courses. The purpose of this grounded action research was to provide the students with an optimal learning environment which would improve on the previous situation. Enjoyment to use the SNS as an LMS was a strong intrinsic motivator to frequently log into their network and connect with their peers. However, such motivation was primarily reported with the SNS-Learning component of the mobile Facebook implementation. The m-Learning component was not viewed in the same fashion, as reports of enjoyment with the mobile

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technology were less frequent. This does not imply that m-Learning was perceived negatively. It merely indicates that SNS-Learning was more readily connoted with feelings of enjoyment.

Learning was also evidenced as students received SNS notifications on their mobile devices. In most instances, these were immediately read and led to the students accessing the French language lecture notes. These notes were not only accessed at the moment of their delivery. Indeed, students were observed reviewing such information while completing tasks in the classroom. In such instances, students had recourse to the Monitor to verify their knowledge of the grammar rules before communicating on the SNS. Such access to the Monitor in a MALL perspective was influenced by location, time, availability of networks and devices at hand.

The third research question dealt with difficulties encountered in the mobile Facebook scenario. Difficulties were primarily identified during the diagnostic and introductory cycles of the implementation. Issues which could be corrected were dealt with; those which were beyond the scope of this study were accommodated. Difficulties encountered in the mobile Facebook setup were constantly monitored in all cycles of intervention. These issues were primarily related to the use of the two technologies. Regarding the use of the SNS, students mainly complained of issues of privacy. These issues were resolved when the online course migrated from a Facebook page to a Facebook group. The researcher as an instructor having previously employed LMSs in his teaching perceived the absence of specific educational features. Such features which were absent were the lack of integration with computer-corrected exercises, or the ability to track student's progression. However, problems related to pedagogical inadequacies of the SNS were not reported by the students.

Since the end of the data collection phase of this study, other cohorts of French students have benefited from a mobile Facebook implementation. The positive aspects of this approach have led to the adoption of this method for all courses taught by the two lecturers involved in the present study. Until a new approach is identified, mobile Facebook will remain the model of choice for enhancing the students' French language acquisition experience.

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Investigating the Acceptance of e-Learning among Agricultural Undergraduates

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ABSTRACT

The usage of Information and Communication Technologies (ICTs) has been widely used in educational development. As the facilities of ICTs developed, the new tools of learning have been discovered. The online learning or e-learning is a method of delivering knowledge using electronic media. E-learning has offered many advantages to the students such as more flexible learning environment as it could be anywhere, not specifically on physical class anymore. In addition, e-learning is different from the traditional learning in terms of delivery method where e-learning utilizes the Internet and Web 2.0, while traditional learning environment required the instructor, a textbook and any additional support materials. However, it is important to investigate the acceptance of e-learning among the students. The issues faced by the students during e-learning implementation should be discovered. Therefore, this study is conducted to investigate the acceptance of e-learning among agricultural students in UiTM Pahang. The data were gathered from the students from the Faculty of Plantation and Agrotechnology in Universiti Teknologi MARA (UiTM) Pahang using online questionnaire. The data were analysed descriptively using the Microsoft Excel 2010. The reported findings might be of interest to academics, administrators, and decision-makers involved in planning, developing and implementation of future e-learning activities.

Keywords: *Acceptance; Agricultural Students; e-learning; Investigating*

INTRODUCTION

Traditional learning has been implemented years ago for teaching and learning. The traditional teaching and learning approach focuses on face to face meetings and total organizational control over the process. Traditional lectures offer opportunities to inspire and motivate students, but one should not make mistake of assuming that students immediately understand and learn whatever the instructor says and puts on the board. Furthermore, some instructors are not aware of their students and keep focusing on the content rather than on what they are saying about the content.

Although the acceptance of e-learning is increasing, there are many traditional faculties that use e-learning as a supplementary to the traditional ways of learning. Most of the faculties still reluctant to abandon the traditional ways of teaching (Radović-Marković, 2010).

The e-learning is commonly referred to the intentionally use of networked information and communications technology in teaching and learning. There are numerous other terms used to describe this mode of teaching and learning such as online learning, virtual learning, network and web-based learning and also distributed learning. Basically, it refers to the educational processes that utilize the information and communication technology to facilitate learning and teaching activities. This type of learning is a method of delivering knowledge using electronic media.

E-learning allows students to participate regardless of geographic location, independence of time and place. It has progressed where students no longer need to meet face-to-face in order to complete their study programme or a course.

Since 2009, blended learning delivery mode has been initiated in Universiti Teknologi MARA (UiTM), whereby teaching and learning processes can be conducted combining face- to-face lecture sessions with e-learning slots. By opting to this new delivery method, at least 30% of course contents need to be delivered to students using e-learning practices. This study focusing on assessing acceptance of e-learning practices among students in Faculty of Plantation and Agrotechnology in UiTM Pahang. The reason for agricultural students were chosen in this study is, by referring to

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the data obtained from System Management Unit, i-Learn Centre, UiTM, statistical data of blended learning deliver mode registration from 2013 shows that only minimum number of courses has been registered from the faculty.

The Faculty of Plantation and Agrotechnology is a new faculty that has been created to play a vital role in producing well-trained professionals in all areas of agriculture and related fields in the country. Faculty of Plantation and Agricultural Technology, UiTM Pahang was established in 2010, in parallel with the establishment of the Faculty in the Main Campus. There are two courses offered under the Faculty which is Diploma in Planting Management and Bachelor of Science (Hons.) Plantation Technology and Management.

LITERATURE REVIEW

Globokar (2010) stated that there is some truth to the belief that online learning can save time relative to traditional coursework, but this "time saved" is limited to the elimination of commute. The traditional class might entail a commute of an hour or longer but with online classes it may require only five minutes of preparation to make sure that the computer and internet connection is well established.

According to Reid (2005), before effective learning can take place it is necessary for the learner to read the requirement of the task, understand the task/ information being presented, to recognize what the task, or the information is suggesting, to identify the key points in the task/ information, to implement the task/ use the information, to become efficient in accessing the information and carrying out the task and to be able to transfer the new learning to other learning tasks.

Learning Styles

There were no two students that learn in the same way. The instructors in traditional face-to-face classes are limited in the extend to which they can tailor instruction to individual learning styles. According to Globokar (2010), online learning or e-learning increases flexibility and also supports

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students's ability to adapt their study habits to the ways in which they prefer to process information.

In addition, students can vary in the ways that they prefer to receive information. There are four common learners namelyVisual learners that most easily comprehend information that they can see, whether in the form of written words or presentations, charts and figures, Auditory learners that do well at processing information that they hear, Kinesthetic learners that prefer to learn by doing and lastly the Tactile learners that prefer "hands on work" such as building models or doing laboratory experiments.

Student's Acceptance

According to a study conducted by Lee at al., (2009), as the service quality of e-Learning improves, the learners tend to be positive towards e-Learning. E-Learning providers can enhance e-learning services as web technologies advance without additional costs by taking advantage of the declining cost of technologies which can result in greater adoption by learners. Besides, the usefulness can be enhanced by providing great services without increasing the complexity of the e-Learning process.

Radović-Marković (2010) conducted an interview to study the acceptance of e-Learning in Serbia and it was found that majority of the interviewees think that online learning is an alternative method of learning. However, the computer literacy is actually the most significant for online learning. Besides, half of the respondents think that they prefer to have discussions with colleagues and instructors through face-to-face methods.

According to Yung and Cornelius (2004) cited by Song (2010) in his report, students were examined with positive and negative experiences regarding the quality of online learning. According to the results, factors that contributed to students positive experiences were flexibility, cost-effectiveness, electronic research availability, ease of internet connection and well-designed class interface. However, the factors that contributed to the negative experiences were delayed feedback from instructors, lack of self-regulation and self-motivation, the sense of isolation, monotonous instructional methods, and poorly-designed course contents.

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Pros and Cons of e-Learning

According to Richardson and Swan (2003) cited by Inoue (2007), there are six (6) advantages offered by online learning environments, namely:

1. Convenience and flexibility are offered by "anytime, anyplace, anywhere".

2. Accessability means that students have access to courses and course materials "24 hours a day (time independent), regardless of location (place-independent)", making them far convenient than the traditional educational experience.

3. Asynchronous learning allows students to reflect upon the materials and their responses before responding, unlike traditional classroom.

4. Students can work at their own pace, which is especially important for non-native speakers.

5. The ability of personal identities to remain concealed means that all students, regardless of race, gender, disability, or appearance are on equal ground.

6. With the option of multiple representations of a concept embedded in an online course, students can store and retrieve information more effectively.

Besides much advantages offered by online learning, there are few disadvantages such as online learning environment is not as effective as traditional learning because of the lack of face-to-face interactions or rapport. At the same time, students will feel disconnected from their classmates because of the lack of facial and vocal expressions and other features common to traditional classroom environments including direct communication and feedback.

Kirtman (2009) in her study stated that although therehave been attempts to vary the instructional methods used, most of the online sessions are best suited for visual learners. Furthermore, for online learning, there

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was no way to know exactly how much time (more or less) was spent on each of the topics. Some online students may have just completed enough work to complete the online assignments but may not have gone beyond those tasks.

METHODOLOGY

Instrument Construction

The purpose of this study is to investigate the acceptance of e-learning approach among the agricultural students in UiTM Pahang. Closed questionnaire items such as the demographic profile of the respondents, users' view on blended learning approach, and online environment to support the online teaching and learning were addressed. The measurements for close - ended questionnaire were structured using the 5-point Likert scale; according to the degree of agreements, 5 for strongly agree and 1 for strongly disagree. At the same time, the respondents were also allowed to give their views and recommendations in the open-ended question.

The questionnaire was divided into five sections. The first section was the demographic profile of the respondents. The computer and internet facilities used during completing the respondents e-learning tasks was asked in the second section. Then, followed by the users' view on blended learning approach. The online environment to support the online teaching and learning was asked in the third and fourth section of the questionnaire. In the last section, the respondents were allowed to give their views and recommendations in the open-ended question. The measurements for close-ended questionnaire were structured using the 5-point Likert scale; according to the degree of agreements, 5 for strongly agree and 1 for strongly disagree. Some of the questions were asked in the form of multiple choices.

Data Collection

The questionnaires were distributed via Google Forms to all Diploma and Bachelor's degree students of the Faculty of Plantation and Agrotechnology in UiTM Pahang during the December 2014-April 2015 semester (Diploma program) and during March 2015-June 2015 semester (Bachelor's degree program). The total number of respondents answered

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the questionnaire was 140 out of 400 students. Most of the students have been using i-Learn at least once in the courses they registered.

The data obtained from the questionnaire were analyzed using the Microsoft Excel 2010. Descriptive analysis such as mean and percentages were used to investigate the factors that influence the acceptance of both diploma and degree students towards the implementation of e-learning approach in UiTM Pahang; to assess the users' views on i-Learn portal as the platform for blended learning and to discover the benefits they found when teaching and learning sessions are being conducted using e-learning approach.

Data Analysis

Demographic Profiles

Students' Demographic Profile
Table 1 represents the descriptive statistics of the respondents' profile. This study indicates that 68 (48.57%) female and 72 (51.43%) male students have completed the questionnaire. A total of 121 respondents was identified as students from the Diploma in Planting Management (AT110) and another 19 respondents were Bachelor's Degree (Hons.) in Plantation Technology and Management (AT220) students in UiTM Pahang. Out of 140 students, 85.71% of them claimed that they do have internet at home. It shows that majority of the students have the access to internet easily that could support the implementation of the e-learning approach.

Table 1: Descriptive Statistics of Respondent's Profil

Measure	Items	Frequency	Percent
Diploma:	Part 1	43	30.71%
	Part 2	50	35.71%
	Part 3	2	1.43%
	Part 4	24	17.14%
	Part 5	2	1.43%
Bachelor Degree:	Part 6	19	13.57%

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Students' View on e-Learning Approach

Table 2 shows the students' perception towards the implementation of e-learning approach in their learning activities at the university. From the findings, it shows that 80.72% students agreed that e-learning provides flexibility to students in terms of their needs which enable the students to study whenever and wherever they want to, and e-learning also helps the students to prepare well for class sessions as they could download notes and do their assessments online easily from i-Learn portal. These two items share the highest mean score (4.09) compared to other items.

Nevertheless, the students felt that they are uncertain whether the e-learning approach would be more effective than traditional approach (full time face-to-face) with a mean score of 3.11. Probably the students are not very much exposed to the implementation of e-learning because sometimes it depends on the lecturers who teach them who would probably prefer to use more traditional approach rather than online approach in certain subjects.

Table 2: Students' View on e-Learning Approach

	Items	Percentage					
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean
1	E-Learning provides flexibility to students in terms of their needs (enabling students to study when they choose to)	0.71%	2.86%	15.71%	47.86%	32.86%	4.09
2	E-Learning helps students to prepare well for class sessions(eg: download notes and assessments)	0.00%	3.57%	22.14%	36.43%	37.86%	4.09
3	E-Learning decreases costs for individual students (printing)	0.71%	2.14%	25.71%	32.86%	38.57%	4.06
4	E-Learning approach supports flexibility of learning styles for students	0.71%	5.00%	18.57%	44.29%	31.43%	4.01
5	E-Learning encourages self-learning to students	0.71%	4.29%	22.14%	47.86%	25.00%	3.92
6	The lecturer helps to guide when using E-Learning	0.00%	5.00%	25.71%	57.14%	12.14%	3.76
7	E- Learning supports ideas and experience sharing amongst students	1.43%	5.71%	22.14%	58.57%	12.14%	3.74
8	E-Learning helps students learn better	1.43%	11.43%	20.00%	49.29%	17.86%	3.71

9	E-Learning supports ideas and experience sharing amongst students	0.71%	6.43%	22.86%	60.71%	9.29%	3.71
10	E-Learning increases interaction levels between individual students and the lecturer outside class	1.43%	8.57%	24.29%	53.57%	12.14%	3.66
11	E-Learning approach encourages students to participate in the discussion(reduce inhibition)	1.43%	8.57%	27.14%	50.71%	12.14%	3.64
12	E-learning increases opportunity for discussion amongst students and lecturers	2.14%	7.86%	32.14%	42.86%	15.00%	3.61
13	E-Learning supports close relationship between students and lecturer	2.86%	6.43%	31.43%	51.43%	7.86%	3.55
14	Students receive enough online feedback from lecturer	0.71%	7.86%	35.00%	48.57%	7.86%	3.55
15	E-Learning increases the study workload for students	3.57%	18.57%	33.57%	37.86%	6.43%	3.25
16	E-Learning approach would be more effective than traditional approach (full time face-to-face)	10.71%	19.29%	24.29%	40.00%	5.71%	3.11

Students' View on i-Learn Portal as Platform for e-Learning

Table 3 indicates the students' view on i-Learn portal as a platform for e-learning in UiTM. 82.14% students agreed that the notes in i-Learn portal are useful to them in the teaching and learning process. The reason could be because lecturers from other UiTM campuses who teach the same course can also place the notes in the i-Learn portal. Thus,the notes can be reached easily by the students in the portal. Not only that, majority of the students claimed that i-Learn portal is user-friendly and easily to access (mean score = 4.07). However, most students felt unsure whether they faced any technical problems when they got accessed into the i-Learn portal (mean score = 3.13).

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Table 3: Students' View on i-Learn Portal as Platform for e-Learning

	Items	Percentage					
		Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	Mean
1	Notes in iLearn portal help in teaching and learning process	0.00%	2.14%	15.71%	51.43%	30.71%	4.11
2	i-Learn portal is user friendly portal	0.00%	2.86%	17.86%	48.57%	30.71%	4.07
3	The instructions provided on the i-Learn portal are easy to follow	0.00%	2.86%	19.29%	52.14%	25.71%	4.01
4	Monitoring tools in i-Learn portal helps in tracking the participations of students	0.00%	2.86%	18.57%	56.43%	22.14%	3.98
5	i-Learn portal is easy to access		5.00%	17.86%	52.14%	25.00%	3.97
6	Functionalities (group forum, course materials, etc) provided on the i-Learn portal is sufficient for BL	0.00%	6.43%	17.86%	55.00%	20.71%	3.90
7	No technical problems when accessing the i-Learn portal	10.00%	15.71%	34.29%	31.43%	8.57%	3.13

CONCLUSION AND RECOMMENDATION

From the earlier findings and discussions, it can be concluded that majority of the students under the Faculty of Plantation and Agrotechnology at UiTM Pahang perceived that the implementation of e-learning approach is beneficial to them. From the recommendations given by the students, 67.14% of them prefer to have a balanced mixture of online learning and face-to-face learning time as mostly practised in UiTM at the moment, followed by 21 (15%) students who prefer the traditional teaching with no online learning, 14 (10%) students would like to spend more time using online and have less face-to-face lecture session, and only 11 (7.86%) students prefer to have 100% online for learning and teaching process.

From the results, it is best to say that online learning gave more benefits to students such as time flexibility, notes are easier to be downloaded and viewed and also save money for printing. However, among the factors that contribute to the success of e-learning is the facility provided to the students, such as internet access facilities. Besides, the lecturers need to give a clear instructions and a transparent assessment in evaluating online quizzes and tests. However, the lecturer should identify the weaknesses of

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the students and their learning style, especially the slow-learner to ensure that no student is left behind.

In addition, to support e-learning practices in teaching and learning processes, variety of online learning materials and tools can be used to deliver content and conduct assessment of the courses such as online quizzes and games, demonstration videos on practical skills, and online discussion and consultation on selected topics. These practices need online pedagogical skills of the instructors in ensuring e-learning is successfully implemented and fulfils the course learning outcomes.

Further studies related to e-learning should be extended in the future in order to find out on the students' performance in their quizzes or tests as a result of using e-learning. It is also suggested to conduct some surveys on students from other faculties in order to compare the students' perception and academic performance among faculties in UiTM Pahang in particular and UiTM in general. A larger sample size is recommended for future study as the number of e-learning users in UiTM Pahang will keep on increasing from time to time.

ACKNOWLEDGMENTS

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Predicting User Acceptance of e-Learning Applications: Web Usage Mining Approach

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ABSTRACT

The successful implementation of e-learning applications is closely related to user acceptance. Previous studies show the use of log files data in the web usage mining to predict user acceptance. However, the log files data did not record the entire behaviour of users who use the e-learning applications that are embedded in a website.Therefore, this study has proposed the web usage mining using Tin Can API to gather user's data. The Tin Can API will be used to track and to record user behaviours in e-learning applications. The generated data have been mapped to the Unified Theory of Acceptance and Use of Technology (UTAUT) for predicting of user acceptance of e-learning applications. From regression analysis, the results showed the performance expectancy and effort expectancy were found directly and significantly related to the intention to use e-learning applications. Behavioural intention and facilitating conditions also were found directly and significantly related to the behaviour of use of e-learning applications. Thus, the approach of web usage mining using Tin Can API can be used to gather usage data for predicting user acceptance of e-learning applications.

Keywords*: E-learning, user acceptance, UTAUT model, web usage mining*

INTRODUCTION

The term of e-learning has been used to explain instructional content or learning experience delivered or enabled by electronic technologies (Downes, 2005). Another definition of e-learning is the use of telecommunication technology to deliver information for education and training (Sun et al., 2008). E-learning offers a more flexible way of learning without depending on the time and place for learning sessions to occur. The increased use of e-learning among learners and teacher has led to a change in the learning environment. The use of e-learning applications in website is one way to conduct online education by distributing materials, and learning process through the Internet. However, if e-learning applications are unattractive and did not meet user requirements, learners and teachers possibly will not use it (Bang et al., 2014; El-seoud et al., 2009; Maldonado et al., 2011; Priego, 2010). Therefore, one of the main goals of e-learning applications developer should have to ensure user acceptance. This is because, user acceptance is an important factor of successful e-learning applications. Prior to this, there are studies that use log files to predict user acceptance. Even so, when students access the e-learning applications that are embedded in a website, the log files did not record the entire data of user behaviour who use it. Therefore, the lack of data causes the difficulty to predict user acceptance.

In previous study, the use of Tin Can API for web usage mining in e-learning applications on the social network is discussed. The Tin Can API can be used to track the behaviour of students who use e-learning applications that are embedded in a website. However, the study of web usage mining using Tin Can API for predicting user acceptance of e-learning applications is not done clearly. The objective of this paper is to design and propose a model for predicting user acceptance of e-learning applications using web usage mining approach.

RELATED WORK

E-learning

The use of technology to deliver learning programme and training is a field that is closely related to e-learning. Typically used to describe media

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such as CD/DVD-ROM, internet/intranet, audio/video and mobile learning. The computer and network-enabled transfer of skills and knowledge are the examples of e-learning. According to Hrastinski (2008), e-learning should be defined basically as learning and teaching facilitated online through technologies of the network. Learner motivation is also related to the actual use of tools and contributing to the interaction in learning situations (Giesbers et al., 2013). According to El-seoud et al. (2009), the increase of learner motivation is also based on a factor as interactive features of e-learning applications. E-learning applications can be a small program such as micro-learning, mobile learning or embedded program in the website.

User Acceptance

Previously, user technology acceptance on e-learning has been examined widely. There have been various theories that have been published by researchers from the social-psychology that may help to describe the use of information and communication technologies. These theories include the Theory of Reasoned Action (TRA) by Ajzen et al. (1980), the Technology Acceptance Model (TAM) by Davis (1985) and the Theory of Planned Behaviour (TPB) by Ajzen (1991)1985, 1987. Research by these authors generated various adoption metrics or instruments that can be used to predict user acceptance.

Investigation of various research approaches for measuring user acceptance in e-learning was perceived that the majority of them have used questionnaire technique for collecting data. There have been few studies into user acceptance using web usage mining. Dasgupta et al. (2002), in the study of user acceptance of e-collaboration technology has been using data log file, such as: performance of users of the system, the total usage of the system, and usage of file exchange capabilities within the system. The study was conducted on a Courseware Management Tool. Meanwhile, Ma and Yuen (2011) have been used log files data based on eight different activities in Interactive Learning Network to predict user acceptance. Among those activities were viewing community announcement, enrolling in the course module, uploading assignment, modifying my profile/my folder, entering the discussion forum, scheduler/calendar, and total log. However, the study did not examine user acceptance of e-learning applications that are embedded in a website.

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UTAUT Model

A unified model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), has been designed specifically to unite together all the different models previously. This model can describe individual technology acceptance decisions across a wide range of information technologies and user populations (Venkatesh et al., 2003). It is formulated as a unified model that integrates the element through eight models in the literature that included the Theory of Rational Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model (MM), the Theory of Planned Behaviour (TPB), the theory combined with TPB and TAM (C-TAM-TPB), the Model of PC Utilization (MPCU), an Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT). The UTAUT was formulated with four core factors of intention and usage: performance expectations, effort expectations, social influences, and facilitating conditions. There are four moderators of key relationships: age, gender, computer experience and voluntariness. The UTAUT model was strong in predicting intention and use behaviour. It also contains relevant factors to explain intention and use behaviour. However, most of the studies adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) on user acceptance of e-learning are based on quantitative research.

Web Usage Mining

Web usage mining is a type of web mining. It is the process of applying data mining techniques to the discovery of significant patterns from data generated from interaction of client-server on the web. The information about users' behaviours and their usage patterns are made known through web usage mining (Han et al., 2012). Mining information from web usage data also enables the prediction of user acceptance in e-learning is done. The process of web usage mining can be separated into four different phases: data preparation, pre-processing, pattern discovering, and pattern analysis (Han et al., 2012; Singh & Singh, 2010). There are three main sources for log file in web usage mining: web servers, proxy servers, and web clients (Hu et al., 2002). One method to get the data is to use the Tin Can API. This method enables the tracking of user behaviour in e-learning applications that inside the website is done.

Tin Can API

Tin Can API or experience API (xAPI) is an e-learning software specification developed by Advanced Distributed Learning (ADL) and Rustici Software (Del Blanco et al., 2013). Tin Can API can track and record all types of experience in e-learning applications. The students' behaviour is recorded in the Tin Can statement as learning data. The Tin Can statement will be stored in the Learning Store Store (LRS), which exist in the Learning Management System (LMS), or by itself. The in-depth reporting and analysis on learning activities can be done through the LRS.

Proposed Model for Predicting User Acceptance of E-Learning Applications

The proposed model for predicting user acceptance of e-learning applications is shown in Figure 1 below. The model and construct definition was based on UTAUT (Venkatesh et al., 2003).
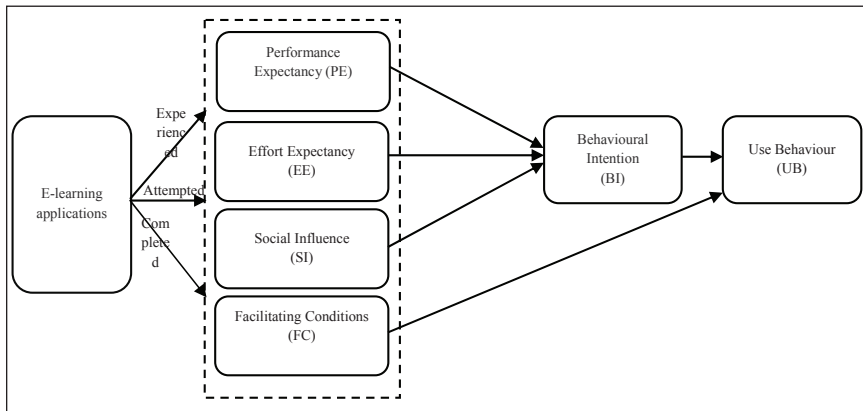

Figure 1: Proposed Model

Referring to this model, learning data such as: "experienced", "attempted", and "completed" from the use of e-learning applications will be achieved. Subsequently, learning data were mapped on four core determinants of *behavioural intention*, and *use behaviour*, namely: *performance expectancy, effort expectancy, social influence,* and *facilitating conditions*. Originally, there were four moderators that can affect constructs in UTAUT model: *gender, age, experience,* and *voluntariness of use*.

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However, all moderators were removed in this study. This is because researchers assume it does not affect the construct because the development of e-learning applications was specifically for learners who will be tested. Previous studies have shown almost all the moderators not much affect the constructs (Jairak et al., 2009; Sundaravej, 2003; Wang et al., 2006). The definitions of construct in the proposed model are explained as below:

Performance expectancy is defined as the degree to which an individual believes that using the e-learning applications will help him or her to attain gains in reaching learning goals. *Performance expectancy* would influence the *behavioural intention* of the individual to use e-learning applications. It is reasonable to predict that the higher the level of the individual believes that the application of e-learning is useful for learning, an individual will intend to use e-learning applications.

Effort expectancy is defined as the degree of ease associated with the use of e-learning applications. *Effort expectancy* would influence the *behavioural intention* of the individual to use e-learning applications. It is logical to predict that the higher the degree of ease of using e-learning applications, an individual will intend to use e-learning applications.

Social influence is defined as the degree to which an individual perceives that important others believe he or she should use the new systems. *Social influence* would influence the *behavioural intention* of the individual to use e-learning applications. It is reasonable to predict that, if an individual perceives that important others believe he or she should use e-learning applications; he or she will intend to use e-learning applications.

Facilitating conditions is defined as the degree to which an individual believes that an organizational and technical infrastructure exist to support for the use of e-learning applications. This construct is direct determinant of use behaviour. *Facilitating conditions* would not influence the *behavioural intention* of the individual to use e-learning applications. However, it is logical to predict that the existence of an organizational and technical infrastructure that support e-learning applications influenced an individual to use it.

Behavioural intention is defined as the degree to which an individual has expressed conscience plans to perform or not perform some specified

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future behaviour. In this study, *use behaviour* will be influenced by *behavioural intention*. It is reasonable to predict that individuals who intend to use e-learning applications in the future will use it after the first attempt.

METHOD

Background

The participants were 24 students from Form Six in a secondary school. They were chosen without taking into account factors like sex and computer experience. They learnt the subjects of *Pengajian Am STPM*. This subject is compulsory pass for each student. In addition of classroom learning, they also used e-learning applications that are embedded in the subject website of *Pengajian Am*. Therefore, the development of better e-learning applications was essential to increase the understanding and performance of students. The research on the user acceptance was important for e-learning applications. In this study, e-learning applications for the *Pengajian Am* subject were developed to measure user acceptance. The period of data gathering for the use of e-learning applications was about one month.

Data gathering, preparation and pre-processing

Advantages of today's technology allow learners' interaction that can be detected through the use of e-learning applications integrated with the Tin Can API. The use of the Tin Can API enables tracking of learning experiences, including conventional learning data, such as scores, or completion of the task. In this study, the Tin Can API was used to gather the learning data for web usage mining. It can record learners' interaction such as content navigation, reading notes, or answering quiz questions. The statements of experience will be delivered to and stored in a Learning Record Store (LRS).

Figure 2 shows how the gathering of learning data. Learners access the e-learning applications that are embedded in a website. Then, learner experiences using learning applications recorded in Tin Can statements. These statements were delivered and stored in the learning record store (LRS).
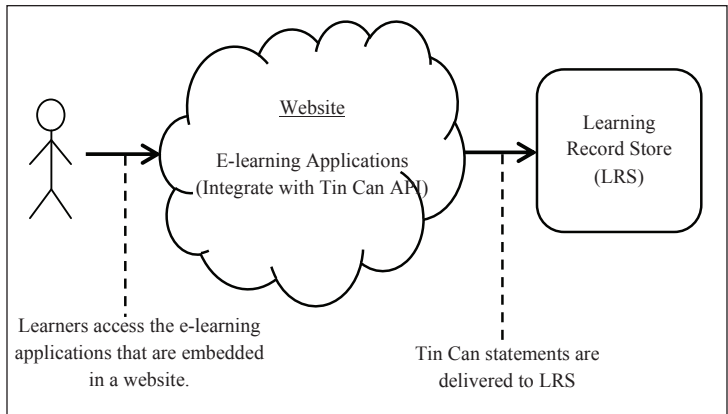
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Figure 2: The Flow of Data Gathering

Tin Can statements format was based on activity types, and activity streams (Actor, Verb, and Object). The examples of activity types were module, course, cmi.interaction, and objective. Meanwhile, for the activity streams, the actor was the agent the statement was about, learner, instructor, teacher, or group. The verbs describe the action of the statement, such as attempted, experience, answered, completed, passed, or failed. The object was what the Actor interacted with, a note, a quiz, or a class. The Tin Can statements from this study are shown in Figure 3.

Figure 3: Tin Can Statements

In the preparation phase, the gathered data will be cleaned, and filtered. Data that was not relevant and not required such as overlapping data will be removed. The information required will be identified. Then, the data will be extracted to the information of usage, content and the structure of the information contained in various existing data sources into the data format required for pattern discovery (Srivastava et al., 2000). In this pre-processing phase, it was necessary to ensure data of user behaviour, and activity in the LRS was readable, and achieved.

Pattern Discovery

Statistical technique was the use of method in pattern discovery to extract the user data of e-learning applications. The statistical analysis is based on the frequency of user behaviour and activities in order to predict the user acceptance of e-learning applications. Data will be extracted using queries and filters in the LRS. The extracted data will be divided into the following categories: "attempted", "experienced", and "completed". Based on these data, the behaviour of users who use e-learning applications can be explored.

Pattern Analysis

Data generated through the use of e-learning applications were the type of text. There were more than 22,000 statements of data. Analysis of quasi-statistics (Horowitz & Becker, 1971) was performed because the qualitative data was big. This method also called an enumeration, the process of quantifying data. In this method, data will be checked and calculated on the frequency of user behaviour. The usage data of "experienced," "attempted," and "completed" have been mapped as constructs in the proposed model. Table 1 shows the constructs, usage of e-learning applications, and descriptions.

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Table 1: Constructs, Usage of e-learning Applications and Descriptions

UTAUT Constructs	Usage of e-learning applications	Descriptions
Performance expectancy (PE)	The frequency of attempted e-learning applications at different times.	The individuals who attempted e-learning applications at the different range of times (after 40 minutes of each session).
Effort expectancy (EE)	The frequency of attempted e-learning applications with completed.	The individuals who attempted e-learning applications with completed.
Social influence (SI)	The frequency of experienced "like" and "share" in e-learning applications.	The individuals who clicked "like" and "share" in e-learning applications.
Facilitating conditions (FC)	The frequency of attempted e-learning applications at different places.	The individuals who attempted e-learning applications at the different range of IP address.
Behavioural Intention (BI)	The total frequency of attempted and experienced e-learning applications after the first attempt.	The individuals who intend to use e-learning applications in the future will use it after the first attempt.
Use Behaviour (UB)	The total frequency of attempted and experienced e-learning applications.	The individuals who use e-learning applications with repeatedly.

RESULTS AND DISCUSSION

Web usage mining approach with the Tin Can API enables usage data of the e-learning applications that are embedded in a website successfully achieved. The usage data was filtered based on pattern analysis in Section 4.4. Multiple linear regression procedures with "enter" method was used in analysing the usage data for predicting user acceptance of e-learning applications. The analyses were divided into two parts: regression analysis on behavioural intention, and use behaviour.

Regression analysis on behavioural intention (BI)

BI was treated as the dependent variable, and are predicted by independent variables such as PE, EE, and SI. Analysis is shown in Table 2.

Performance expectancy and effort expectancy were found directly and significantly related to intention to use the e-learning applications. The beta coefficients for the constructs were 0.398 ($p < 0.05$), and 0.399

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(p<0.05). The prediction of performance expectancy influencing behavioural intention based on "Frequency of attempts the e-learning applications at different time" can be accepted. Similarly, the prediction of effort expectancy influencing behavioural intention based on "Frequency of attempts the e-learning applications with completion" can be accepted. Social influence was found not to be significantly related to intention to use the e-learning applications. The beta coefficient was 0.277 (p>0.05). The prediction of social influence influencing behavioural intention based on the "Frequency of experienced "like" and "share" in the e-learning applications". This may be caused by lack of usage "like" and "share" in the e-learning applications. However, the coefficient of determination (R2) was high (R2 = 0.799, p<0.001).

Table 2: Regression Analysis on Behavioural Intention (BI)

Constructs	β	t-value
Performance expectancy (PE)	0.398	2.354*
Effort expectancy (EE)	0.399	2.839*
Social influence (SI)	0.227	1.665
R^2	0.799	
Adjusted R^2	0.769	

*p < .05

Regression analysis on use behaviour (UB)

UB was treated as the dependent variable, and were predicted by independent variables such as BI, and FC. Analysis is shown in Table 3.

Behavioural intention and facilitating conditions were found directly and significantly related behaviour of use the e-learning applications. The beta coefficients for the constructs were 0.839 (p<0.05), and 0.175 (p<0.05). The prediction of behavioural intention influencing use behaviour based on "Total frequency of attempts, and experienced the e-learning applications after first attempt" can be accepted. Meanwhile, the prediction of facilitating conditions influencing use behaviour based on "Total frequency of attempted, and experienced the e-learning applications" also can be accepted. The coefficient of determination (R2) was high (R2 = 0.955, p<0.001).

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Table 3: Regression Analysis on Use Behaviour (UB)

Constructs	β	t-value
Behavioural intention (BI)	0.839	11.942*
Facilitating conditions (FC)	0.175	2.494*
R^2		0.955
Adjusted R^2		0.951

*$p < .05$

CONCLUSION

Predicting user acceptance based on the interaction with the e-learning applications that are embedded in a website is challenging because information about user interaction, and behaviour are difficult to be gathered. The ability to detect the learners' experience during the interaction with e-learning applications can bring many benefits to predict the user acceptance of e-learning applications. The use of web mining to identify the user acceptance in e-learning settings is practical. This can be achieved by using the Tin Can API that was integrated with e-learning applications to obtain learning data. The learning data is a text statement that describes the behaviour of students who use e-learning applications. Analyses of multiple linear regressions have been done based on the frequency of "experienced", "attempted", and "completed" of e-learning applications to predict user acceptance. With this method, the prediction of user acceptance using UTAUT model for e-learning applications can be implemented. From the analysis of results, only the social influence was found not to be significantly related to intention to use e-learning applications. The enhancement of e-learning applications can be made after the user requirement has been identified through the analysis.

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Effectiveness and Student Teachers' Perceptions of Digital Materials in Enhancing Vocabulary Learning among Rural Primary Students

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ABSTRACT

This paper provides insights on the application of digital materials which are developed based on Luckin's Ecology of Resources to enhance the vocabulary learning among rural primary students in Sabah. The paper aims to share the preliminary findings on the effectiveness of the digital materials developed and to objectively investigate the student teachers' perceptions on digital materials. The web-based authoring tools used to develop the digital materials in the research were PowToon, Prezi and VideoScribe. These authoring tools include aspects such as animation, audios, photos, graphics and video creation. The project was conducted in Bundu Tuhan Primary School which is located in the interior area of Ranau. Among the participants involved are primary students from Year One to Year Three classes as well as a group of 14 student teachers from the TESL programme of University Malaysia Sabah. Research data were collected by using quantitative instruments which included both pre and post-tests as well as survey questionnaire. Findings revealed significant differences in the mean scores in the students learning of vocabulary taught with digital materials; and the existence of relationship between the student teachers' perceptions on digital materials and how it improved the students' vocabulary learning. The final section of the paper proposes plausible recommendations to

improve future application and implementation of digital materials in local schools especially in rural schools.

Keywords: *digital materials; rural education; vocabulary learning*

INTRODUCTION

The 21st century marks the era when most youth are exposed to various technological devices and digital materials that transform text beyond its usual traditional form. Digital technologies are deemed as essential parts of one's daily lives, as these digital materials and tools are not only easily accessible, but are also interactive and can be manipulated to cater to the students' learning needs. Brand et al. (2012) stated that technology can help "facilitate the attainment of learning goals for individuals with wide differences in their abilities to see, hear, move, read, write, understand English, sustain attention, organize, engage and remember". Thus, it is important for teachers to maximize the full advantage of the features of ICT to provide education that nurtures the abilities for learners who will lead the 21st century.

However, the surge of new technologies also comes with the arrival of new literacies (Baron, 2010; Jacobs, 2010; Gainer & Lapp, 2010). These new literacies comprise innovative text formats (multiple media or hybrid texts; Lemke 1998), new reader expectations (reading nonlinearly; Warschauer, 2006), and new activities (website publication; Leu et al., 2004). In order to develop the advanced literacy levels required for success in school and beyond, improving students' vocabulary is an area of urgent need (Biancarosa & Snow, 2006; Graves & Watts-Taffe, 2008). Many researchers have identified that learning vocabulary requires children to be exposed to multiple exposures to word meanings (Beck & McKeown, 2001; Blachowicz & Fisher, 2000) before they are able to remember the words (Juel & Deffes, 2004). Under these premises, the present study attempts to maximize the *multimodality* and *adaptivity* features of digital materials, as well as integrating appropriate learning context to enable learners to learn vocabulary effectively.

The study was conducted to (1) throw further light on the process and outcomes of creating digital materials via the Ecology of Resources Model proposed by Luckin (2010) and (2) objectively investigate the student teachers' perceptions of their use of digital materials in enhancing vocabulary learning among rural primary students. Specifically, this paper seeks to answer the following research questions:

1. To what extent are the digital materials developed and used in the project effective in enhancing the rural primary students' vocabulary learning of English?

2. What are the student teachers' perceptions in using digital materials to enhance the rural primary students' vocabulary learning of English?

The Ecology of Resources Model of Context

Luckin (2010) defines context as:

"Dynamic and associated with connections between people, things, locations and events in a narrative that is driven by people's intentionality and motivations. He further argues that technology can help to make these connections in an operational sense and people can help to make these connections have meaning for a learner.

Luckin further adds that a learner is not exposed to multiple contexts, but rather has a single context that is their lived experience of the world; a 'phenomenological gestalt' (Manovich, 2006) that reflects their interactions with multiple people, artifacts and environment. The partial descriptions of the world offered to a learner through these resources acts as the hooks for interactions; in which the action and meaning are built. In this sense, meaning is distributed amongst these resources. However, it is the manner in which the learner at the centre of their context internalizes their interactions that is the core activity of importance. These interactions are not predictable but are created by the people who interact, each of whom will have intentions about how these interactions should be."

<div align="right">Luckin (2010, p. 18)</div>

This definition recognizes the intricacy of the concept of context, though there are key points to take into considerations for our purpose in which context is about the way a learner is connected to the world, including other people and context is personal to the learner and not something to which they are serially exposed.

The Ecology of Resources Model is illustrated in Figure 1 below. It develops the Zone of Available Assistance (ZAA) and Zone of Proximal Adjustment (ZPA) concepts into a characterization of a learner along with the resources and relationships which form the learner's context. The resources that encompass a learner's ZAA include a wide range of categories; which include people, technologies, buildings, books and knowledge. One of the types of resources that a learner encounters is the knowledge and skills of the subject of their learning. The second category of resource is 'tools and people' which includes books, pens and paper, technology and other people who know more about the knowledge or skills to be learnt as to compare to what the learner knows. The final category of the resource is the 'environment' which includes the location and surrounding environment of the learner such as a school classroom, a park, a virtual world, or rather a place of work. This model provides a way to characterize a learner based on the resources and relationships that form the learner's context.
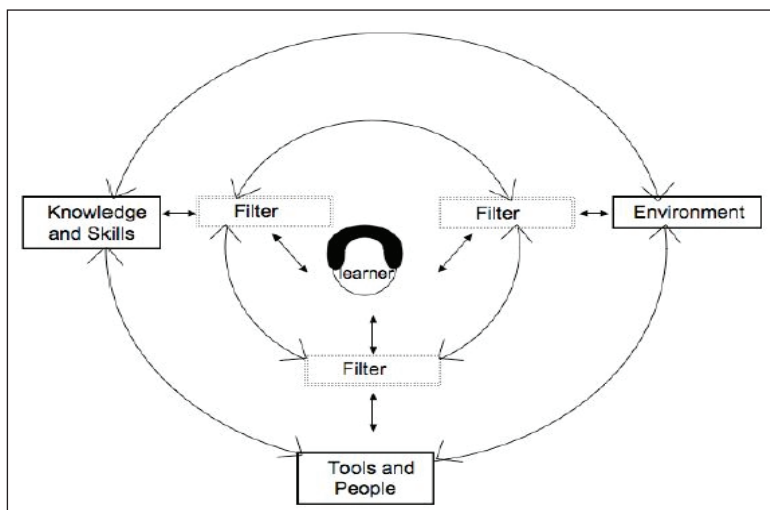
Figure 1: Ecology of Resources Model (Luckin, 2010)

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The Ecology of Resources design framework is iterative and it comprises three phases, each of which includes several steps as follows:

1. Phase 1: Creating an Ecology of Resources Model in order to identify and organize the potential forms of assistance that is able to function as resources of learning. The phase is comprised of six steps as listed below:

    a) Step 1 – to brainstorm potential resources to identify learners' ZAA
    b) Step 2 – to specify the focus of attention
    c) Step 3 – to categorize the resource elements
    d) Step 4 – to identify the potential resource filters
    e) Step 5 – to identify the learner's resources
    f) Step 6 – to identify potential more able partners

2. Phase 2: Identifying the relationships within and between the resources produced in Phase 1. The extent to which these relationships meet a learner's needs and how they might be optimized with respect to the learner is also identified.

3. Phase 3: Developing the scaffolds and adjustments in order to facilitate the learning and enabling the negotiation of a ZPA for a learner. Phase 3 of the framework focuses on identifying the possible ways in which the relationships identified in Phase 2 might best be supported or to be scaffold. Hence, this support might be offered through the manner in which technology is introduced, used or designed.

Design and Implementation Phase of Digital Materials

The development of digital materials is guided by the three categories from the Ecology of Resources model namely 'knowledge and skills', 'tools and people' and 'environment'. This model recommends a way of illustrating a learner in the forms of interactions which take the learner's wider context into account. Various forms of assistance available are identified and understood in order to form the resource elements that the learner interacts with.

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The Ecology of Resources framework includes a design process which categorizes the ways in which technology, people, and the learners themselves can best support learning. In this research, the learners' vocabulary learning is categorized as 'knowledge and skills', the digital materials used and the student teachers are the 'tools and people' respectively, while the rural primary school is classified as the 'environment'. A learner's interactions with the available resources are often filtered – hence, in this research, the vocabulary learning is filtered into ten selected vocabulary for each topic in each year respectively. The five topics included in the lesson are based on the English Language Curriculum for Primary Schools (KSSR). The tools and people available to the learners are filtered through a variety of features and functions of the digital materials implemented to support learning; and it also depended on how well the student teachers maximized the use of the digital materials in their lessons. Finally, the learner's access to the resources in 'environment' is also filtered by the school settings; which in this research, it was heavily influenced by the electricity supply and the familiarity of the content integrated in the digital materials to the learner's environment.

METHODOLOGY

The research aims to share the preliminary findings on the effectiveness of the digital materials developed in enhancing the students' vocabulary learning and to objectively investigate the student teachers' perceptions on digital materials. Among the web-authoring tools used in the research is to develop digital materials which included *PowToon*, *Prezi* and *VideoScribe*. In order to answer the research questions, two types of statistical tests are used, specifically, non-parametric Wilcoxon signed-rank test and Chi-square test.

Project Site

The site chosen for the research was Bundu Tuhan Primary School, located in the area of Ranau, Sabah which is approximately 100 kilometers away from the state capital, Kota Kinabalu. The school is selected due to its geographical isolation and the school's lack of exposure towards the use of digital materials in the teaching and learning processes.

Participants

A total of 44 students from Year 1, 2 and 3 were involved in the following research. They comprised twelve Year 1 students, nineteen Year 2 students and thirteen Year 3 students respectively. Majority of the students' native language is Kadazandusun and most of them have low level of proficiency in English.

In addition, 9 undergraduate student teachers from the TESL programme volunteered to participate in the research. All of them were undergraduates of the TESL programme in a public university. Nine of them were in their third-year of study, while three of them were in their fourth year of study. The nine third-year pre service teachers had limited knowledge in pedagogy, but had experienced teaching in a rural school as volunteer teachers. In this project, they were assigned to teach in groups of three. The three fourth-year pre service teachers had more experience teaching as volunteer teachers in rural schools. Thus, they were assigned to monitor the other pre service teachers.

Instruments

In the research, the data is analyzed by quantitative means. There were two types of research instruments used; namely achievement test for the students which included both pre-test and post-test which were implemented prior to the intervention of digital materials and after respectively. Survey questionnaires were also distributed for the student teachers in order to investigate on their perceptions towards the use of digital materials in enhancing vocabulary learning.

In the questionnaires distributed, a close-ended Likert-Scale format was used. There were five aspects included in the questionnaire; a) how digital materials help the student teachers in their works; b) how digital materials help the students in their vocabulary learning; c) how confident the student teachers in using digital materials to teach students; d) how the digital materials affect the student teachers' anxiety level and e) the student teachers' beliefs in the values of digital materials in teaching students.

The survey questionnaire was adapted from the research of *'Evaluating the Use of ICT in Education'*, (Papanastasiou & Angeli, 2008). Adaptations

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were made in terms of its wording where some of the wordings were changed to better reflect the research issues and a few categories were added to meet new needs. Harkness (2008) identified that the purpose of adaptation is to better fit the needs of a new population, location, language, or mode, or any combination of these. Papanastasiou and Angeli (2008) conducted the overall analysis to determine the construct validity of the constructs measured in the questionnaire which disclosed that the items were significantly correlated with each other.

FINDINGS AND DISCUSSIONS

To answer research question; "Are digital materials used in the project effective in enhancing the rural primary students' vocabulary learning of English?" the null hypothesis would be accepted or rejected based on the sources of data derived from the students' performance in their achievement tests. For research question; "What are the student teachers' perceptions on the usage of digital materials in enhancing the rural primary students' vocabulary learning of English?" the findings from the survey questionnaires of the student teachers are discussed. The examples of the digital materials developed from web-authoring tools used in the research are shown in Figure 2 below.

Figure 2: Examples of Digital Materials Developed

Findings of the Effectiveness of Digital Materials in Enhancing the Rural Primary Students' Vocabulary Learning in English

Table 1: Pre and Post-Test Results for Year 1 to Year 3 Students

Year / Level	Year 1		Year 2		Year 3	
	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
Poor	5	2	2	0	1	0
Moderate	5	0	11	2	4	0
Excellent	2	10	6	17	9	13

Based on Table 1, the results of the pre-test and post-test for Year 1 to Year 3 students showed that there were positive increments in their overall performance of vocabulary learning. The number of students who scored poorly in the test for each year decreased, with Year 1 showing great improvement from pre-test to post-test. Furthermore, the number of students who scored moderately also decreased in each year with Year 2 students demonstrating drastic improvement from pre-test to post-test. Majority of the students in each year displayed excellent performance in their post-test with Year 2 students once again showing the most significant improvement.

Table 2:Findings of Research Hypotheses

Hypotheses		Results
H_o	There is no significant difference in the mean scores in the students learning of vocabulary taught with digital materials.	Hypothesis is rejected.
H_a	There is a significant difference in the mean scores in the students learning of vocabulary taught with digital materials.	Hypothesis accepted.

Table 2 above shows that the null hypothesis of the research is rejected, while the alternative hypothesis is accepted. Based on the analysis of the Wilcoxon signed ranks test, Year 1 (0.002<.05), Year 2 (0.000<.05) and Year 3(0.001<.05); all three tests displayed significant differences in the output for the pre-test and post-test (p<.05) respectively. Hence, this can be concluded that the students demonstrated significant improvement in their vocabulary learning through the intervention of digital materials in their teaching and learning process.

Findings of the Student Teachers' Perceptions of Digital Materials in Enhancing the Rural Primary Students' Vocabulary Learning in English

Table 3: Findings of the Survey Questionnaires

No	Item	SD (%)	D (%)	N (%)	A (%)	SA (%)
a) How do digital materials help the student teachers in their work?						
1	Pedagogical skills			11	33	56
2	Technological skills			11	33	56
3	Presentation skills				22	78
4	Understanding of subject area of knowledge				33	67
b) How do student teachers think digital materials help the students in their language learning?						
5	Introduces the students to new language item/skills				67	33
6	Help the students to understand English			11	44	44
7	Promote in-class discussion		11	22	44	22
8	Facilitate collaborative activities in which students work together in a small group		11	22	56	11
9	Help the students to learn problem-solving and critical thinking skills	11		33	44	11
10	Construct the students' own understanding or experience in a content area			11	56	33
c) What is the student teachers' confidence level in using digital materials to teach students?						
11	I can select appropriate software to use in my teaching		11	11	33	44
12	I feel confident in using digital materials as computer will help students understand English better	11		33	33	22
13	I can use internet in my lessons to meet certain learning goals	11		11	44	33
14	I can design technology-enhanced learning activities for my students			22	33	44
15	I can use PowerPoint in my class				22	78

	d) How do digital materials affect the student teachers' anxiety level?	SD	D	N	A	SA
16	It scares me	11	56	11	11	11
17	It stresses me out	22	56	11	11	
18	If something goes wrong, I will not know what to do to fix it		67	22	11	
19	I do not feel comfortable with the idea of digital materials as a tool in teaching and learning	22	67		11	
20	It makes me skeptical	11	78		11	
	e) What is the student teachers' belief about the values of digital materials in teaching students?					
21	It allows students to express their thinking in better ways			11	78	11
22	It helps students to understand English better			11	56	33
23	It helps teachers to teach in more effective ways				67	33
24	Whatever the computer can do, I can do equally well			67	22	11
25	The use of digital materials as learning tools excites me			22	44	33
26	It is not conducive to student learning because it is not easy to use		78	22		
27	The computer is not conducive to good teaching because it creates technical problems	11	44	44		
	f) How effective is the integration of ICT in education?					
28	Students can enhance their learning skills			22	56	22
29	IT provides vast knowledge to students through Internet				67	33
30	The use of digital projectors helps the students for better learning				56	44
31	ICT can be used to enhance the education efficiency at the local, regional and national level				67	33

* SD   Strongly Disagree
   D   Disagree
   N   Neutral
   A   Agree
   SA   Strongly Agree

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Table 3 above summarizes each of the questionnaire items in their sections respectively. Based on the findings, majority of the student teachers chose agree or strongly agree for positive statements; and they also disagreed for majority of the negative statements. However, some of the student teachers were neutral on a few statements. For example, a majority 67% of them (n=6) felt neutral on the statement 'whatever the computer can do, I can do equally well'. The findings also demonstrated that majority of the student teachers agreed that the integration of ICT in education is indeed effective. For example, 67% of the student teachers (n=6) and 33% of them (n=3) agreed and strongly agreed that ICT can be used to enhance the education efficiency at the local, regional and national levels.

Based on the chi-square test performed, only 2 items (Q20 & Q21) out of the 27 items from the questionnaire are proved to be significant as the result of the analysis shows ($x^2<.05$). Hence, the results demonstrated that a) there is a significant relationship between the student teachers' skepticism on digital materials on how they affect their anxiety level; and b) there is a significant relationship between the values of digital materials in teaching and how the student teachers believe that digital materials allow the students to express their thinking better.

CONCLUSION

The research was conducted to primarily determine the effectiveness of digital materials used in the project in enhancing the rural primary students' vocabulary learning of English and secondarily to investigate the student teachers' perceptions on digital materials. The findings showed two significant points which are related to the Luckin's Ecology of Resources model. The first point lies on how technology-rich learning experiences of digital materials that take learners' wider context into account assisted in building learners' understanding of the vocabulary. The digital materials are effective as they help to assist learners in associating new knowledge with their previous knowledge in L1. The usage of real pictures that relate to the learners' daily lives also proved to be helpful in enhancing their vocabulary learning. Secondly, majority of the student teachers agreed that the intervention of digital materials does not only help to improve the students' vocabulary learning but it also helps to enhance their skills as

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English teachers. The student teachers stated that the diverse features of the digital materials helped in stimulating the learners' senses which ultimately led to increasing the students' motivation to learn.

In addition, the findings also showed two areas of concern which are bound to be insightful for future implementation of digital materials in rural schools. The first concern is the digital materials' high dependence on the supply of electricity. The frequent blackouts in the area of Ranau had caused interruption in lessons as LCD projector could not be used. Hence, the student teachers had to initiate on backup plans such as using handmade flash cards to introduce vocabulary to students. Secondly is the developers' basic skill in building the digital materials from web-authoring tools, which caused the features of the materials used are limited to certain extent. Thus, it is suggested that for future purposes, the main aim is to improve the digital materials' interactivity such as including moving graphics, providing virtual exercises and advanced games for the learners.

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Engaging the Millennial Generation Student With e-Learning in Dentistry

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ABSTRACT

The need to move from traditional teaching and learning methods to more interactive approaches has been in high demand from the young generation of tech-savvy students. However, this move in dentistry has been very slow in Malaysia, despite the exponential growth of e-learning in other disciplines. Nevertheless, the Centre for Restorative Dentistry Studies (UiTM) is in the transformation to actively embrace the e-learning curriculum structures combined with traditional teaching methods. Three peer-reviewed e-modules were developed with each module comprised audio-visual lectures, video demonstrations and online students' assessments. The concept of flipped classroom were applied where these e-modules were uploaded to i-Learn (the university online learning portal) for students to assess at home. Questionnaires were given to assess their perception towards e-modules received. Conventional lectures (82.4%), e-modules (64.7%) and textbooks (64.7%) were reported as the most often material used by students. After the exposure to e-modules, 15 students (29.4%) suggested replacing lectures with e-modules but 36 students (70.6%) insist on having the conventional lectures combined together. Major drawbacks and students concerns (58.8%) were technical problems and the lack of direct communications with the lecturers. However, all students (100%) stated that they would continue to use the e-modules in the future and request for more in other topics. It was evidently found that the students' perceptions to e-modules are generally positive. However, the drawbacks and their main concerns are points to be considered before further development of a comprehensive blended learning curriculum in the Faculty.

Keywords: *dental education;blended learning; restorative dentistry; e-learning*

INTRODUCTION

For more than three centuries, the pedagogical model of delivering education has been the traditional lecture based approach, placing large groups of students in a room and reciting lectures to them. Other traditional teaching methods in dentistry are in the form of lectures, seminars and demonstrations. Students came in different personality and attitudes throughout the years. They are classified by generations that are also known as generation Y or the millennial generation. They grew up in culturally diversed schools, are tech-savvy, enthusiastic, confident, well networked and learning oriented individuals. Finding the best methods to communicate with them is essential in every university's teaching. This calls for the need for a new pedagogical solution of innovative teaching and learning methods to address the demand from the stakeholders to produce competent graduates with exemplary communication and team working skills.

E-learning or Computer Assisted Learning (CAL) is referred to the use of internet technologies to deliver a broad array of information that enhances knowledge and performance (Rosenberg, 2001; Wentling et al., 2000). Globally, there are few dental schools that have executed a method of teaching known as blended learning. The term 'blended learning' mostly involves "combining Internet and digital media with established classroom forms that requires the physical co-presence of teacher and students". It was introduced by Bonk in 2006, but was a concept familiar to most of the educators in the early 21stcentury. The approaches combine e-learning modules with traditional teacher-orientated where as an example; a lecture or demonstration is supplemented with an online material. One of the pioneer institutions in dentistry blended learning module is University of Birmingham where they have developed a website known as Ecourse. This website is a platform where demonstration videos, assessments and lecture series were uploaded and ready to be assessed by the students before the start of any module.

Many factors have driven the development and the increasing number of blended learning in dentistry including the decreasing teaching staff numbers, increasing dental student numbers and cost effectiveness of blended learning in the long term (Bains et al., 2011). A randomized control trial study done by Stockwell et al. (2015) found that blended learning

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improved student performances and video assignments increased the attendance. Students were motivated and actively interacted among them together with the lecturers in the teaching and learning environment. In terms of acquiring manual skills and conceptual knowledge, it was found that students who experienced blended learning statistically did better in their grades compared to their traditional learning colleagues (Maresca et al., 2014).

The declining number of academic staff in United Kingdom (UK) dental school was one of the main factors that have driven the development of e-learning material (Murray, 2001). Therefore, there were few studies that investigated the effectiveness of this teaching method in dentistry and various outcomes were obtained (Hobson et al., 1998; Rosenberg et al., 2003; Gupta et al., 2004; Schmid et al., 2009; Kavadella et al., 2012). Generally the results were positive and they concluded that e-learning was superior or at least as effective as the other modes of learning. As for the perception of students' to the use of technology, a study done by Eagleton (2015) found that 46% of the participant that used animated tutorials in physiology subjects said that the tutorials did help in memorizing and understanding a process better with the animation given.

However, it has been emphasized that the main barriers of blended learning were lack of adequate training in information technology (IT), plagiarism of the teaching materials, lack of interaction between students and lecturers and the initial time and cost involved to develop the blended learning might be high (Gupta et al., 2004).

In an effort to understand the current need and benefits of blended learning with e-modules for dental students, this paper describes the step-by-step planning and execution by the Centre for Restorative Dentistry Studies (CoS Restorative Dentistry), Faculty of Dentistry, Universiti Teknologi MARA in the transformation to actively embrace the e-learning curriculum structures combined with traditional teaching methods in teaching dentistry.

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METHODOLOGY

Development of E-Modules in Restorative Dentistry

In early 2013, the academic staff of Faculty of Dentistry were given a thorough exposure and explanation on university's vision to promote blended learning in all faculties. All staff were then required to attend a blended learning workshop organized by i-Learn centre (the university online centre) in order to develop information technology skills to produce e-content material. The i-Learn Centre provides facilitators to conduct different levels of e-content development to every faculty in the university.

The next step in the material development process was the planning in the CoS Restorative Dentistry. The initial move started by allocating each lecturer a block of lecture topics to design their own e-content materials at the beginning of the semester. The allocations were discussed in the CoS Restorative Dentistry meeting and agreements were achieved from all lecturers on the topics allocated. Then each of them were given a period of three months to produce at least one e-content material with online assessment on a topic to be used in their teaching and learning programme.

Development of an e-module involved different stages, started from the elaboration of the teaching materials, validation of the contents material, discussion on delivery methods and standardization of the modules. During the development of an e-module process, academic staffs did receive technical supports from the i-Learn Centre for their video recording of demonstrations and tutorials on the used of iSpring Presenter 7 (iSpring Solutions Inc, Alexandria, USA) programme. Other than iSpring programme, a few lecturers did explore on other presentation programmes as their blended learning materials including e-book (3DPageFlip Software Co., Ltd, GuangZhou, China) and keynotes (Apple Inc, California, USA).

Three e-modules for preclinical restorative dentistry have been successfully developed using three different programme; iSpring, Keynotes and e-book (Fig.1). Each module comprised audio-visual lectures, video demonstrations, online students assessments and discussion forum. Prior implementation in the teaching and learning programme, these modules were vetted and validated in the department followed by upload at the i-Learn website for the students to access.

Implementation of the E-Modules using Flipped Classroom Concept

The three e-modules were implemented in the Year 2 preclinical restorative dentistry courses. The developed e-module topics were listed in the first semester of Year 2 teaching curriculum. The concept of flipped classroom was applied where these e-modules were uploaded to i-Learn, the university online learning portal (Figure 2) after the topic introduction taught face-to-face (1 hour lecture) and before the practical sessions. Indication for the upload timing between lecture and practical sessions was to give initial exposure on the topic before students go for self-directed learning on the topics. Students with minimal knowledge on a topic should not be exposed to CAL e-module alone as it has been reported that they had difficulty to understand new topics without a teacher support first (Browne et al., 2004). During the implementation of blended-learning modules, students were informed that they were able to access the e-modules anywhere as long as they have Internet services. With these e-modules, students were actively immersed in the online adaptive learning environment, which delivers the learning content to the student outside of the classroom on their own time. The video demonstrations and graphic step-by-step manual guide in the e-modules were indicated as a first exposure for the upcoming practical sessions. The given assessments at the end of each e-module implied as a revision on knowledge delivered through the given face-to-face lecture session.

The one-hour face-to-face discussion on the subject allocated before the practical sessions in the timetables was used for group interaction. Students were engaged in discussion activities rather than watching and listening to the lecturers giving live demonstration. Students would ask questions, solve problems, explain concepts, interpret observations, discuss and apply the information pre-learned online through the e-modules to perform the preclinical projects assigned to them.
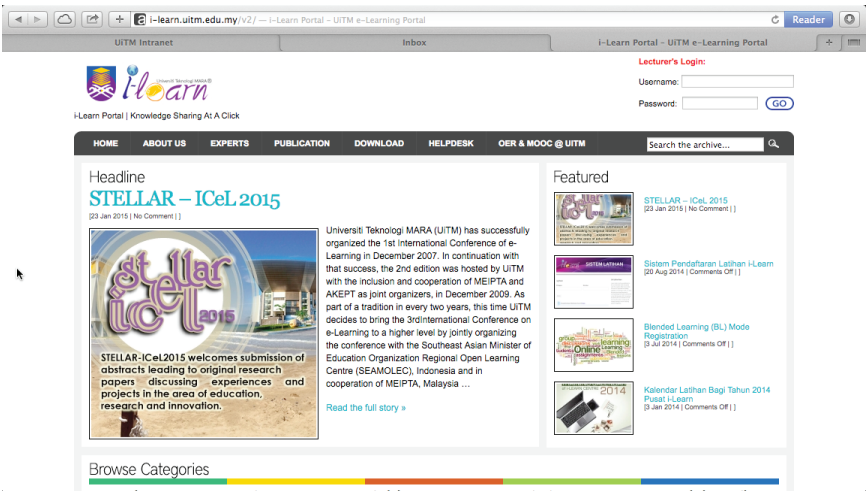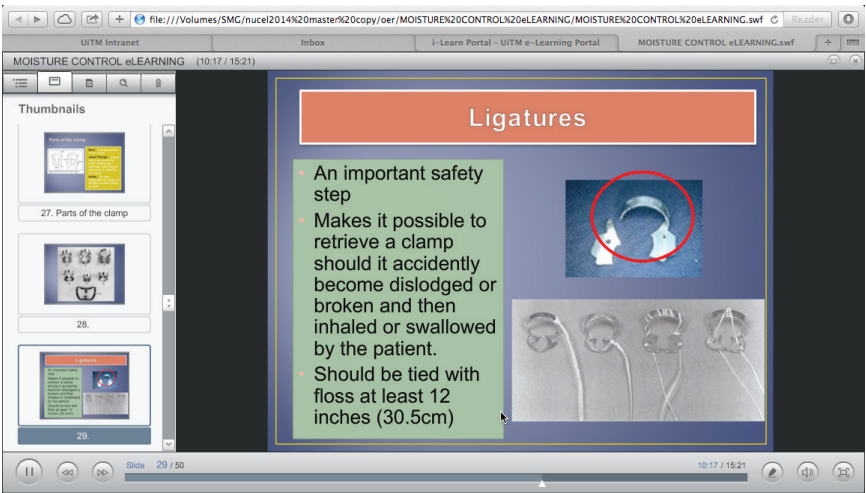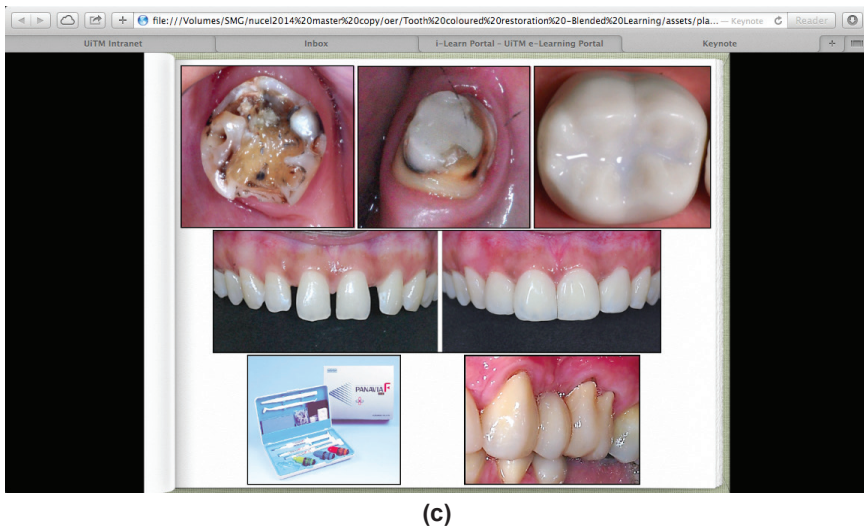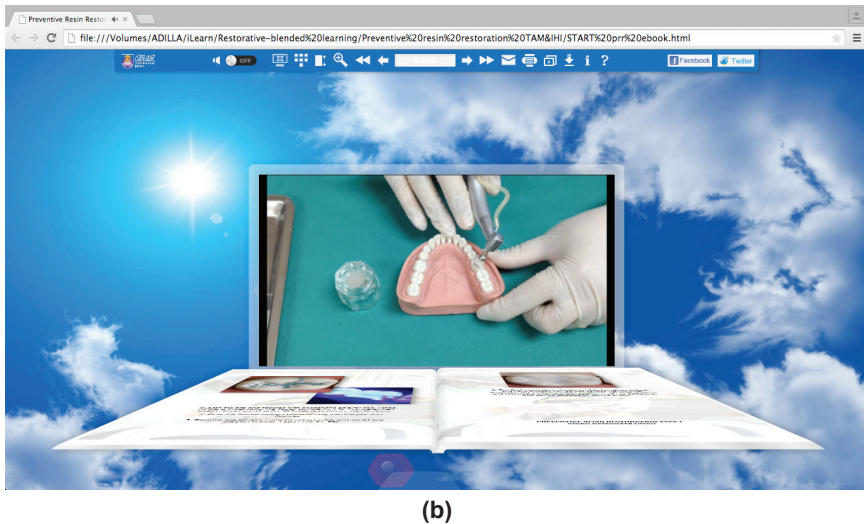
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Figure 1: The University Online Learning Portal

(a)

(b)

(c)

Figure 2: The Different Programme of Developed E-Modules
(A) ispring (B) e-Book (C) Keynote

Assessment of Students' Perception on the Given E-Modules

The Year 2 students enrolled in the preclinical restorative dentistry course were the targeted cohorts of students for the study on their perception to e-modules. They were the selected group because they have just entered the course with zero base-line knowledge.

Questionnaire forms by Gupta et al. (2004) were adopted and modified for the suitability of the study to assess students' perception. Once the three e-modules have been delivered to the Year 2 students (54 students), questionnaires were given to them through their students email accounts using an online questionnaire (Google Forms, Google, Califonia USA). All responses from the e-questionnaires were treated anonymously and it was stated before they did answer the questionnaires.

RESULTS

A total of 51 e-questionnaires were received through Google Forms from 54 students, giving a 94.4% response rate. In the learning material section of the questionnaire, students have been reported to most often use conventional lectures (82.4%), e-modules (64.7%) and textbooks (64.7%) as their learning materials as shown in Figure 3. After the exposure to our three e-modules, 15 students (29.4%) did suggest to replace lectures with e-modules on the three topics, but 36 students (70.6%) still insist on having the conventional lectures combine together as shown in Figure 4. The common reasons stated for replacing lectures were; the e-modules were more interactive, allow them to have notes and videos accessible at all time and to reduce their face-to-face interactions which will reduce the hours in timetable. However, these groups of students did inform specifically that only simple and selected topics could be replaced by e-modules only. For the group of students that insisted to maintain conventional lecture and only have the e-modules as supplements, their major reason was that they prefer direct interactions with lecturers and to see the lecturers faces.

Figure 5 tabulated the comments on drawbacks and concerns in using the e-modules. The two major drawbacks and students' concerns are technical problems (31.3%) and the lack of direct communications with the

lecturers (27.5%). Comments were also received regarding the content of the e-modules where 9.8% stating that videos require subtitle, background music should be more catchy and speakers' voice should be clearer. However, all students (100%) stated that they would continue to use the e-modules in the future and request for more in other topics.
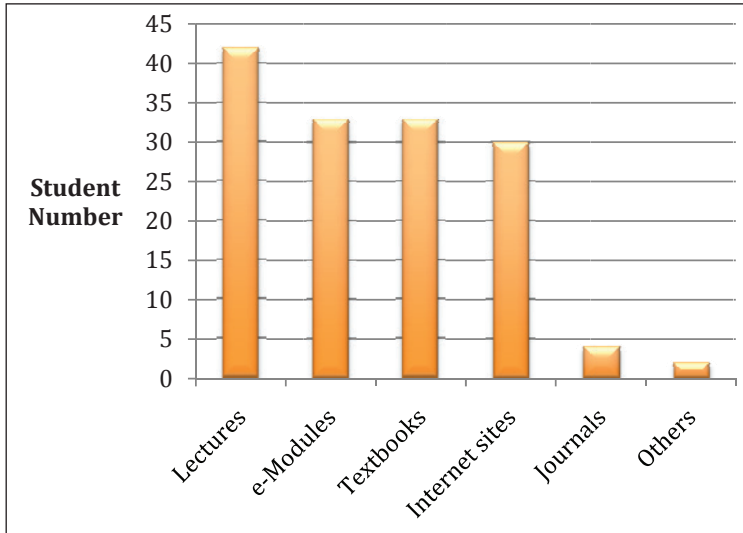
Figure 3: The Sources of Material Used by Students in Learning Dentistry
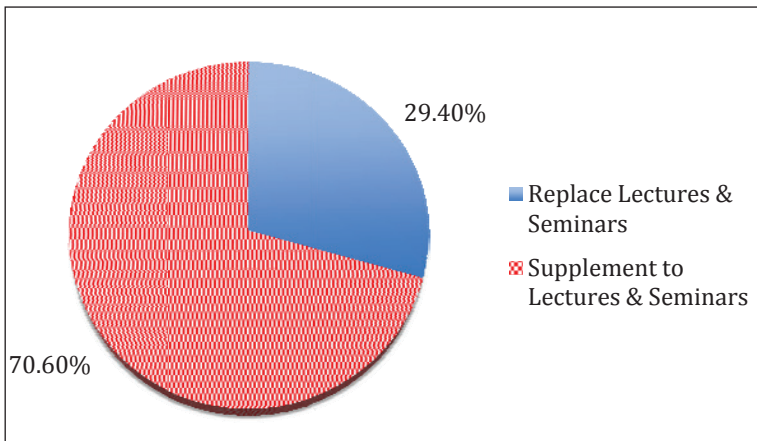
**Figure 4: The Perception of Students for E-Modules
Replacing the Conventional Teaching Style**

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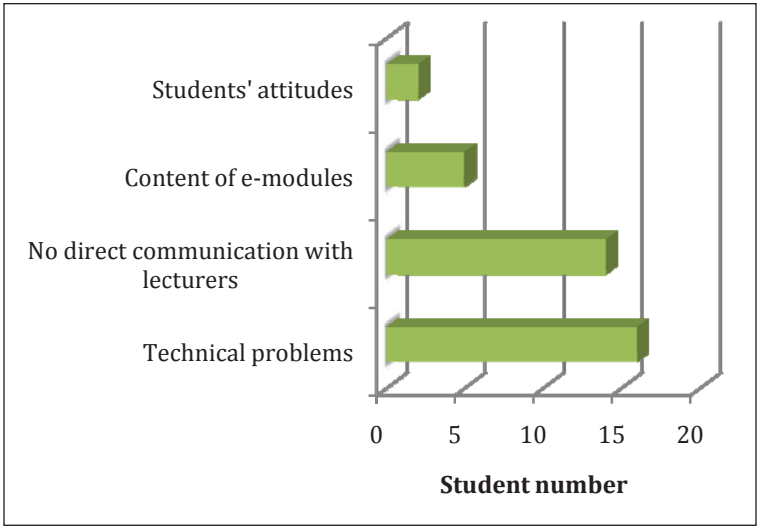
Figure 5: The Drawbacks and Concerns by Students in Using E-Modules

DISCUSSION

The delivery of e-module in the CoS Restorative Dentistry was done in a blended learning concept where the combination of traditional teaching method and CAL were implemented. This is in agreement by many researchers that CAL alone is not sufficient to engage students' understanding on certain topics (Scittek et al., 2001) and not all students have the learning style suitable with CAL (Ess, 2000). As for the delivery of the e-module part, it can be either synchronous or asynchronous (Wentling et al., 2000). Synchronous delivery refers to real-time and instructor mediated learning for all learners simultaneously such as in a classroom or computer laboratory where learners can communicate directly among them during the learning session. This will also ensure that all students will undergo the e-modules as instructed. This delivery method would be preferable for the 27.5% students who requested for direct interactions with lecturers during the e-modules. The disadvantage on this delivery type is that it will require allocated time in the timetable. The asynchronous method can curb the high number of face-to-face hours for a course by reducing the allocated hours in the timetable. The e-modules are viewed at their own time out from the normal timetable with the approach of flipped classroom. Flipped classroom

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is a form of blended learning which brings interactive engagement pedagogy to classrooms by having students learn content online, usually at home, and homework is done in class with teachers and students discussing and solving questions after the e-modules. Teachers' interaction with students are more personalized and guided instead of lecturing methods. Park and Howard (2015) implemented a flipped classroom for a predoctoral course and found that students' participations in class and learning accountability increased. Feedback after the experience was generally positive with regard to the collaborative and interactive aspects of the flipped classroom.

There were many challenges encountered by the lecturers in the development and implementation of e-modules in the CoS. The main obstacle was the capability of the lecturers to develop the e-content as an interactive module. It was a struggle for everyone in the beginning because of the new concept and skills to be adopted, however with the support and facilities provided by the university i-Learn Centre and the faculty itself, the process was facilitated. Clark (2002) has denoted that it is very important that an e-module to be well designed and interactively developed to enable a self-directed leaner to be more active and engaged in learning, not just display text and images as in a textbook.

In the questionnaires given to students for this study, 9.8% of them commented on the e-module content with 3.9% reported that the content made them sleepy due to less interaction. Therefore, a suggested approach to make an e-module interactive is by having an online forum. However, it is one of the components that consume more time due to the boundless time and duration for a discussion to be on a topic. The lecturers have to always login to the e-learning platform to give feedback to the students' comments and questions asked in the topics. As a consequence, the time consumed would be significantly higher in the lecturers' preparation and implementation for a teaching and learning material. This matter has been raised and discussed in the university management and currently, it has been agreed that any lecturers registered as a provider of a blended learning module, will receive 2 hours per week of lecturer's duty responsibility. The given 2 hours will reduce their in-office teaching and learning duty from 39 hours to 37 hours per week.

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Other encouragement from the University to enhance the participation of lecturers in blended learning module is the recognition of an e-module as a publication with given honorarium. The recognition of an e-module will be done at the University i-Learn Centre. As per the faculty role to drive blended learning modules among the academicians, every Centre of Studies were instructed to present their progress on blended learning material in the monthly Academic Faculty Committee meeting chaired by the Dean. During this meeting, the head of department will report the progress and the drawback, if any, in their development and implementation of blended learning modules.

Despite the instruction from University, the decision for the CoS Restorative Dentistry to move from traditional teaching to blended learning was also due to the students' interest and the limited human resource. The increased numbers of undergraduate students to 80 intakes per year and the curriculum taught from second semester Year 1 up to Year 5 have stretched the teaching personnel to the maximum. The increase number of groups in the class might cause less interactions and focus of a lecturer are to the bigger crowd of students. By implementing blended learning, students who come to classes with questions or topics to discuss after going through the e-modules will create an interactive student-lecturer communication. Other benefits are the reduced face-to-face time indicated in the timetable for the lecturers and students. Therefore, more time can be allocated for lecturers to do other activities such as research, publication writings and administration work. As for the students, they will not have an 8am-6pm timetable.

There are always limitations in any pedagogical methods applied in teaching and learning. This study found that technical issues (31.3%) were the main drawback reported by students during the usage of e-learning modules. Grimes (2002) faced the problem when he implemented an e-course in dental terminology. Klein et al. (2012) reported the same problem even after 10 years from Grimes where they stated that technological challenges could be very frustrating for learners and can negatively impact their perception of electronic learning materials. Eagleton (2015) found that 54% of the students who were given animated tutorials did not access the content due to no access to computer and internet outside from the faculty. Unavailability of internet and computer, slow internet line, limited computer capability to download and play large file size modules were the

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comments received for the technical drawbacks in our study. Majorities of these comments were from students who are renting accommodation nearby the campus where they do not have access to internet at home. To curb these limitations, it has been planned in the future that the new dental campus will have sufficient hostel rooms for all students and will be fully equipped with wifi services and a computer laboratory.

The overall perceptions of online learning concluded from this study were positive, and although some drawbacks were apparent, all of the students stated that they learned a great deal and found the e-modules valuable, which was a similar finding with the study carried out by Reissmann et al. (2015). The satisfaction ratings were high and further qualitative evaluation revealed that most responses were positive, with not a single negative comment regarding the blended learning concept. Students really enjoy the convenience of taking the e-modules at a time that fits their schedule and a place that they did not have to commute to attend. They also assured that they will 100% utilize the modules again in the future and requested for more e-modules in different topics.

CONCLUSION

It was evidently found that the students' perceptions to e-modules are generally positive and the students appreciated the e-learning modules. However, their main concern of direct communication with lecturers and the technical problems are points to be considered and resolved before further development of a comprehensive blended learning curriculum in the Faculty of Dentistry, Universiti Teknologi MARA.

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Automated Essay Scoring Feedback (AESF): An Innovative Writing Solution to the Malaysian University English Test (MUET)

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ABSTRACT

Recent advances in information and communication technology (ICT) infrastructure can be harnessed to support and improve the quality of teaching and learning of English writing skills especially for second language context where rule based support is necessary. Essay writing is indeed the most demanding tasks to both teachers and students. From conducting the class to the assigning of task as well as marking and providing feedback from teachers, whereas from drafting essays to final submission and resubmission of essays by students require on-going iterative cycles to facilitate improvement. However, a common scenario is that the iterative process takes too much time, thus resulting in limited practice. An innovative solution to imitate such process is via the Automated Essay Scoring Feedback (AESF). AESF is a networked tool that has the ability to score and provide feedback to students' essays instantaneously. With the speed that exceeds human ability and accuracy of a human scorer, it is hoped that AESF can increase the frequency of essay writing in the class that eventually results in improvement in students' performance. This paper aims to highlight the novelty and rationale of having AESF, its design and features as well as how this tool can be blended into the writing classroom, particularly for the Malaysian University English Test (MUET) extended essay writing.

Keywords*: automated essay scorer; paragraph scoring*

INTRODUCTION

Harnessing computational methods in essay marking is no longer a new issue and is being greatly expanded to large scale assessment, including Scholastic Aptitude Test (SAT), Graduate Record Examination (GRE), Test of English as a Foreign Language (TOEFL) and Graduate Management Admission Test (GMAT) (Attali, Burstein, Russell & Hoffmann, 2006; Shermis, 2014). Automated Essay Scorers (AES) dated as early as 1966 by Professor Ellis Page with Project Essay Grade (PEG™)(Page, 2003) and thereafter, Criterion (Burstein, Chodorow & Leacock, 2004), Intelligent Essay Assessor (IEA), and IntelliMetric ("IntelliMetric® | Vantage Learning," n.d.). These systems are proven fast, exceeding human scoring, and reliable with a higher inter rater reliability as compared to the reliability of only human marking (Shermis, 2014).

In this paper, an Automated Essay Scoring Feedback (AESF) system is proposed to aid secondary school students in learning Malaysian University English Test (MUET) essay writing. The AESF system is a web-based instructional writing tool that can score and provide feedback to submitted essays instantaneously as demanded by users, targeting on students at the pre-University stage. AESF is developed based on Natural Language Processing and supervised machine learning framework where the scoring model is trained using a large collection of essays with different scores obtained from students on pre-determined topics. The system is hoped to simplify teachers' tasks and improve students writing ability by on-going and sufficient practice as they needed as suggested by various commercial AES (Mayes, 2014). The novelty lies in teacher autonomy, student autonomy, cultural sensitivity, and paragraph level grading.

BACKGROUND

Automation of essay marking employs sophisticated language processing technologies and statistical methods to analyse a wide range of text features with its corresponding values that are being internalised or learned by the system to score unknown essays (Li, Link & Hegelheimer, 2015). The automation process is generally similar with human holistic scoring, but with huge samples. Human evaluation of essays is usually based on marking

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schemes that outline rubric that delineates specific expectation on essay responses. A moderation process is based on small samples that serve as bench marks and eventual agreement on marking between two or more graders to fine pitch the marking score (Attali et al., 2006).

Unlike humans, who can read and internalise the scoring rubric with their background knowledge and language processing skills, system on the other hand, requires a huge pool of data for learning and training before it can score accordingly (Dikli, 2006). Once, the system has internalise the text features, it can score as accurate as human scorers and more reliable than human, with great speed that excludes human weaknesses of being bias, inconsistent and having individual preferences (Shermis, 2014).

Currently, Malaysia lacks home-grown AES that is tailor-made for the Malaysian context, especially for marking extended English language essays. There are some local systems that only cater for short answer response with predetermined finite answer keys (Ab Aziz, Ahmad, Abdul Ghani& Mahmod, 2009). As for extended general English writing skills improvement system, this technology is not available as most research results published on the AES effectiveness with Malaysian students are based on commercially available systems like Criterion and My Access! (Li et al., 2015). A drawback in such system is that the grading may not be valid because the training model is based on essays written by native language users (L1) (Ene & Upton, 2014) while the marking criteria/scheme may not necessarily be the same as how a Malaysian teacher may grade their students' essays. Therefore, it is unfair to grade, second language users (L2) against L1 where essays may also be culturally different than the L2. Thus, if essays are not measured with the same yardstick, the scoring cannot be valid (Dikli, 2006).

Therefore, there is an urgent need for a tailor-made tool that can help score essays reliably and validly in the Malaysian school context. Besides, automated feedback is accepted by students and should be further improved to help L2 students to be more precise in using the language (Ene & Upton, 2014). AESF targets the Malaysian University English Test (MUET) for prototyping because MUET students are at a stage just before varsity. This is also a good platform to train students to use ICT for independent learning at the tertiary level as they will be required to use ICT extensively

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for producing reports, assignments and thesis. If writing via computer is a must, then utilising MUET students in AESF development and usage can be more fulfilling for students who see the need to use ICT apart from being more critical and mature in providing feedback on the usage of the system. With this, the AESF prototype can be further improved and also be adjustable to other level of education in school.

The Development of AES

Project Essay Grade (PEG™) was one of the earliest automated essay scorers, devised by Ellis Page in 1966 using proxy measures to determine the grade of the essays (Page, 2003; Rudner & Gagne, 2001). The features include average word length, essay length, and the use of commas and semicolon (Rudner & Gagne, 2001). This system does not include aspects of semantic, lacking in human ability to organize and make meaningful transactions.

Subsequently, Intelligent Essay Assessor (IEA), a system which considers the semantic value of essays was introduced (Lemaire & Dessus, 2001). This is achieved using Latent Semantic Analysis (LSA) technique to assess essays. This scoring technique assumes that "there is a hidden semantic space in each text which is the accumulation of all words meaning" (Jiang & Wei, 2012, p. 58). With the application of matrices, unique words are extracted and associated with its importance through frequency count. The latent semantic space created gives essay its meaning, depending on the co-occurrence of words in the corpus used (Lemaire & Dessus, 2001). Therefore, it can only be reliable if the corpus is reliable in the first place. The weakness of this technique is that it cannot represent the actual knowledge of the students because word order, syntax, logic and other information are ignored (Landauer, Ladam& Folts, 2001).

E-rater that uses Natural Language Processing (NLP) is regarded as a revolutionary grading tool because it is based on a corpus of learner actual language. The E-rater features include "a syntactic module, a discourse module, and a topical analysis module" (Dikli, 2006, p. 54). Similar to IEA that uses information retrieval technology, E-rater applies Vector Space Model (VSM) to determine the relevance of text content (Burstein, 2003b). E-rater assumes that a good essay is resembled by other good essays and vice versa in terms of language used and content presented (Dikli, 2006).

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The validity of this grading system depends on the validity of the sample grading of the corpus (Dikli, 2006).

Probably the most widely used, Intellimetric model is the very first essay scoring tools that applied Artificial Intelligent (AI) (Burstein, 2003a). It integrates AI, NLP and statistical technologies which internalises the pooled wisdom of human expert rater (Elliot, 2003). The features considered in this tool include mechanics, sentence structure, focus and unity, organisation, development and elaboration (Elliot, 2003; Dikli, 2006). Using a parsed corpus, IntelliMetric is capable of emulating the way the human brain acquires, accesses, and uses information, hence, learning the way to examine sample pre-scored essays. This system applied a non-linear and multidimensional approach to analyse essays (Elliot, 2003).

With the on-going development and enhancement of AES, the reliability of an AES system has been shown to be comparable to human marker even in high stakes examinations (Shermis, 2014).

The Novelty of AESF

Due to the lack of AES that specifically caters for Malaysian users, AESF is considered a viable, valid and reliable tool in essay marking for the Malaysian University English Test (MUET) because it is trained based on a corpus compiled using actual MUET graded essays collected from schools (Gebril & Plakans, 2014). These graded essays are scored based on the actual MUET marking criteria by experienced teachers in schools. Therefore, with valid and reliable training pool, essays graded by AESF should be more reliable than non-local commercially available AES.

Being trained using actual L2 learner corpus, AESF is also culturally sensitive as essays written by L2 will have vocabulary, structure and setting that are only familiar and acceptable by their culture, termed as 'localisation of English'. These localised English is easily intelligible by another Malaysian who is accustomed to the culture of the context (Hashim & Leitner, 2011). Endornomativity is unavoidable as English used in Malaysia is widely blended with various other languages used. For instance, borrowed words from the national language or other mother tongue are often used with or without inverted commas to make essays more vivid and realistic (Hashim & Leitner, 2011). Hence, commercially available AES will not be

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able to treat such essays fairly as how an actual Malaysian marker would (Lewis, 2013).

AESF is considered state-of-the-art because it allows teachers or test administrators to have full autonomy to train, set and keep track of their students' progress. No AES can score essays topic untrained by the provider (Shermis, 2014). AESF allows the teachers to expand the marking topic by training their own topic even though this may take some time because teachers need to build up the training corpus. Teachers can upload graded essays as training set and without any additional procedure on the teacher's part. He or she can set the new topic for scoring new essays input by students. However, the number of graded essays used for training need to reach at least 200 essays before the tool can be scored reliably. This feature allows teachers to have a tool that they can use continuously with new topic added as they wish. For most AES, teachers are restricted to only pre-listed topic available for them. If the topics are not suitable for students or Malaysian context, then the AES cannot be fully utilised. Therefore, the ability to train new essays in AESF makes it a more flexible platform to utilise ICT to ease teachers' essay marking burden.

On the other hand, students will also have the autonomy to decide when they require feedback on their writing. Unlike usual word processor such as Microsoft Word that flags errors as we type, errors will only be flagged by the AESF when students request for feedback. This is similar to writing on paper where errors are not flagged immediately and students' floor of thought will not be distracted by the flagging of errors. When students request for error feedback, it means that they have written what is in their thought and is ready for feedback. Then, with the feedback flagged by AESF, students can rectify or improve on their weaknesses before continuing with their writing (Ene & Upton, 2014; Li et al., 2015). This can be done repeatedly until the students are satisfied with their performance (Attali, 2004). Some may argue that, with normal word processing, the auto correction can also be "off" but that requires additional knowledge on setting the programme and involves more indirect steps that may burden non-expert ICT users.

In addition, students are also given the opportunity to decide if they prefer to have a final score or paragraph by paragraph scoring. Final score means students will have to complete the whole essay before they submit the

essay for scoring. A holistic score will be provided to reflect the quality of the essay as a whole. In contrast, paragraph by paragraph scoring provides scores for each paragraph indicating quality of each paragraph anytime as students wish. This mimic the classroom support provided by teacher where students may ask for feedback from teachers to make sure that they are on the right track so that they can proceed writing with more confidence (Likkel, 2012).

Being networked allows higher flexibility to teachers and students in using AESF. They are not restricted by brick and mortar because AESF are not installed on computers or laptops in laboratory. AESF can be accessed anywhere via Internet connection. This overcomes the problem of insufficient computers and limited time in school to utilise ICT in education. Students can access AESF anywhere and anytime as they wish to complete their assignments. Similarly, teachers can keep track of students' progress flexibly at their convenience.

The Features and User Interface of AESF

AESF is networked, a valid link with some authentication are needed before one can get access to the system. Figure 1 shows the login page of AESF. It is designed in two modules; the teacher's and the students' module. The provision of module is set based on email registered.
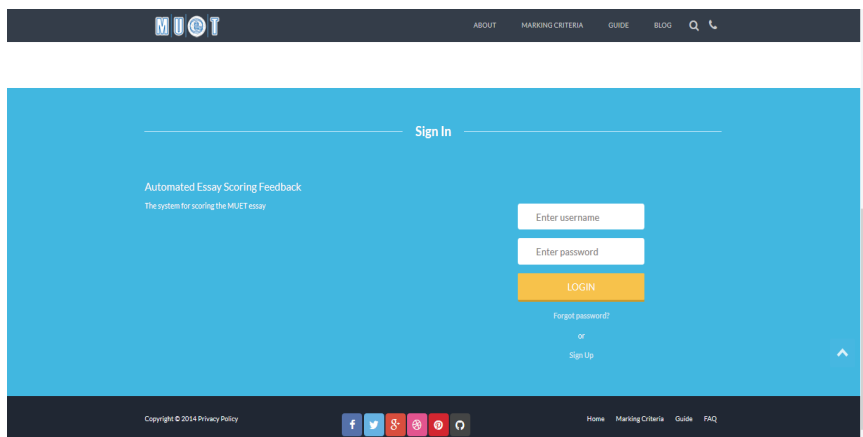
Figure 1: The Login Page of AESF

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For the teacher module, the teacher can choose to collect "*gold standard*" (essays used for training AESF) or making corrections or amendments to the gold standard. Once gold standard is in placed or trained, the teacher can set the task according to the need of his/her lesson. He or she can choose the respective topics and set a timeframe for the writing assignment. Once the due date is up, students cannot submit essays or make further corrections. The user interface of the teacher module is shown in Figure 2.
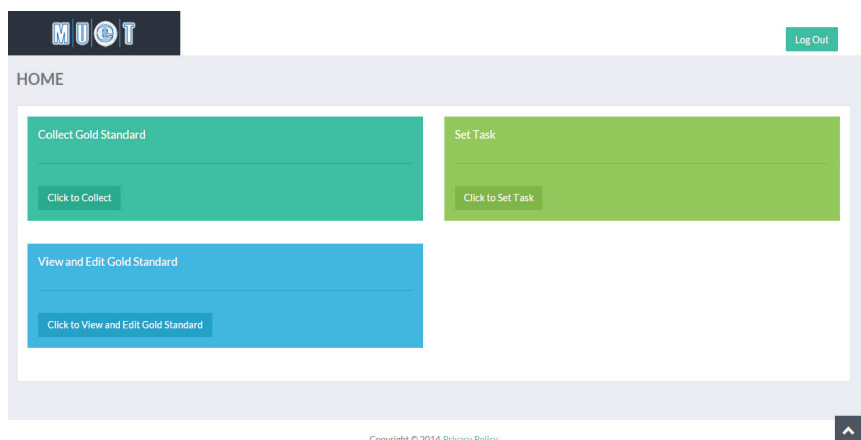
Figure 2: The Teacher Module

As for the students' module, they are shown the rubric of the essay and also the time limit set by their teachers. In this module as shown in Figure 3, students can choose to write their essay in the "full essay" option or the "paragraph by paragraph" option.

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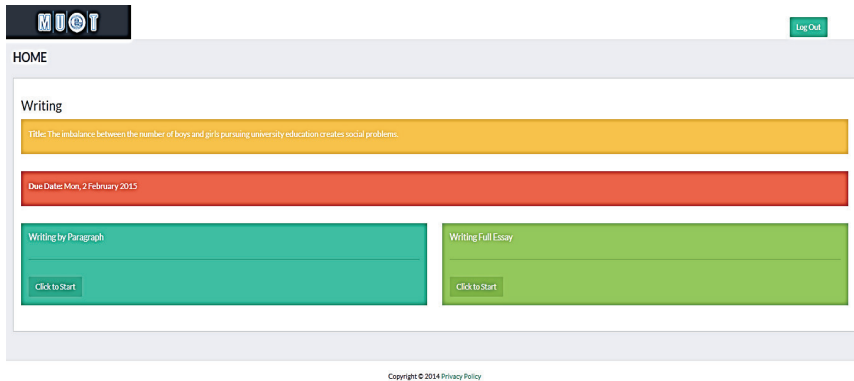
Figure 3: The Student Module

For the paragraph option, students write essays as usual by separating each paragraph using the "enter" button. Whenever students need feedback, they can hit the "preview" button. By hitting the "preview" button, AESF will automatically segment the essay into paragraph and assign a score to each paragraph together with some feedback. Students can then revise and continue writing over and over again until they are satisfied with their score before they submit their essays to their teachers.

For the full essay module, the process is more straightforward. Students will need to write the complete essay and then hit the "preview" button like the previous option. AESF will score and provide a holistic score. In addition, it also provides some general comment and some flagging of errors on the essay itself. Similarly, students can edit and re-score their essays as many times as they need before submitting their final essays to their teacher.

AESF employs the state-of-art advancement in NLP and ML to train and score essays. The AESF essentially constitutes two computing components; Essay Processor (EP) and Essay Grading Model (EGM). The EP technically is an essay analysis engine which is able to detect 10 essays properties:

1. Total word count in an essay
2. Total sentence count
3. Average words per sentence
4. Average words per paragraph

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5. Average sentence per paragraph
6. Spelling error count
7. Spelling error rate (Spelling error count/Total word count in an essay)
8. Word type
9. Lexical richness (Word type/Total word count in an essay)
10. Use of noun, adjective, and adverb

The EP is built upon NLP research findings and is rather acute to extract the intended features.

Once all the sample essays are analysed and the ten features are extracted, these information will be fed into the EGM to grade student's essay. EGM essentially is built upon a machine learning algorithm, Vector Space Model (SVM) which has the capability to learn from the data given. The algorithm learns to construct a mathematical model from the input and using that to make prediction and decision of essay grade.

Referring to Figure 4, in order to grade an essay, the essay is fed into the EP, which is represented by a series of features which in turn is projected into the EGM to estimate the essay score and band.
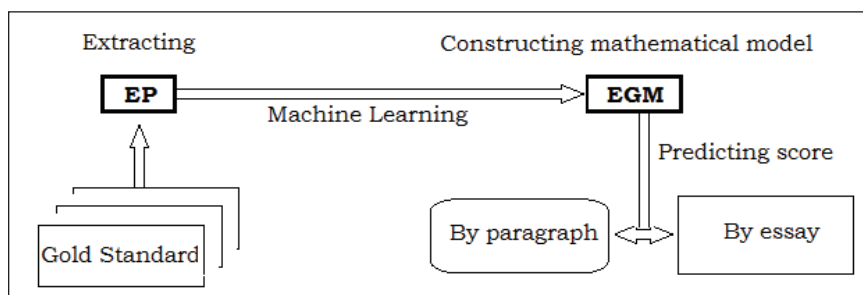

Figure 4: The Working Model of AESF

Performance Evaluation of AESF

Based on the marking rubric of MUET, essays are judged based on content, language and organisation, where content takes up 50% and the other 50% was equally shared by language and organisation. The sum of both areas suggests the final holistic score.

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In order to evaluate the performance of AESF, content measurement as suggested by the lexical richness and content coherency and language proficiency as measured by the interweaving of syntactic correctness and a variety of sentence structures are combined to predict a final score. The reliability of the score prediction by AESF is compared to independent human score.

A preliminary evaluation was carried out involving an essay topic of 250 real essays, composed by different students. Each essay was graded by five participating teachers, from the distribution of Bands 1, 2, 3, and 4. The 250 essays were then fed into AESF to obtain their correspondent bands. The band from AESF is then compared to the bands given by the teachers. If the band from AESF is in agreement with the teachers, it is a hit, the other a miss. Table 1 summarizes the accuracy (number of hit/total essay) of the model to grade different band of the essay with leave-one out approach. Leave-one-out approach is a collective estimate performance of an essay predictive model trained on n−1 essay, where at each iteration, the essay being left out would be used to evaluate the model.

Table 1: Percentage of Accuracy in Scoring with AESF

Band	1	2	3	4	5	6
Accuracy	65.0%	25.7%	88.8%	0%	N/A*	N/A*

*Data is not available at the time of collection.

As we notice, the highest accuracy is on scoring Band 3 essays. This is due to the fact that the Band 3 essays are the norm in the essay collection. This is followed by Band 1 prediction, where the essays in this group demonstrate certain obvious properties: low word count, use repeated words, low number of sentences, just to name some.

However, the current system has its bottleneck at predicting Band 2 essays accurately as they demonstrate very thin borderline with Band 1 essays where most of them were miss-categorized into Band 1. In addition, Band 4 did not work as it has extremely low number of essays. In this initial study, evaluations on Bands 5 and 6 essays were not carried out due to a lack of sample essays in these two categories.

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Blending AESF into the Writing Classroom

The ability of AESF in marking essays can be blended into the teaching of essay writing in common classroom as a writing tool for homework and enrichment purposes. In order not to distract and disrupt the smooth flowing of a common writing lesson, AESF will be used at the "while" writing and "post" writing stage. After the teacher has discussed the rubric and the outline of the essay based on classroom contribution, s/he will then get students to draft out their outline on paper. Either at school or at home, students may be given 1-3 days to complete and submit their essays via AESF. They are given the flexibility to write in either paragraph by paragraph or full essay option.

Once, the deadline is up, the teacher can go through the submitted essays and add on or rectify the feedback and the score assigned to each essay. From this process, the teacher will be able to identify the general mistakes that students make and identify individual students for remedial purposes apart from extracting model essays if there is any for other students to refer to. Each student's progress is also recorded each time students preview their work. A copy is saved so that the teacher will have a complete record of the students' progress and the areas that the students have come to realise and hopefully learn for future essays.

CONCLUSION

The reliability of AESF scoring can be greatly improved with the increase of the corpus size that has an equal distribution of grades. At the prototype stage, AESF demonstrated the accuracy level of 88.8% in predicting Band 3 score, hence, is confident that the same or even higher accuracy level can be achieved with bigger training sample. With wider application, more essays will feed into the system and the corpus can grow when the graded essays by the system is being moderated by human score and being added to the training database.

The value of a home grown AESF will far exceed any commercially available AESF when validity is concerned. A system that is tailor-made based on the construct of the test administered and trained using samples

of scored learners corpus of the same level ensures a valid ground for assessment. Despite the validity and reliability of AESF, it is more beneficial to fit it into the real life classroom rather than for the large scale testing of MUET simply because Malaysia does not have enough resources to administer the examination in full scale with a computer.

With AESF in the classroom, students will have a platform for self-edit and on-going practice in writing, making them more aware of mistakes and language proficiency as most L2 learners need most. The immediacy in the scoring and feedback provides more impact to students to be precise in their writing and present the best to their teachers. Teachers on the other hand can focus more on the content and development of their students' essays rather than having to correct the students' surface mistakes.

It is worth mentioning that the role of the teacher in the classroom remains important as facilitator and instructor whenever students need help in understanding the responses of AESF. No matter what, a machine remains a machine that is only to ease human activity, but not taking over the human's role.

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i-Learn Portal: UniversitiTeknologi MARA Pahang Student's e-Learning Continuance Intention Level and Influences Factors

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ABSTRACT

Blended Learning (BL) is the teaching and learning technique implemented in Universiti Teknologi MARA (UiTM) for the past few years. BL is the approach that combines the physical classroom learning and electronic learning (e-Learning). UiTM has developed an i-Learn portal as a platform to support e-Learning activities.The users of the i-Learn portal are UiTM students and lecturers.The objectives of this study is to determine an individual usage continuance intention level for the i-Learn portal services in UiTM Pahang. Other objectives are to identify the factors that lead to the agreement or reluctance of continuity in using i-Learn portal services in UiTM. This quantitative research used questionnaire as a tool to gather information from the respondents. Decomposed technology acceptance model proposed by Juan Carlos Roca et. Al (2006) is used as an outline on questionnaire design. This model is used because it is tailored for e-Learning services characteristics. The respondents for this research are Diploma in Computer Science UiTM Pahang students that have the experience using i-Learn portal services in their studies. Most of the subjects taught for Diploma in Computer Science at UiTM Pahang implement the blended learning technique that utilized the i-Learn Portal services. The results of this research on continuance intention towards i-Learn Portal among UiTM Pahang students is undecided. The factors that lead to this result is less perceived on cognitive absorption, flaws on information quality and the system quality.

Keywords: *e-Learning; Continuance Intention;i-Learn Portal*

INTRODUCTION

Universiti Teknologi MARA (UiTM) moves to the new era of teaching and learning method by implementing blended learning approach to upgrade UiTM students and lecturers professionalism and education quality. López-Pérez et al., (2011) said "blended learning is proven has a positive effect in reducing the failure rates and also improve the student's exam marks". Blended learning is defined as the integration of face-to-face physical classroom learning experiences and online or electronic learning (e-Learning) experiences (Garrison &Kanuka, 2004). The interest of this study is on e-Learning experiences that comprises all forms of electronically supported learning and teaching process (Wikipedia Foundation Inc., 2011). UiTM uses the e-Learning service system named i-Learn portal that is initiated and maintained by i-Learn Centre (i-Lec). This portal act as a Learning Management System (i-Learn Centre (i-LeC), 2015) or a platform to support e-Learning activities in UiTM. The success of e-Learning implementation in UiTM gives big impact on the success of blended learning approach proposed in UiTM teaching and learning process.

Based on previous research analysis done by Chao-Min Chiu, Meng-Hsiang Hsu, Szu-Yuan Sun, Tung-Ching Lin and Pei-Chen Sun (2005),it stated that the success of the information technology (IT) depends on user acceptance and their usage continuance intention. The main objective of this research is to determine the user's usage continuance intention level towards i-Learn Portal. Other objectives are to list and discuss the positive and negative factors of i-Learn Portal criteria's that influence the user's continuance intention level. These positive and negative factors will align the future improvement on i-Learn portal and will also increase the success level of e-Learning implementation in UiTM.

LITERATURE REVIEW

The success of IT is determined by the user acceptance level and usage continuance level (Chao-Min Chiu et. al, 2005)quality, and value. Research hypotheses derived from this model are empirically validated using the responses to a survey on e-learning usage among 183 users. The results suggest that users' continuance intention is determined by satisfaction,

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which in turn is jointly determined by perceived usability, perceived quality, perceived value, and usability disconfirmation. ?? 2004 Elsevier Ltd. All rights reserved.", "author" : [{ "dropping-particle" : "", "family" : "Chao-Min Chiu", "given" : "", "non-dropping-particle" : "", "parse-names" : false, "suffix" : "" }, { "dropping-particle" : "", "family" : "Meng-Hsiang Hsu", "given" : "", "non-dropping-particle" : "", "parse-names" : false, "suffix" : "" }, { "dropping-particle" : "", "family" : "Szu-Yuan Sun", "given" : "", "non-dropping-particle" : "", "parse-names" : false, "suffix" : "" }, { "dropping-particle" : "", "family" : "Tung-Ching Lin", "given" : "", "non-dropping-particle" : "", "parse-names" : false, "suffix" : "" }, { "dropping-particle" : "", "family" : "Pei -Chen Sun", "given" : "", "non-dropping-particle" : "", "parse-names" : false, "suffix" : "" }], "container-title" : "Computers and Education", "id" : "ITEM-1", "issue" : "4", "issued" : { "date-parts" : [["2005"]] }, "page" : "399-416", "title" : "Usability, quality, value and e-learning continuance decisions", "type" : "article-journal", "volume" : "45" }, "uris" : ["http://www.mendeley.com/documents/?uuid=d80c2172-e92d-4066-82e6-2894b7a570d2"] }], "mendeley" : { "formattedCitation" : "(Chao-Min Chiu, Meng-Hsiang Hsu, Szu-Yuan Sun, Tung-Ching Lin, & Pei -Chen Sun, 2005. Most popular model used for usage continuance model is Decomposed Technology Acceptance Model created by Juan Carlos Roca, Chao Min Chiu, and Francisco José Martínez (2006). This model is the enhancement of Technology Acceptance Model created by Davis (1989) that focuses on e-Learning services. The structure of this section is the evaluation of Technology Acceptance Model or its popular acronym is TAM proposed by Davis and followed by the evaluation of Decomposed Technology Acceptance Model proposed by Juan Carlos Roca et. al (2006). This structure is meant to guide the researcher and reader to have a proper understanding on Decomposed TAM.

Technology Acceptance Model (TAM)

TAM is the model to evaluate the first factor on the success of Information Technology services known as user acceptance factors. Information technology acceptance level stated by TAM model is based on two factors known as perceived on usefulness and perceived on ease of use. Perceived on usefulness is the "the degree to which a person believes that using a particular system would enhance his/her job performance", and perceived ease of use is defined as "the degree to which a person believes

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that using a particular system would be free of physical and mental effort" (Davis, 1989). Figure 1 shows the diagram of the Technology Acceptance Model proposed by Davis.
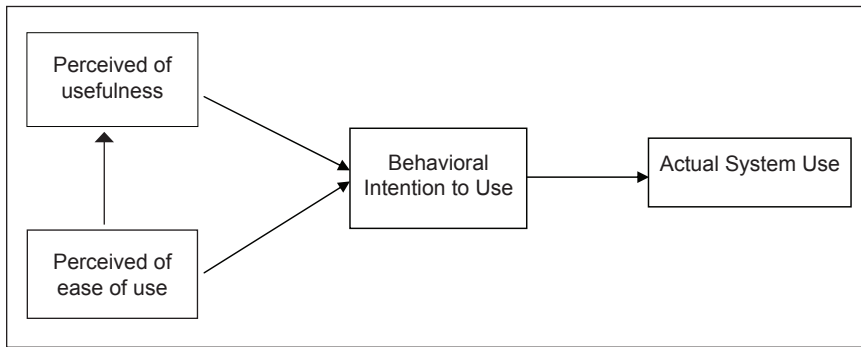
Figure 1: Technology Acceptance Model (Davis, 1989)

The usefulness and ease of use are two main criteria outlined by this model to make sure the Information Technology services is accepted and will be used by the users. This is important because human will use the technology that did not give the burden to their mental and physical (Nor Zalina Ismail et al., 2012). Based on this model and this research perspective, Learning Management System in UiTM named i-Learn Portal should give the benefit on student's result improvement and also the increment on lecturer's job performance.

Decomposed Technology Acceptance Model

Decomposed Technology Acceptance Model is used to evaluate the second factors on IT success factor known as user's usage continuance intention. It uses Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM) and Expectancy Disconfirmation Theory (EDT) as a basic of the proposed Decomposed Technology Acceptance Model (Juan Carlos Roca et. al, 2006). Figure 2 shows the diagram of decomposed Technology AcceptanceModel.

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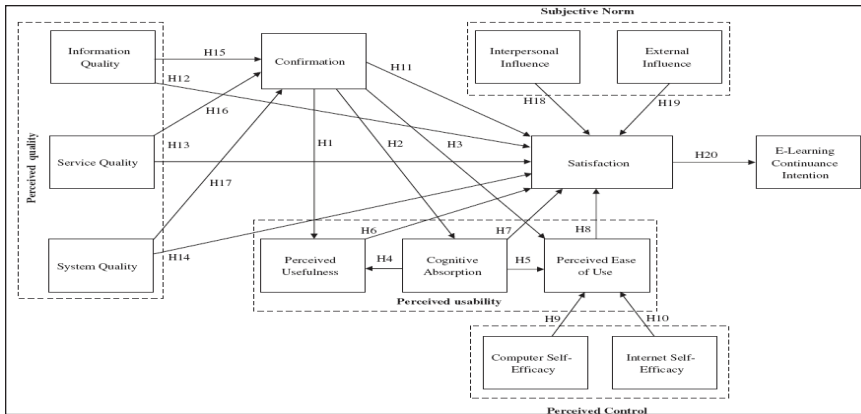
**Figure 2: Decomposed Technology Acceptance
Model (Juan Carlos Roca et. al, 2006)**

Decomposed Technology Acceptance Model outlines twelve factors that lead to the e-Learning continuance intention. The factors are listed as below:

1. Perceived usefulness
2. Perceived cognitive absorption
3. Perceived ease of use
4. Perceived internet self-efficacy
5. Perceived computer self-efficacy
6. Interpersonal influence
7. External influence
8. Information quality
9. Service quality
10. System quality
11. Confirmation
12. Satisfaction

Decomposed Technology Acceptance Model proposed by Juan Carlos Roca et. al (2006) is chosen because this model is specific for e-Learning service compared with other user's usage continuance intention model. In addition, another factor on choosing this model is because it used other established model as a base for their proposed Decomposed Technology Acceptance Model(Nor Zalina Ismail et. al, 2012).

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METHODOLOGY

This is a quantitative research based on questionnaire survey. There are two main activities involved in this research, which are data collection and data analysis.

Data Collection

This section described two important elements in this phase which are data collection tools used in this research and the people involved in the data collection phase known as respondents. This research used a questionnaire as a data collection tool. The questions in the questionnaire were created based on the twelve e-Learning Continuance Intention categories or factors listed by decomposed technology acceptance model. The questionnaire adopts Likert scale with five points as a measurement. Table 1 shows the five points Likert scale rating and strength of agreement used in the research questionnaire.

Table 1: Research Questionnaire Rating and Strength of Agreement

Rating	Strength of Agreement
1	Strongly disagree
2	Disagree
3	Undecided
4	Agree
5	Strongly agree

The number of respondents involved in this research is 240 people as proposed by Krejcie and Morgan table that based on 562 population of UiTM Pahang Diploma in Computer Science students. This table used for determining sample size for a finite population used 95% degree of accuracy. The respondents are among first semester until fifth semester of Diploma in Computer Science UiTM Pahang students. This course is chosen because 70% of Computer Science subject is registered for blended learning mode that must implement e-Learning teaching and learning experience thru i-Learn Portal.

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Data Analysis

The analysis of data is carried out in order to obtain the continuance intention level in using i-Learn Portal services among UiTM students. This phase is also to determine the influence factors of i-Learn portal usage continuance intention level. These analysis outputs were described in results and discussion section to identify the strengths and weaknesses of i-Learn portal services.

This data analysis phase involves three steps stated as data input, generate the question's mean and standard deviation values and generate category's p-value and Cronbach's α values. Data input activity involve the task to input all the respondents rating in the research questionnaire into SPSS application. The questions rating values are input as different variables. The next step is to generate the mean and standard deviations value for each question in the research questionnaire. Last step is to generate the p-value and Cronbach's α value for each category of questions in the research questionnaire. The generated of mean, standard deviations, p-value and Cronbach's α value is done by using the SPSS data analysis functions.

RESULTS AND DISCUSSION

The results of this study are discussed based on mean value generated in data analysis phase. Table 2 shows the output of mean, standard deviation for each question and Cronbach's α and p-value for each category in the questionnaire distributed to the respondents.

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Table 2: Data Analysis Result

No	Category	Questions	Mean	Standard Deviation
1	*Perceived usefulness*	Using the i-Learn Portal service can improve my learning performance	3.79	0.770
		Using the i-Learn Portal service can increase my learning effectiveness	3.78	0.788
	(Cronbach's α = 0.132, p-value=0.465)	I find the i-Learn Portal service to be useful to me	4.09	0.677
2	*Perceived cognitive absorption*	Time flies when I am using the i-Learn Portal	3.26	0.954
		Most times when I get on to the i-Learn Portal, I end up spending more time than I had planned	3.18	0.971
	(Cronbach's α = 0.836, p-value=0.0000)	When I am using the i-Learn Portal I am able to block out most other distractions	3.14	0.904
		While using the i-Learn Portal, I am absorbed in what I am doing	3.35	0.868
		I have fun interacting with the i-Learn Portal	3.51	0.892
		I enjoy using the i-Learn Portal	3.62	0.850
3	*Perceived ease of use*	Learning to operate the i-Learn Portal service is easy for me	3.88	0.646
		It is easy for me to become skillful at using the i-Learn Portal service	3.77	0.718
	(Cronbach's α = 0.784, p-value=0.050)	My interaction with the i-Learn Portal service is clear and understandable	3.79	0.724
4	*Perceived Internet self-efficacy,*	I feel confident in navigating the i-learn Portal by following hyperlinks	3.80	0.659
		I feel confident in the i-Learn Portal finding information	3.86	0.669
	(Cronbach's α = 0.904, p-value=0.0000)	I feel confident in the i-Learn Portal posting messages on a bulletin board	3.68	0.752
		I feel confident in the i-Learn Portal exchanging messages with others users in discussion forums	3.61	0.828
		I feel confident in the i-Learn Portal chatting	3.50	0.934

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5	*Perceived computer self-efficacy,*	I could complete my learning activities using the i-Learn Portal if I had never used a system like it before	3.55	0.857
	(Cronbach's α = 0.843, p-value=0.608)	I could complete my learning activities using the i-Learn Portal if I had only the system manuals for reference	3.49	0.826
		I could complete my learning activities using the i-Learn Portal if I had seen someone else using it before trying it myself	3.51	0.932
		I could complete my learning activities using the i-Learn Portal if I had just the built-in-help facility for assistance	3.55	0.831
		I feel confident in the i-Learn Portal downloading files	3.84	0.850
6	*Interpersonal influence*	My family thought I should use the i-Learn Portal	3.32	0.932
	(Cronbach's α = 0.873, p-value=0.0000)	My colleagues thought I should use the i-Learn Portal	3.63	0.831
		My friends thought I should use the i-Learn Portal	3.56	0.850
7	*External influence*	I read/saw news reports that using the i-Learn Portal was a good way of learning	3.62	0.884
	(Cronbach's α = 0.875, p-value=0.0000)	Expert opinions depicted a positive sentiment for using the i-Learn Portal	3.58	0.796
		Mass media reports convinced me to use the i-Learn Portal	3.41	0.887
8	*Information quality*	The i-Learn Portal provides relevant information for my job	3.59	0.859
	(Cronbach's α = 0.880, p-value=0.0000)	The i-Learn Portal does not provide easy-to-understand information	3.29	0.890
		The output information from the i-Learn Portal is not clear	3.16	0.939
		The i-Learn Portal presents the information in an appropriate format	3.60	0.817
		The information content in the i-Learn Portal is very good	3.63	0.789
		The information from the i-Learn Portal is up-to-date enough for my purposes	3.61	0.846
		The completeness of output information that the i-Learn Portal delivers is not sufficient for my purposes	3.29	0.893
		The reliability of output information from i-Learn Portal is high	3.60	0.806
		The i-Learn Portal provides the information I need in time	3.56	0.845

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9	*Service quality* *(Cronbach's α = 0.887, p-value=0.0000)*	The i-Learn Portal has a modern looking interface	3.42	0.925
		The i-Learn Portal has visually appealing materials	3.51	0.891
		The i-Learn Portal provides the right solution to my request	3.67	0.782
		The i-Learn Portal gives me prompt service	3.63	0.801
		The i-Learn Portal does not give me individual attention	3.44	0.911
		The i-Learn Portal has a good interface to communicate my needs	3.60	0.812
		The i-Learn Portal does not have convenient operating hours	3.43	0.963
10	*System quality,* *(Cronbach's α = 0.796, p-value=0.0000)*	Number of steps per task in the i-Learn Portal are too many	3.48	0.907
		Steps to complete a task in the i-Learn Portal follow a logic sequence	3.61	0.715
		Performing an operation in the i-Learn Portal always leads to a predicted result	3.56	0.741
		The organisation of information on the i-Learn Portal screens is clear	3.64	0.723
		The i-Learn Portal has natural and predictable screen changes	3.54	0.805
		The i-Learn Portal responds quickly during the busiest hours of the day	3.06	1.193
11	*Confirmation,* *(Cronbach's α = 0.906, p-value = 0.241)*	My experience with using the i-Learn Portal was better than I expected	3.54	0.817
		The service level provided by the i-Learn Portal was better than I expected	3.50	0.892
		Overall, most of my expectations from using the i-Learn Portal were confirmed	3.57	0.827
12	*Satisfaction,* *(Cronbach's α = 0.890, p-value = 0.543)*	I am satisfied with the performance of the i-Learn Portal	3.59	0.865
		I am pleased with the experience of using i-Learn Portal	3.63	0.839
		My decision to use the i-Learn Portal service was a wise one	3.58	0.831
13	*Continuance Intention,* *(Cronbach's α =0.866, p-value = 0.910)*	I will use the i-Learn Portal on a regular basis in the future	3.64	0.742
		I will frequently use the i-Learn Portal in the future	3.62	0.778
		I will strongly recommend others to use it	3.63	0.876

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Reliability of the respondents answer is 93.9% reliable based on overall Cronbach's α value generated by SPSS is 0.939 (p-value=0.000). Based on the mean rating that nearly to value 3 which means "undecided" shows that respondent did not fully agree on the perceived cognitive absorption regarding two issues which are "most times respondents get on i-Learn Portal, he/shespend more time than planned and i-Learn Portal did not really block out other distractions when he/she is using the portal". Other categories falls under "undecided" rating scale are related to information quality because respondent is undecided whether the information from i-Learn Portal is clear or not. The last issue falls under "undecided" rating scale which is system quality related to i-Learn Portal respond time during peak hours. It shows that the continuance intention level towards i-Learn portal service among UiTM Pahang students is "undecided" to continue on using it.

CONCLUSION

The result of this research shows that i-Learn Portal continuance intention level among UiTM Pahang students is not in the good score. i-Learn Portal should improve their perceived cognitive absorption issues, information quality and system quality. Solution and action should be taken on how to get better student engagement, increase the information quality and improve the respond time during peak hours. The improvement will increase the user's continuance intention level.

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Enhanced Collaborative e-learning Model with Cognitive Assessment and Open Learner Model

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ABSTRACT

This paper is focused on proposing a model of an enhanced collaborative e-learning system by including the elements of cognitive assessment and open learner model. The main objective is to provide a new andragogical tool to foster self-regulated learning for programming subjects through the online collaborative e-learning platform. The proposed model includes the cognitive assessment module in collaborative e-learning platform such as the assessment of logical thinking skills and metacognitive knowledge among the beginners in programming field. The goal is to provide the students with evaluation mechanisms towards their own cognitive abilities. The open learner model is also included in this model in order to provide qualitative performance representations to the students, where they can reflect their own milestones for each programming topic and monitor their own progress as they improve their programming skills. The open learner model will adapt the SMILI Open Learner Modeling Framework which highlights four important elements that need to be identified, which are the context and evaluation, the learners content that can be viewed, the presentations of the open learner model and the users that gain access to the system. Meanwhile, the iterative waterfall model is being proposed in this paper to be used as the overall methodology that comprises six main phases which are feasibility study, requirement gathering and analysis, design, implementation, evaluation and maintenance.

Keywords*: cognitive assessment; collaborative e-learning; learner model; open learner*

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INTRODUCTION

Computer programmers are still in demand these days due to the increasing needs of application software, mobile applications and web applications. Despite the fact that computer programmers are still relevant these days, learning to program is generally considered hard, and the enrolments in programming courses in tertiary levels were reported to decline worldwide (Koorse et al., 2015). Over the past few years, high failure rates in programming courses have also been recorded and reported in many colleges and universities from all around the globe. A recent study done by Watson and Li (2014) that involved 15 different countries including the United States, Australia, United Kingdom, Finland, China and Indonesia has revealed that the average passing mark for computing programming courses was only at 67 percent.

For many years, researchers and academicians have doubled their efforts to identify the factors that contribute to the high failure rates in computer programming courses. The most common cause is the nature of the programming subject itself that demands high level of intellectual capabilities and often being related to the engineering activities as claimed by Valentin et al. (2013). Other possible causes are the lack of interest and motivation in learning programming, lack of prior knowledge, the technical nature of the programming languages used and differences in teaching and learning styles and strategies as mentioned by Kalelioglu and Gulbahar (2014).

Meanwhile, cognitive abilities have also been claimed as one of the factors that determine the success or failure in introductory programming courses (Othman et al., 2015). Among the cognitive abilities required in becoming a successful programmer are metacognitive and problem-solving skills, analytical and critical thinking, as well as reasoning and logical thinking skills (Havenga et al., 2013; Osman &Maghribi, 2015)**.**By using these skills, students should be able to analytically and logically analyze the given problems and provide the right solutions. These steps are likely to be the most important steps in Program Development Life Cycle (PDLC) (Mazlan& Othman, 2015). Previous studies have also revealed that students with under developed cognitive abilities will fail to grasp the basic problem-solving concepts of programming, consequently will lead them to be less

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motivated or even withdrawing from the course (Mazlan& Othman, 2015; Othman et al., 2015).

The typical traditional teaching and learning method in programming classes or practical sessions have also played an influential factor that determines students' levels of understanding and engagement in learning programming. The linear approach that starts by introducing the students with the basic of programming language and later guide them towards finding the best strategies in solving programming problems only involved the use of blended materials and lecture notes (Osman &Maghribi, 2015; Zain &Paidi, 2015). Minimal interaction between students and lecturers will eventually lead the students to become passive information receivers, especially when large groups of students are involved (Zain &Paidi, 2015).

Over the past few years, varieties of new strategies, techniques and methods have been studied, introduced and employed in teaching and learning programming in order to overcome these issues. Some researchers have applied the use of concept maps and other visual instructional strategies and techniques (Osman &Maghribi, 2015; Zain &Paidi, 2015). Others include studies about the differences of students' logical thinking skills, cognitive abilities and personality profiles as the predictor of success in computer programming (Othman et al., 2015). Meanwhile, previous studies have also showed interest in incorporating collaborative learning or pair programming techniques in physical or online classrooms to encourage active learning and enhance students' engagement in learning programming (Othman et al., 2015; Zain &Paidi, 2015).

Recent studies have also utilized the Information and Communication Technologies (ICT) to enhance teaching and learning programming such as multimedia and interactive games, mobile applications and e-learning platforms (Tillmann et al., 2013; Valentin et al., 2013). Meanwhile, the emergence of numerous collaborative e-learning platforms has also shown positive outcomes in supporting and facilitating teaching and learning for programming courses such as the Online Collaborative Learning System (OCLS) designed by Othman et al. (2013), Supporting Collaboration and Adaptation in a Learning Environment (SCALE) by Verginis et al. (2011) and AutoLEP by Wang et al. (2011). All of these collaborative e-learning systems offer multi-benefits towards supporting the teaching and learning

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process for programming subjects as well as improving students' learning styles and strategies.

Although there have been countless efforts and studies done to improve the students' programming skills, particularly in using the collaborative e-learning platforms, most of the collaborative e-learning platforms do not provide users with cognitive assessments and open learner models. Cognitive assessments such as the Group Assessment Logical Thinking (GALT) test is usually being done using pen and paper with its main goal is to identify the differences of students' cognitive abilities (Roadrangka et al., 1983). Meanwhile, the existing open learner models are often presented separately from the e-learning systems and mostly developed to cater individual learner models rather than providing learner models for groups of learners (Clayphan et al., 2014).

Therefore, the purpose of this study is to propose an andragogical solution by designing a model for the enhanced collaborative e-learning system that includes both the cognitive assessment module and the open learner model. The aim of this study is to raise students' awareness towards their own personal and collaborative groups' achievements through self-assessment and self-regulated learning. The reflection of performance through the open learner model will allow the students to see their own developing knowledge, difficulties and learning process (Clayphan et al., 2013). Open learner model can also provide mechanism to observe learners' behaviour and qualitative representations of the learner's cognitive and affective knowledge (Bull & Kay, 2007). To date, there are only a few researchers who have embarked on combining the online collaborative platforms with the learner models such asBull and Kay (2007), Bull and Vatrapu (2011), Alotaibi and Bull (2012), Clayphan et al. (2014) and Kickmeier-Rust et al. (2014). Therefore, this open learner modeling technique with the cognitive assessment module in the enhanced collaborative e-learning system can be a potential medium to encourage metacognitive activities that will influence the collaborative groups to take greater responsibilities towards their learning in programming. Hence, it would help the students to improve their programming skills.

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RELATED WORKS

Collaborative E-learning System for Programming

The development of the e-learning systems for teaching and learning programming are positively progressing towards the Computer-Supported Collaborative Learning (CSCL) system such as the Online Collaborative Learning System (OCLS) by Othman et al. (2013) and Supporting Collaboration and Adaptation in a Learning Environment (SCALE) by Verginis et al. (2011). These collaborative e-learning systems were claimed to be effective in facilitating online group collaborations and incorporate social networking features. For instance, with SCALE, students were expected to be actively involved with their own improvement in programming by referring to the feedbacks and recommendations given by the system. Students will become increasingly aware of their own performance in programming courses via SCALE (Verginis et. al., 2011). Other research involves the development of a web-based system named AutoLEP that was developed by Wang et al. (2011) to help novice programmers in attaining their programming skills by providing novel assessment mechanism that allows users to test and evaluate their own programs. Students' learning experiences were claimed to be improved via this system (Wang et al., 2011).

To date, most of these collaborative e-learning platforms do not provide the students with the cognitive assessment module and open learner models. Students need to be tested with programming questions that are equivalent to their cognitive abilities and also at the same time being guided to improve their cognitive milestones via the collaborative e-learning platform. Moreover, the reflection of their achievements in programming based on the cognitive levels that will be displayed by the open learner model will help the students to understand more about their own cognitive abilities. Eventually, they will find ways to improve which will lead them to enhance their programming skills too.

Cognitive Assessments

There are varieties of cognitive assessments that have been widely implemented in the field of education such as Metacognitive Awareness Inventory (MAI) and GALT. For instance, MAI is used to measure the students' metacognitive knowledge. In solving programming problems,

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metacognition role has been proven important where previous study has identified that student who performs well in programming, eventually facilitates more metacognitive skills than the lower achievers (Havenga et al., 2013). In addition, the linear model of problem-solving development lifecycle actually demands metacognitive control over planning, monitoring and evaluation of the solution of the problem, traits that are important in computer programming (Havenga et al., 2013). Therefore, it is equally important for the students to be aware of their own metacognitive levels of knowledge in order to foster active engagements with their own progress in learning computer programming.

Meanwhile, for this study, GALT test will be incorporated in the cognitive assessment module for the collaborative e-learning system. This logical thinking test has been widely utilized in the teaching and learning fields and the Cronbach's alpha reliability coefficient is 0.52, which is considered moderate to be used in this study. GALT test was first developed by Roadrangka et al. (1983) with six subscale measures for logical operations as depicted in Table 1. The subscale measures cover the tests for conservational reasoning, proportional reasoning, controlling variables, probabilistic reasoning, correlational reasoning and combinatorial reasoning.

Table 1: The Six Subscale Measures for Logical Thinking in GALT Test

Subscales	Item No.	Item Descriptor
Conservational reasoning	1	Piece of Clay
	2	Metal Weigh
Proportional reasoning	3	Glass Size
	4	Scale
Controlling variables	5	Pendulum Length
	6	Ball
Probabilistic reasoning	7	Square and Diamonds #1
	8	Square and Diamonds #2
Correlational reasoning	9	The Mice
	10	The Fish
Combinatorial reasoning	11	The Dance
	12	The Shopping Centre

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Open Learner Model

There are many types of open learner models to be adapted in the online platforms either as simple or complex representations. For instance, the simple learner models will present simple information to the learners such as the learner's level of knowledge for every selected topic. This simple information will be represented using skill meters and covers the expert knowledge, problematic areas and misconceptions (Bull & Kay, 2007). Meanwhile, the complex learner models will present information that is more thorough to the learners by facilitating varieties of modeling techniques such as knowledge tracing in cognitive modeling or Bayesian networks (Bull & Kay, 2007). Previous online systems developed using the open learner models, involved works done by Bull and Kay (2007) called SMILI and OMLlets.

Open Learner Model for Collaborative Platforms

To this day, open learner models are normally being developed to represent learner models for individual learners. Thus, combining the open learner model in the collaborative e-learning platform has been seen as a new direction in Computer-Supported Collaborative Learning (CSCL) research.This will provide open learner model to groups of learners (Bull &Vatrapu, 2011). In recent study done by Kickmeier-Rust et al. (2014), an open learner model has been developed together with the competence-based feedback for collaborative language learning. Other than that, open learner model has also been developed for scaffolding students' reflection towards collaborative brainstorming (Clayphan et al., 2014). Another interesting study, conducted by Alotaibi and Bull (2012), has used the social network platform such as the Facebook with the combination of an open learner model named OLMlets to investigate the effectiveness of online interaction and collaboration. Open learner model offers many benefits to the learners as mentioned by Bull and Kay (2007), which some of the benefits are; the open learner model helps to promote metacognitive activities such as reflection, planning and self-assessment, supports navigation and facilitates groups collaborations.

Therefore, due to the fact that the open learner model has plenty of beneficial factors to offer to the students and lecturers, it can be seen as a

potential effort in supporting groups collaboration and discussion as well as fostering self-regulated learning in the collaborative e-learning environment.

PROPOSED MODEL OF AN ENHANCED COLLABORATIVE E-LEARNING WITH COGNITIVE ASSESSMENT AND OPEN LEARNER MODEL

This section discusses the proposed model of an enhanced collaborative e-learning platform with open learner model and cognitive assessment modules embedded into it as depicted in Figure 1. Based on Figure 1 below, the students will be divided into small collaborative groups and later engage with the collaborative activities by answering programming questions constructed in the e-learning contents. The lecturers will do the division of the collaborative groups manually by mixing the low achievers with the high achievers in each collaborative group. This is to provide a platform for the low achievers to discuss and learn more from their high achievers' friends.
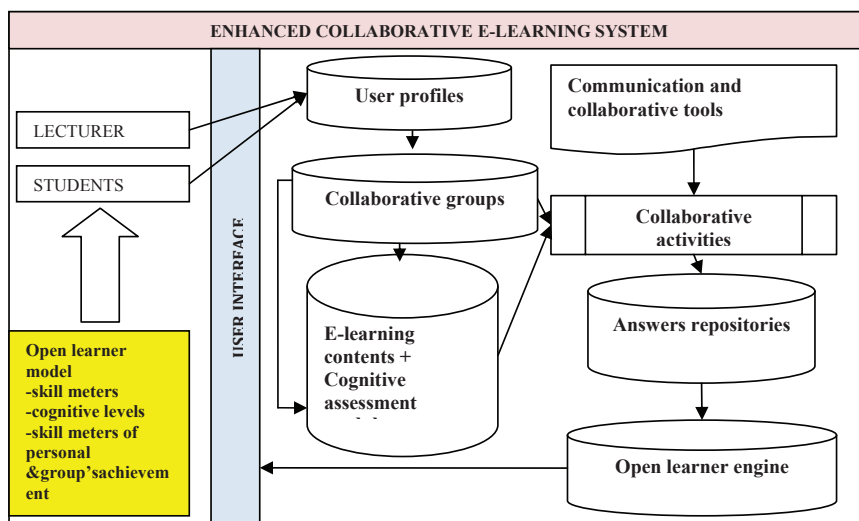

Figure 1: Enhanced Collaborative E-Learning System with Cognitive Assessment Module and Open Learner Model

Meanwhile, the development of the e-learning contents will include two cognitive assessment modules which are the logical thinking test module and the programming questions module that will cover all the main topics from the introductory programming subject and will be constructed based on Bloom's Taxonomy cognitive domains. His taxonomy cognitive domains have six main stages of cognitive developments, which are knowledge (C1), comprehension (C2), application (C3), analysis (C4), synthesis (C5), and evaluation (C6) which have been widely implemented in the field of education and is aimed to ensure that the students will achieve their cognitive milestones.

The results from both cognitive assessment modules will be displayed in the open learner model to represent the students' achievements in each programming topic. The open learner model proposed in this collaborative e-learning system will include displays of skills meters for individual achievements and collaborative groups' performance. The skill meters will not only highlight the positive achievements, but will also highlight the problematic areas or misconceptions for each individual student and their collaborative members in order to create awareness on their own and group development and progress in programming subject as well as encouraging self-regulated learning and active discussion in the virtual environment.

MATERIAL AND METHOD

In order to develop the enhanced collaborative e-learning system with the cognitive assessment modules and the open learner model as proposed in the previous section, an iterative waterfall model has been used as the methodology. The iterative waterfall model as depicted in Figure 2 below involves six main phases which are i) feasibility study ii) requirement analysis, iii) design, iv) implementation, v) evaluation and vi) maintenance.
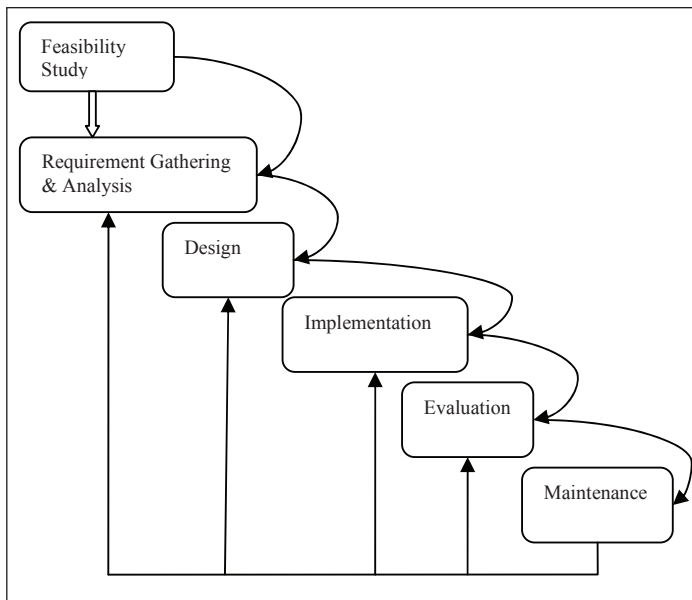
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Figure 2: The Iterative Waterfall Model

Feasibility Study

During this phase, interviews and questionnaires were conducted to determine whether a new or improved system is a feasible solution. The activity in this phase involved the collection and analysis of different information and data items that were needed as input, process and outputs. Problems have also been defined and feasible solutions were strategized and evaluated in the feasibility study.

Requirement Gathering and Analysis

The second phase of this study involved requirement gathering and analysis where firstly, the research population and samples were determined. The population of this study are the Computer Science lecturers and students working and enrolled in Computer Science Department at UniversitiTeknologi MARA (UiTM) Perlis. The sample of this study consisted of male and female students enrolled in the first semester classes, where in each of these classes programming courses are taught to heterogeneous classrooms with no grouping or ability tracking. The goal of

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this requirement gathering and analysis is to identify the users' views and needs to ensure the developed system can fulfill the requirements needed. Finally, the analysis of the requirements was represented using the Entity-Relationship Diagram (ERD) and Data Flow Diagram (DFD).

Design

The overall design and development of the cognitive assessment modules in the e-learning contents involved the use of web-based application tools such as MySQL for the database, PHP and Apache web server. The original version of GALT test that comprised 12 questions was designed and transformed to suit the online interface where the students' answers will be saved in the database. The individual scores for the logical thinking test were then displayed in the final open learner model.

Meanwhile, the design of the open learner model for the enhanced collaborative e-learning system was adapted from the SMILI Open Learner Modeling Framework as proposed by Bull and Kay (2007). By referring to this framework, four elements were identified, which are the context and types of evaluation, the contents that are open for the learners to view, the graphical representation of the open learner model and the actors that will be granted the full access to the system.

The context and types of evaluation for the open learner model designed and developed for this study mainly focused on the overall interactions of the learners with their learner models. This was done by firstly determining the topics in the Fundamentals of Computer Problem Solving subject as the e-learning contents and the types of the programming questions that will be asked in the enhanced collaborative e-learning system. In this study, both multiple-choice and short structured questions were constructed based on Bloom's Taxonomy cognitive domains and represented in the e-learning contents for the collaborative activities.

Meanwhile, based on the SMILI Open Learner Modeling Framework, the open learner model designed for this study will support the accuracy, learner reflection on knowledge and understanding, learners monitoring their learning, as well as group collaboration. The learners were also being granted to navigate between questions if they are not satisfied with their

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learner models. This is to encourage the learners to identify their own problematic areas or misconceptions in order for them to improve and finally achieve their targets.

For the graphical representation of the open learner models designed for the enhanced collaborative e-learning system, the simple presentation such as skill meters were used to display the individuals or groups' achievements. Three stages will be displayed on the skill meters based from the questions answered in the collaborative activities, which are the percentage of correct answers, misconceptions, and questions that have not been answered. Lastly, the main actors identified for the enhanced collaborative e-learning system are the lecturers as the system administrators and the students as the learners. Both actors were given full interactions with the collaborative activities, cognitive assessment and open learner models.

Implementation, Evaluation and Maintenance

Currently, the development of the enhanced collaborative e-learning system with the cognitive assessment and open learner model is in its design and development stage. Therefore, the future work for this study will involve the implementation of this enhanced collaborative e-learning system in the programming classes in UiTM Perlis. Usability testing and user acceptance testing have also been scheduled to be conducted once the system has been fully developed and implemented.

RESULTS AND DISCUSSION

This section discusses on the design and development of the cognitive assessment modules and open learner model for the enhanced collaborative e-learning system.

Cognitive Assessment Module: Logical Thinking Test

For the first cognitive assessment module, each student needs to answer a logical thinking test. The logical thinking test used in this study is the GALT test that has been described in the previous section. Figure 3 below depicts an example of the logical thinking test that has been embedded in the collaborative e-learning system. Altogether, there were 12 questions

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that the students need to answer and the results will be displayed in the open learner model after they have finished all the cognitive assessment modules.
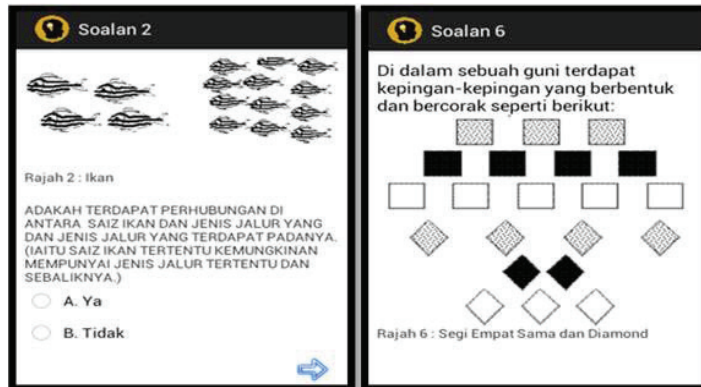

Figure 3: Example of Logical Thinking Test

Cognitive Assessment Module: Programming Questions based on Bloom's Taxonomy Cognitive Domains

In this module, each of the students in the collaborative groups was asked to answer series of questions posted by the lecturers in the system, where each of the questions represented each topic from the Fundamentals of Computer Problem-solving subject. There were two types of questions that have been constructed, namely the multiple-choice questions and short structured questions. The students were also been given options to answer questions with different cognitive levels. Figure 4 below shows the example of the multiple-choice questions with the cognitive levels. The collaborative group members were allowed to discuss with each other via the chat room available in the system. This is to support group's collaboration, communication and discussion among the group's members from dispersed locations.
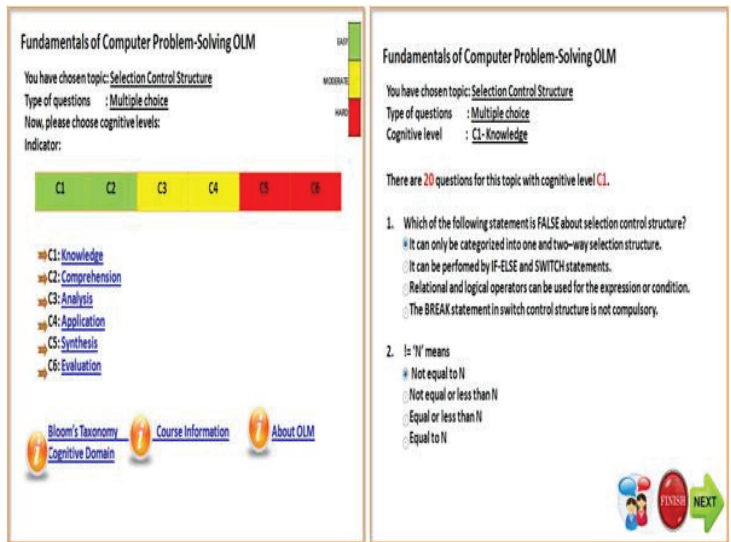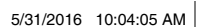
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Figure 4: Example of Multiple-Choice Questions with Cognitive Levels

Open Learner Model

This module will represent the students with their individual and group's open learner models as depicted in Figure 5. Each open learner model represents the skill meter that reflects the individual and collaborative group's achievements for logical thinking tests and for each programming topic that they have previously answered. The open learner model designed for this study will display three stages of performance for each student in the collaborative group, which are the correct answer, labeled in blue colour, misconceptions with red colour and have not answered questions in green colour. The goal is for them to be aware of their own performance and progress in the particular programming topic, and if they are not satisfied with the initial results, they can always return to the cognitive assessment modules and execute the test again. The open learner model is also aimed to foster self-regulated learning where the students will be increasingly aware with their own learning progress and how they can improve their learning and understanding in programming through the collaborative e-learning platform.

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Figure 5: Example of Individual and Collaborative Group's Skill Meters

CONCLUSION AND FUTURE WORK

As a conclusion, the proposed model of the enhanced collaborative e-learning system can also be used as a platform for group collaborations, cognitive assessments and representations of open learner models for individual or groups of learners. The open learner model concepts proposed in this study will represent the learners' cognitive achievements such as logical thinking skills, and cognitive developments based on Bloom's Taxonomy cognitive domains. Other than that, the open learner model designed for this study will also help to highlight the students' problematic areas or misconceptions in each programming topic based on the questions that they have answered in the cognitive assessment modules. From there, students can directly cater the problematic topics by doing extra exercises in the e-learning system or simply execute the cognitive assessment modules again until their skill meters show some improvements. The graphical display of the individual or group's performance will be constantly changing as the students improve their programming skills and progressing in this subject. By referring to these achievements, students will be increasingly aware of their own performances and become more engaged with their own

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personal achievements in programming as well as actively participate in group discussions via the collaborative e-learning platform. Future work for this study will embark on the full development, implementation and evaluation of this system that involves usability and user acceptance tests.

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The Use of WhatsApp Group
in Class-Related Information Sharing
Through Academic Discussions

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ABSTRACT

The world nowadays is acquainted with the term 'technology' as humans are surrounded with sophisticated gadgets which may help to ease communication amongst human beings. The purpose of this study was to investigate the students' perceptions on the use of WhatsApp Group in class-related information sharing through academic discussions. Apart from that, this study also examined the impacts of using WhatsApp Group in discussion related to learning as well as to investigate whether or not WhatsApp Group may improve students' learning process. This study was a quantitative study conducted in a college in Perak. Questionnaires were distributed to 150 respondents by using random sampling. The data were analysed by using the SPSS Version 22.0. The results indicated that students have positive perceptions and it gives positive impacts to students' learning by using WhatsApp Group in Class-related Information sharing through academic discussions. The result also shows that WhatsApp Group may lead to students' improvement in their learning process.

INTRODUCTION

The world these days are definitely surrounded by technology. This is proven when Bansal and Joshi (2014) stated that teachers now are required to diverse the use of technology in their teaching, since the students are

more technology-savvy. Teachers are now converting their traditional teaching method to become more technology-like teaching styles to ensure the students' interest is always there in the classrooms, during the teaching and learning sessions. Researchers have found that there is booming of e-learning classrooms, where the students may learn the content online by using the computer mediated tools such as laptops, iPad and smartphones. There are numerous e-learning sites that can be easily found by the teachers and students in order to improve their teaching and learning process and is reflected to be a new notion covering a variation of applications, learning procedures and learning approaches (Barhoumi & Rossi, 2013). E-learning targets to distribute teaching to students which are not present in the classroom. It delivers admission to learning properties when the teacher and students are separated by time, distance or both (Honeyman & Miller, 1993).

However, Amry (2014) indicates that learning could also be affected by multiple variables, including the cognitive and psychological states of the learner, teacher professionalism as well as nature and complexity of the pedagogical approach. On top of that, Prensky (2001) suggests that our students today are all suitable to be recognised as 'native speakers' of the digital language of computers, video games and the Internet. The statement given by Prensky (2001) indicates that the advancement of learning styles is appropriate due to the attitude of young generations in which they are keener to communication and learning through mobile devices such as smartphones.

BACKGROUND OF THE STUDY

In the current scenario, students are categorized as digital natives and they are exposed to digital gadgets since they were born. Throughout their life expectancy, they are surrounded by ICT tools such as laptops, computers, mobile phones and the terms Wall Posts, Status Updates, as well as those microblogging lexical terms namely OOTD, ASAP, LOL, HB and so forth that may indicate the use of Social Media in their daily life. With that, teachers nowadays are moving towards the adaptation of ICT in their teaching and learning such as by the use of online discussions using WhatsApp Group for the purpose of enhancing the digital native students' participations. This happens when the digital native students

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would prefer to ask questions outside of the classrooms at their leisure time using WhatsApp. Hence, this research will investigate the use of WhatsApp Group Discussions in class-related information sharing through academic discussions at a college in Malaysia.

RESEARCH OBJECTIVES

The research objectives of this study are:

1. To gauge students' perceptions on the use of WhatsApp Group in class-related information sharing.

2. To identify impacts of using WhatsApp Group to share class-related information.

3. To investigate whether or not WhatsApp Group discussion may improve learning process by sharing information in discussion beyond the class hour

Research Design

This study is a descriptive research utilizing questionnaire as the instrument. The questionnaire consists of three sections which are (1) WhatsApp Group Effects to Class-related Information Sharing, (2) Perceptions towards WhatsApp Group to Class-related Information Sharing and (3) WhatsApp Group Helps to Improve Learning Process beyond the Class Hour. The questionnaire was adapted from Norliyana (2013) and Nur Amalina (2014) and it uses Likert Scale as a medium of measurement.

Samples

The sample of this study includes 150 students from Diploma in International Business (DIB) in MARA Professional College, Seri Iskandar, Perak, Malaysia. These students are digital natives living in the digital gadget world in the 21st century. These students are taking Fundamental Business English at the moment the study is carried out. Their entrance qualifications to further their study in this college are at least 5 credits including Bahasa Melayu and English.

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Demographic Background

Table 1 indicates the percentage of male and female students who participated in the study. Findings revealed that female respondents was higher than male respondents. There were 107 female respondents which comprised 71.3% of the whole sample whereas only 43 respondents were male, which made up of 28.3% from 150 samples.

Table 1: Distribution of Gender

	Frequency	Percent (%)
Male	43	28.7
Female	107	71.3
Total	150	100.0

Table 2 illustrates the distribution of age of the respondents. It was clear that the highest respondents involved in this study were 19 years old which comprise 58 respondents while the lowest was 22 years old and above which comprised only 7 which made up of 4.7% out of 150 respondents. It was clear that the respondents of 18 years old and 20 years old were relatively similar in range which include 39 respondents of 18 years old and 37 respondents of 20 years old.

Table 2: Distribution of Age

	Frequency	Percent (%)
18 years old	39	26.0
19 years old	57	38.7
20 years old	37	24.7
21 years old	9	6.0
22 years and above	7	4.7
Total	150	100.0

Table 3 illustrates the years of respondents' experience to use WhatsApp. It indicates that 59 (39.2%) respondents have been using WhatsApp for 3 to 4 years and followed by 55 respondents to use WhatsApp for 1 to 2 years (36.7%). In addition, 28 students have experienced using WhatsApp for 5 to 6 years (18.7%) while 5 students have been using WhatsApp for more than 6 years. There were 3 samples opted for others in

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which 1 of the 3 has been using WhatsApp for only 4 months, and followed by another 2 samples for 7 months and 9 months.

Table 3: Distribution of Years Using WhatsApp Group

	Frequency	Percent (%)
1-2 year	55	36.7
3-4 years	59	39.3
5-6 years	28	18.7
More than 6 years	5	3.3
Others	3	2.0
Total	150	100.0

Table 4 indicates the frequency of WhatsApp Checking Daily by the students. A total of 93 out of 150 students was found to frequently check their WhatsApp more than 16 times daily. The lowest was 1-5 times daily with the frequency of 4 while 27 respondents check their WhatsApp Application for 6 to 10 times daily and 18 students checked their WhatsApp for 11 to 15 times daily. There were 6 respondents opted for Others which means 1 respondent checked his WhatsApp every second, the second respondent checked the application for 19 times daily, and followed by 2 other respondents for 32 times daily, 27 times daily and lastly for more than 20 times daily.

Table 4: Frequency of WhatsApp Checking Daily

	Frequency	Percent (%)
1-5 times daily	4	4.0
6-10 times daily	27	18.0
11-15 times daily	18	12.0
More than 16 times daily	93	62.2
Others	6	4.0
Total	150	100.0

Table 5 indicates the number of WhatsApp Group the respondents have in their WhatsApp Application. Majority of the respondents have 4 to 7 groups with the frequency of 67 (44.7%), while the second highest was 8 to 10 groups with the frequency of 52 (34.7%).

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Table 5: Number of WhatsApp Group

	Frequency	Percent (%)
1-3 groups	7	4.7
4-7 groups	67	44.7
8-10 groups	52	34.7
Others	24	16.0
Total	150	100.0

Table 6 demonstrates the average time the students spent to communicate per session. The highest percentage found at less than 15 minutes per session with 41 students (27.3%) who opted for that range, while the second was at 26% students admitted that they spent at least 16 to 30 minutes per session. Falling not too far behind the leading range was 28 students who determined to spend more than 1 hour per session.

Table 6: Time Spent to Communicate in WhatsApp Group per Session

	Frequency	Percent (%)
Less than 15 minutes	41	27.3
16-30 minutes	39	26.0
31-45 minutes	21	14.0
46-60 minutes	19	12.7
More than 1 hour	28	18.7
Others	2	1.3
Total	150	100.0

Students' Perceptions towards WhatsApp Group

This section outlines the findings of the students' perceptions on the use of WhatsApp Group in Academic Discussion.

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Table 7: Distribution of Findings for Students' Perceptions

Item	Item Detail	Mean	Std. Deviation
B15	Promotes a collaborative and cooperative learning environment with my lecturers and classmates.	4.42	4.24
B12	Helps me to have instant discussions with my lecturer and classmates.	4.38	4.09
B10	Helps me to collaborate with my classmates.	4.20	0.85
B8	Let's me stay up-to-date with my lecturer and friends.	4.15	0.84
B14	Helps me actively participate in general discussion about our academic course topics.	4.13	1.65
B11	Eases the process of discussion between lecturer and students without having to have face-to-face meeting.	4.00	0.83
B9	Helps me to get useful information related to my academic content.	4.02	0.82
B13	Increases my interaction with my lecturers and classmates.	3.63	1.00

Table 7 clarified that the mean value for item B13 was the lowest with mean value of 3.63 (SD=1.00). On the contrary, item B15 had the highest mean value of 4.42 with 4.24 standard deviation value. Overall results show that the respondents have positive perceptions on WhatsApp Group usage in academic discussions.

This section also contained one open-ended question. The question was "Do you think that WhatsApp Group will be able to help you to share information related to class with classmates?"Some of the feedbacks were:

Respondent 86
"WhatsApp can also be useful during emergency such as when we as students don't have credit because it is free."

Respondent 89
"WhatsApp may give simple way of communication and no need to see face to face because we can get rapid information."

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Respondent 93
"Using WhatsApp can be more interesting and more efficient while we exchange ideas and information between class members."

Respondent 105
"WhatsApp Group helps me to ease my burden to complete my assignment when we do jokes and it makes me laugh and release stress."

In short, these points of view justified that the students would feel comfortable and excited towards the implementation of the use of WhatsApp group as a method to share information amongst the lecturers and students.

WhatsApp Group Impacts to Class-related Information Sharing

Table 8 clarified that the mean value for item C25 was the lowest with mean value of 3.92 (SD=0.87). On the contrary, item C19 has the highest mean value of 4.42 with 0.89 standard deviation value. Overall results show that have positive perceptions on WhatsApp Group usage in academic discussions.

Table 8: WhatsApp Group Impacts to Class-related Information Sharing

Item	Item Detail	Mean	Std. Deviation
C19	When I am not sure about some matters related to my course subject, I will ask my lecturer and classmates in WhatsApp Group	4.42	0.89
C20	I use WhatsApp Group to share my learning content with my lecturer and classmates	4.41	0.89
C21	I believe WhatsApp Group is a good medium to develop close relationship between lecturer and students.	4.24	0.75
C18	I believe WhatsApp Group would help me to remember information that we have learned in class.	4.09	0.93
C22	I believe I would be more confident to voice out my opinion in WhatsApp Group rather than face-to-face interactions.	3.96	0.97

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C23	I believe WhatsApp Group can be useful for organizing learning activities with lecturer and classmates.	3.96	0.97
C24	I believe WhatsApp Group is a relevant, active and interesting way of communicating with lecturer and classmates especially for post classroom discussions.	3.93	0.87
C17	I believe WhatsApp Group plays an important role in exchanging information with lecturer and classmates after the class hour.	3.93	0.87
C25	I believe WhatsApp Group has a significant potential for functioning as an educational tool in discussions after the class hour.	3.92	0.87

This section also contains one open-ended question. The question was "What is the most significant impact of using WhatsApp group in sharing class-related information with lecturer and classmates?" Some of the answers were:

Respondent 5
"WhatsApp Group may give positive impacts on the relationship between classmates and also between lecturers."

Respondent 12
"Helps to get instant feedbacks from lecturers and friends when needed."

Respondent 25
"WhatsApp Group gives easy ways to me to any class-related word, especially in deal with assignments."

Respondent 30
"WhatsApp Group give me a lot of benefits especially when I don't understand about any subjects."

Respondent 36
"Assignment and tasks can be distributed equally and we can have good discussions in WhatsApp Group."

Respondent 47
"WhatsApp Group is an interactive way to do work require team work."

Respondent 86
"WhatsApp group helps me to have small meeting with teammates."

These opinions justified that most students believe that WhatsApp group could enhance their learning during or after class sessions and at the same time they would also believe that WhatsApp group could promote good relationship with other classmates and lecturers.

WhatsApp Group Helps to Improve Learning Process

Based on Table 9, the mean value for item D27 is the lowest with mean value of 2.37 (SD=0.95). On the contrary, item D31 has the highest mean value of 3.98 with 0.95 standard deviation value. Overall results show that it has positive improvement on students' learning process.

Table 4.10: WhatsApp Group to Improve Learning Process

Item	Item Detail	Mean	Std. Deviation
D31	WhatsApp Group may help me to boost up my confident level in voicing out opinion instead of face-to-face interactions.	3.98	0.95
D28	WhatsApp Group helps me to improve my understanding on matters I do not understand about my course content.	3.87	0.86
D29	WhatsApp Group may improve the way I communicate with lecturers and classmates by getting rapid feedback.	3.87	0.73
D30	WhatsApp Group may improve the relationship between lecturer- students and students-students in academic discussion.	3.74	0.88
D27	WhatsApp Group helps me to improve in developing my skills (Writing, Speaking, Listening, Reading) related to the academic outside of class.	2.37	0.95

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This section also contains one open-ended question. The question was "How will WhatsApp Group help you to improve in sharing information related to the course you undergo?". The feedbacks were generally positive and a few of the feedbacks were:

Respondent 17
"From the WhatsApp, we can be able to share and inform any information or discuss task that has been given by lecturers because most of the students do not have enough time to go and see lecturers face-to-face so we can just discuss in the WhatsApp Group."

Respondent 33
"WhatsApp Groups helps me improve my understanding about anything I don't understand in the class."

Respondent 87
"This helps me improve my learning when I take photos during lecturer present and forward it in WhatsApp group so I can help my friends to understand also."

Respondent 99
"Helps me to save money because I don't need to always topup my phone and just discuss anything in WhatsApp group."

Respondent 111
"It helps me to get extra information and knowledge from the forward message from friends."

Respondent 121
"WhatsApp group may help me to discuss about tasks without having to meet and have face-to-face meeting so it improves my time management for meeting face-to-face."

Respondent 130
"By having discussion in WhatsApp group, I can improve my pronunciation where the lecturer give the words and ask us to record our voice and try to pronounce the words correctly."

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Respondent 143

"I can always refer back to the previous messages so that I won't forgot the old information during I do revisions."

What are the students' perceptions on the use of WhatsApp Group in class-related information sharing beyond the class hour?

Based on the data analysis that was done on demographic background, it could be concluded that all respondents were active in using WhatsApp in their daily life. The communication on using WhatsApp would not just focus on the interactions between peer to peer, but they could also be actively interacted in group communications. This could be seen from the analysis that 62% respondents spent more than 16 times daily to check on WhatsApp and 79.4% respondents had at least 4 WhatsApp groups and more. This indicates that all respondents did not have problems in using WhatsApp since they were active to communicate in WhatsApp group. Hence, this analysis supported the statement by Jones et al. (2010) that students, known as Generation-Y nowadays may not be having difficulties in learning through the latest Social Media since they have been familiarised with those sophisticated platforms.

Majority of the students agreed that WhatsApp group created a collaborative learning environment in which the result could be seen on the mean score for item B15 "promotes a collaborative and cooperative learning environment with my lecturers and classmates" (mean = 4.42). Therefore, this result supports the output from a study by Rojas (2010) that ICT could be used as one method to encourage students to keep on learning, as WhatsApp, also a tool under ICT, could create good environment for learning.

On top of that, the overall perception was computed as shown in Table 7 with the mean score 4.09 and standard deviation 0.93 which indicate that majority of the students had positive perception towards using WhatsApp group in sharing information. Hence, it was believed that students felt encouraged to use the new ways of learning method in discussion and it could enhance collaborative learning (Kessler, 2010). Students could also gain extra information and knowledge by using WhatsApp group discussion with the help of Social Media especially the WhatsApp application that could gather more information online.

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A number of respondents also provided positive feedbacks and opinions about the implementation of WhatsApp group in sharing information related to class with other classmates. In conclusion, these points of view justified that the students would feel comfortable and excited towards the implementation of the use of WhatsApp group as a method to share information amongst the lecturers and students. This result may upkeep the statement by Tian et al. (2011) that apart from receiving information on the learning contents, students could also enhance and create more joyful lifestyle. On top of that, students would feel learning is not a burden based on the environment that has been generated when students may have discussions using Social Media (Rojas, 2010).

What are the impacts of using WhatsApp Group to share class-related information?

Based on the results, most of the students agreed that WhatsApp group provided positive impacts in sharing class-related information. The result in Table 8 shoes that the highest mean score was 4.42 for item C19 "When I am not sure about some matters related to my course subject, I will ask my lecturer and classmates in WhatsApp Group". This result justified that most of the students believe that learning process would become easier and flexible with the use of WhatsApp Group in discussions. Students do not need to wait for any specific time to discuss in case they are having problems related to their study and discussion for any matters could be done at anytime even after classroom sessions (Preston et al., 2013).

The second highest mean score was calculated for item C20 "I use WhatsApp Group to share my learning content with my lecturer and classmates" which received the mean score of 4.41 which revealed that majority of the students believed that WhatsApp group could be one of the tools for them to share knowledge and information with their lecturer and classmates. Nowadays, knowledge and information is not only gained from the books, but it could also be gained from other online sources such as forums, videos and blogs. WhatsApp group could easily help students to share information with classmates and lecturers for the purpose of knowledge sharing or to create discussion in order to get clear understanding about information that has been shared (Bertelson et al., 2009).

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Besides that, most of the students gave good responses and feedbacks about the impacts of using WhatsApp group in sharing information. These feedbacks justified that most students believe that WhatsApp group could enhance their learning during or after class sessions and at the same time they would also believe that WhatsApp group could promote good relationship with other classmates and lecturers. This result reflected that learning could be more effective with quality output when students feel comfortable and at the same time it generates good relationship among teacher and students (Preston et al., 2013; Tian et al., 2011).

How can WhatsApp Group discussion help to improve students learning process by sharing information in discussion beyond the class hour?

Based on Table 10, the highest mean score of 3.98 was calculated for item D31 "WhatsApp Group may help me to boost up my confident level in voicing out opinion instead of face-to-face interactions". This is consistent with Kessler (2010) that the encouragement for students to participate more in discussion by asking more opinions could be done through discussion on WhatsApp group. The lecturers could also receive benefit from this discussion in which they can evaluate their students' academic performances base on the topic discussed.

The second highest mean score was 3.87 which is calculated for item D28 "WhatsApp Group helps me to improve my understanding on matters I do not understand about my course content". Majority of the students agreed with this item as discussion could be done in more proactive environment in which is more comfortable to voice out with opinions (Rojas, 2012). Besides that, WhatsApp group could also be the medium for students to revise lessons which have been delivered in class with classmates and lecturers.

Other than that, most of the students gave positive feedbacks and comments in the open ended question that was asked in which it required their personal opinion on WhatsApp group towards learning process. It could be concluded that the students believed that this medium could benefit them to get information easily particularly by using the online discussions through WhatsApp Group. Furthermore, communication could also be done with less expenses. Besides that, students believed that WhatsApp group is very useful to discuss topics related to learning anytime and anywhere.

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CONCLUSION

Students have shown positive responses on the use of WhatsApp Group in class-related information sharing through academic discussions. With this, it allows all parties to be easily updated and they may even receive rapid feedbacks on the go as everybody is having the WhatsApp Application in their smartphones and tablets now. Apart from that, WhatsApp group may also motivate the students to communicate and have discussions on academic matters, since it may bring confidence to students to voice out opinions in the discussions. Teachers and lecturers may also enhance students to follow this new way of communication to become handier, so that learning sessions would be interesting. In conclusion, this research is done with hope to shed the light on the trend of using WhatsApp Group in discussing several matters. With the notable findings that have been gathered, it becomes clearer

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