

Perceptions and Experience in Mobile Learning via SMS

A Case Study of Distance Education Students in a Malaysian Public University

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Abstract—SMS can be utilized as a new opportunity that can be applied to improve current educational practices and processes in a variety of fields, including distance education. This study is an in-depth qualitative inquiry into distance education students' perception and experience in mobile learning via SMS. A set of interview questions was used as the survey method to gather primary data from five students enrolling in the School of Distance Education, Universiti Sains Malaysia. The findings revealed that SMS learning generally was perceived positively by the respondents. They agreed that SMS learning is convenient, useful as reminder and relevant to their studies. Apart from few issues raised, respondents agreed that their SMS learning experiences were great, helpful and they generally satisfied with the system. As implications, the study shed lights on the potential of SMS learning as an effective and innovative paradigm in pedagogy particularly in distance education environment.

Keywords—mobile learning, SMS, distance education, perception, experience, Malaysia.

1 Introduction

The rapid growth of technologies at present gives impact to many sectors including education. This evolution has combined the traditional way of teaching with virtual

learning environment as well as e-learning application. It allows learners to learn anywhere, usually at anytime, as long as they have a computer and e-learning application. Mobile technology has also been recommended for the use in teaching and learning environments. Evans outlined that mobile learning or m-learning inherits advantages from e-learning, but extends their reach by making use of portable wireless technologies [1]. iPods, MP3 players, PDAs and mobile phones are some examples of mobile technologies. Thus, mobile learning is seen as a subset of e-learning.

Although e-learning has been widely used in the education environment, there are some impediments in the application of the e-learning systems. West mentioned that it is sad that not every student has access to a computer and the Internet [2]. He further implied that given the costs of hardware, it is not affordable for school districts to provide a personal computer to every student. Study by Andersson (2008) found that the main access-issue is not that of having a computer but that of connectivity where it is usually the speed of the connection that is the limiting factor and even those who go to internet cafés find the connection to be too slow for required assignments [3]. E-learning may provide learners with flexibility and convenience [4] as they can access any information at any time they free and like. However, in order to practice e-learning, learners must ensure to have access to computers and at the same time provided with technical support to ensure they have sufficient bandwidth available to support the type of online learning applications being used [5]. However, West suggested that most young people have phones, and this provides a real opportunity to transform their learning [2]. This is parallel with current situation in Malaysia where higher education institution students at least own one mobile phone per person. According to Zulkefly and Baharudin, a study conducted in a Malaysian higher education institution found that students preferred to communicate through SMS rather than through a voice call because of cost [6]. Affordability is one of the key factors that customers consider in choosing mobile services aside from ease-of-use and usefulness [7].

In Malaysia, there are increasing numbers of higher institutions are adopting e-learning as one of the teaching and learning methods. Although e-learning has shown benefits such as collaborative learning, flexibility, convenience [5] etc, some studies show that it is difficult to engage students in the online learning environment. Akour proposed that universities have invested in technologies such as e-learning, online learning, web services, and mobile devices in order to offer better services to students and to enhance their educational effectiveness[8]. However, online learning requires a very high degree of self-motivation which is found to be lacking among our learners [9]. Hence, the current practices in most universities in Malaysia are still lacking in ubiquitous and convenient tools that can support and assist students' lifetime learning process. Without any effort to bridge the gap, a successful student-centred learning process might be harder to achieve.

This study aimed to investigate distance education students' perception in mobile learning via the Short Messaging Service (SMS). The motivation of this research was based on the flexibility of SMSes as a communication tool to deliver and receive educational information. Besides that, this research will be looking at the distance education students experience while participating in an SMS learning project. The

participation of the students will be studied in-depth by looking at their personal belief and perception on the use of SMS for distance interaction with their tutor or lecturer.

2 Literature Review

2.1 What is Mobile Learning

The mobile platform is actually preparing for the new generation of learners which is always referred as *on-the-go students*. According to Cain (2012), on-the-go students at all levels are looking for more ways to utilize their mobile tools to get things done, including learning [10]. Cain suggested the use of mobile devices, especially mobile phones, as their growing availability make them a great platform upon which to provide supplemental content, and thus enabling learners to reinforce their knowledge anytime and anywhere [10]. From the aspect of improving students' understanding, Cain further added that,

“Student understanding and retention can be enhanced and improved by providing alternative learning activities and environments. Education theory recognizes the value of incorporating alternative activities (games, exercises and simulations) to stimulate student interest in the educational environment, enhance the transfer of knowledge and improve learning retention with meaningful repetition.” [p 259-264]

The mobility features of mobile devices make them a potential tool to motivate students as they progress in improving their grades. In details, mobile devices allow students who are interacting with their handheld devices to merge their learning experiences in a shared collaborative environment both synchronously and asynchronously. Mobile learning also offers another vision using handheld devices in wireless classrooms for computer-supported cooperative learning [11].

Mobile phones and SMS are now becoming a part of students' life in today's world. Mobile learning via SMS is the easiest and the cheapest technology to disseminate information and knowledge to students. Within educational environments, students frequently move venues [12], but their personal mobile phones are characteristically at hand or in-the-pocket with access rates well beyond the typical study or work day (Cereijo-Roibas & Arnedillo-Sanchez, 2002) [13]. Due to their small size and familiarity, mobile phones in the classroom can be unobtrusive [14], require no technology training, and are not intimidating to most users.

M-learning intersects mobile computing with e-learning; it combines individualized (or personal) learning with anytime and anywhere learning [15]. It is facilitated by a convergence of Internet, wireless networks, W/H devices (Wireless phones and Handheld devices) and e-learning. With a W/H device, the relationship between the device and its owner becomes one-to-one, always on, always there, location aware, and personalized [16]. The place independence of W/H devices provides several benefits for e-learning environment like allowing students and instructors to utilize their spare time while traveling in a train or bus to finish their homework or lesson preparation [17].

There has never been a specific definition of ‘mobile learning’. ‘Mobile learning’ is definitely not simply the combination of ‘mobile’ and ‘learning’ and according to Traxler, it has always implicitly meant ‘mobile e-learning’ and its history and development have to be understood [18]. Thus, many wider issues should be addressed in terms of explaining, understanding and conceptualizing it. However, there are many evolving definitions that attempt at identifying and defining mobile learning as done by Quinn, “E-learning through mobile computational devices: Palms, Windows CE machines, even your digital cell phone” [15]. Another view of mobile learning quoted that “exploitation of ubiquitous handheld hardware, wireless networking and mobile telephony to enhance and extend the reach of teaching and learning” [19].

2.2 Why Mobile Learning

One of the advantages of mobile learning is its flexibility and convenience. According to Kuzspa (2005), this medium is usually available at all times, so that it is possible to “access updated information and learning content anytime and anywhere” [20]. Mobile devices, she added, are “handy and always with you”, and they are particularly suited for “repetitive learning”. For example, when learning foreign languages, learners can make use of short repetition phases to better cram the whole learning materials. A study done by Ally and Satuffer attempted to determine how learners perceive the enhancements by using mobile devices to distance learning materials or online learning [21]. The results concluded that the majority of students responded that they either agreed or strongly agreed that the use of the mobile device to access the course materials was useful and provided both flexibility and convenience.

Another advantage of mobile learning is identified as speed of access. According to Ismail and Idrus, mobile devices enable learners to gain immediate access to data as mobile devices are place-independent [22]. Therefore provides several benefits for e-learning environment such as allowing students and instructors to utilise their spare time while travelling in a train or bus to finish their homework or lesson preparation [17].

Mobile learning can play an important part in setting up communication between teachers and students using mobile handled devices. With easy and reliable communications, the learning process will become more interesting. This surely makes mobile learning an important thing to be implemented in the education system that can cater for all. Hence, mobile learning may be useful as a supplement to teaching and learning in classrooms, online learning and more traditional methods. Ownership of a mobile phone plays a crucial role in implementing mobile learning application among students (Corlett, Sharples, Chan & Bull, 2004) [23].

A study conducted by Ring indicated that 93% of students having wireless access reported that the technology made the course more convenient and they could work from anywhere [24]. It is also reported that they were able to access courses while commuting, which showed that the wireless technology afforded them the freedom to access the course from anywhere and students are able to get an overall feel for the

content of the course. The mobile phone is now a part of the learner make-up in their everyday life. As much as they need to undertake their educational activities, they value their time more in terms of what they need to get out of that material quickly.

2.3 Mobile Learning in Malaysian Setting

In recent years, mobile phones are widely used by young people not only in New Zealand but also in Asia, Europe, America, and South Africa (Green, 2007) [25]. SMS, as a popular mobile phone application that provides an excellent resource for the deployment of a mobile learning environment among university students [26].

Several researchers in Malaysia have focused their research on SMS-based mobile learning. Despite its popularity, mobile learning or generally simplified as m-learning is still in its infancy [22] and in an embryonic stage. Despite its infancy, several studies [27][28] have already been carried out to determine its feasibility as a learning tool. Generally, it was found that SMS learning is accepted by students and feasible to be used by students and teachers. Although the introduction of mobile phones for learning in Malaysia is considered as a new idea, there was a forecast that mobile phones or specifically smart phones would be used in secondary schools in Malaysia from the year 2016 to 2020 (Siraj & Saleh, 2003) [29]. In another paper, Siraj (2004) estimated that Malaysia has a huge potential to implement mobile learning in its curriculum in five to seven years on, which is what she literally means by the year 2009 to 2011[30].

Mobile learning has been found to be favourably accepted by students whereby a pilot research project conducted at Universiti Sains Malaysia involving distance education students revealed that students have overwhelming agreement and positive responses on the usage of mobile phone for learning [22]. The results show that learning via mobile phone was able to assist and motivate the students' study.

In another Malaysian study, Nordin et al. stated that mobile-learning activities are effective ways to motivate students and to foster interaction [31]. Whereas, Ismail et al. [4] focused on learners' perception concerning the satisfaction level of m-learning and Ismail et al. found that learners easily get any information that they need at anytime anywhere via SMS [5].

This is also supported by Ally and Stauffer [21] and Lawrence et al. [32] in their reports that stated the majority of students agreed that the use of mobile devices to access course material was useful and provided both flexibility and convenience. These local and international studies have proven the usefulness of mobile learning as a support tool for the educational field. As Wagner stated in his study, the use of technology alone is insufficient to ensure success in learning [33]. Another important factor to be considered is the technological readiness. Technology readiness can be defined as "people's propensity to embrace and use new technologies for accomplishing goals in home life and at work" [34].

Despite its vast potentials, m-learning is still minimally developed in countries like Malaysia. It is also not very common in higher education [35]. The scholarship of m-learning is also still under-represented though it is steadily developing. Lomine stated that there is a growing volume of publications, seminars and events on m-learning

hinting a real possibility that m-learning is becoming “the next big thing” in education [35].

3 Methodology

Most of the studies in mobile learning focused on quantitative methodology to answer their research questions and in getting views on the usage of mobile phones in teaching and learning. This study however studied in-depth students’ perception on the effect of using SMS in their distance learning environment. As such, a case study approach was found suitable to be used in this qualitative study. Case study is used in this study because it emphasizes on detailed contextual analysis especially in this study which is related to students’ perceptions on their participation in mobile learning initiatives. In this study, the researchers gathered the participants’ voice on their learning through SMS and what it means for them to be able to learn from a different method of teaching and learning. People have their own reasons for their actions, and researchers need to learn the reasons people use [36]. This study looked in depth on how individuals perceive mobile learning as a method of teaching and learning so that the study would be able to provide “*thick*” description [36] on the subject rather than a mathematical proof of what occurs during the mobile learning intervention.

This study employed a descriptive case study. Descriptive cases require that the investigator begin with a descriptive theory, or face the possibility that problems will occur during the project. Pyecha used this methodology to study special education, using a pattern-matching procedure [37]. Several states were studied and the data about each state’s activities were compared to another, with idealized theoretic patterns. Thus what is implied in this type of study is the formation of hypotheses of cause-effect relationships. Hence the descriptive theory must cover the depth and scope of the case under study. The selection of cases and the unit of analysis are developed in the same manner as the other types of case studies.

In this research, a set of interview questions was used as the survey method to gather the primary data needed. A questionnaire is a research instrument containing a series of questions for gathering information and feedback from respondents. The interview question technique was chosen in this research because it helps researchers to look at in-depth students’ perception on the effect of using SMS in their distance learning environment. It is also inexpensive and often provides standardised answers for respondents to choose, and thus makes the process of compiling data less complicated [38].

The sampling frame of this study was the Distance Education students in the School of Distance Education (SDE), Universiti Sains Malaysia (USM) who owned mobile phones and agreed to employ their mobile phone as a medium of communication. The populations of interest in this study were 105 distance learners who enrolled voluntarily to become mobile learners in mobile learning via SMS project (SMS learning). Almost all of the participants in this research were working adults, scattered all over the country. However, only 5 students volunteered to be

involved further for the purpose of this qualitative study. They are students who had been approached and voluntarily agreed to participate in this study. A brief background of each of the respondent is given as follow:

- Respondent A is a management student in year 4 at the SDE, USM who has worked with the government as a secretary officer before and she/he has used hand phones since year 2000.
- Respondent B is a student in year 3 at the SDE, USM who has experiences working as a clerk at the Malaysian Pilgrims Fund Board for six years.
- Respondent C is a student at the SDE, USM with six years experience working at the Centre for Drug Research, USM. She/he has used handphones since last ten years until now and her/his latest handphone model is Sony Ericson.
- Respondent D is a student at the SDE, USM who has working experience for two years and has used a handphone since 2003. Now, she/he is using a Sony Ericsson handphone.
- Respondent E is a management student in year 4 at the SDE, USM who has worked in private sector with seven years working experience. She/he has used handphone since the last eight years until now and the latest model is a Samsung.

The students were interviewed individually and each interview lasted between 20 and 30 minutes. All 5 participants interviewed provided a starting point for looking at patterns that formed using SMS learning. During the interviews, students were asked questions regarding their personal backgrounds, their general understandings about learning, and their experiences with e-learning in the course, their personal learning through the SMS learning and their personal opinion about SMS learning. The interview session was definitely a test for the researchers own interviewing and communication skills. The interview questions were developed with the adaptation from Ziden's interview questions [39]. The interview questions for the students consisted of five parts namely Part A: Personal-General Question; Part B: General understanding about learning; Part C: SMS in this course; Part D: SMS Learning-refer to contribution and Part E: SMS Learning.

4 Data Analysis And Findings

The purpose of this research study was to get an in-depth understanding on respondents' perception mobile learning via SMS and their experiences in SMS learning. First of all, respondents were interviewed regarding their mobile phone usage as summarized below.

4.1 Respondents' Background

Respondent A said that she only uses "*basic applications*" such as send and receive text messages (SMS), send and receive pictures (MMS), receiving and making voice call, taking pictures and listening to Play music (MP3). This shows that the respondent has been accessing the common application available in the mobile phone

in her daily life. Similarly, Respondent B explained that he has been using the “*basic applications*” such as send and receive text messages (SMS), send and receive pictures (MMS), receiving and making voice call, taking pictures, listening to play music (MP3), playing and recording videos and also playing games. On the other hand Respondent C who has been using mobile phone for the past 10 years, felt that she is “*quite expert*” in using the device. Apart from phone calls, SMS and MMS, she also accessed internet through her mobile device. She said it is “*quick and easier*” to browse internet through mobile phone if she need on-stop information. As for other Respondents D and E who has been using mobile phone since 2003 and 2002 respectively, they mentioned that they are more towards using “*basic or generic applications*” on the device.

Thus, the findings revealed the respondents most frequently used mobile phone applications. All respondents seemed to be using mostly the generic applications on the phone which is used daily and a must-use application. Apparently, the finding indicated that the most accessible application that the respondents have is sending and receiving text messages or SMS, although one respondent said that she has been using the device to access email. The survey by MCMC (2010), in the MCMC’s Hand Phone Users Survey 2008, stated that the percentage of people accessing the internet continues to decline from the proportion observed in 2006 [40]. In addition, it also showed over 100 percent of cellular phone penetration rate nationwide. Nonyongo et al. reported that, mobile phone has also become such a convenient device to use because the communication services provided (especially SMS and phone call) are quick, efficient, and cheap [41]. Therefore, this suggested that SMS has been the most wanted application by users. A study by Lekkad showed that SMS will transmit messages within the same cell or to anyone with roaming service capability [42] and at the same Kitsantas and Chow noted that SMS encourages interactivity and personalization of learners to be involved continuously in the learning process since there is less formality, easy, and quick [43].

4.2 Students’ Perception on Mobile Learning via SMS

The first research question for this study is to gain understanding on the respondents’ perception on mobile learning via SMS. The findings exhibited that the respondents generally viewed mobile learning via SMS as a convenient way of learning especially for working adults like them. Respondents elaborated that:

I find the application is easy to use and convenient.

(Respondent A)

It uses a simple language that easy to understand and provides student with compact informative notes which easy to remember.

(Respondent B)

SMS learning is easy to use and I only need a mobile phone without any internet access.

(Respondent D)

Respondents also agreed that SMS is a “*good reminder of information*”. Mobile phone has always been a medium of reminder for respondents and thus SMS learning

can be a good reminder regarding their studies. They felt that the text-based notes that they received acts as “*an alarm*” to them and always will remind them about their study. The information or notes that were sent everyday can help them to remind about the future studies. The students also felt that SMS learning become a great reminder for them during revision activities.

It becomes a great ‘reminder’ for me to do some important revision for my study.

(Respondent B)

Change how the way I learn, as I was always reminded of what to do.

(Respondent C)

The next theme revealed was SMS learning is relevant to students’ learning environment. The notes that they received are interesting and it helps them to remember their learning materials better. The students felt that SMS learning system is good learning tools that provides relevant information and helps them to understand more on mobile usage. Below are the some elaborations that the respondents gave during the interview:

This system is relevant to student.

(Respondent A)

I think that SMS learning system is a good learning tool that provides relevant information and helps her to understand more on mobile usage

(Respondent D)

I think that SMS learning is quite simple, relevant and informative.

(Respondent E)

4.3 Students’ Experience in SMS learning

Next, the interview gathered respondents’ feedback pertaining to their experiences in SMS learning. The experiences gained from SMS learning facilitate respondents in their learning process and it was a wonderful experience for them. The respondents felt that SMS learning is quite simple, relevant and informative. It gives them a brief view about the topic that they need to cover on and it also helps in terms of memorizing process since the SMS system uses the simple language that is easy to understand. Most of them felt really satisfied with this system. For instance, according to Respondent A, she is generally very satisfied with SMS learning. She elaborated:

SMS sent is quite simple, relevant and informative. It just enough to give me a brief view about the topic that I need to cover on and memorizing process getting better since the SMS system uses the simple language that is easy to understand.

In the meantime, Respondent B pointed out that this SMS learning should be continued as it is a great “reminder” for him to do some important revision for his study. He commented:

SMS learning is another innovative effort that brings new way in education system. It uses a simple language that easy to understand and provides student with compact informative notes which easy to remember.

As for Respondent C, she mentioned that the SMSes she received regularly at night and in the morning helps her study by providing simple notes that able to give a brief

view on certain topics. Some of notes provided are relevant to her studies. She further explained:

SMS learning system took an advantage since the system do not required an internet connection. So, the system will be operating much easier without the need of internet access.

According to respondent D, as compared to e-learning which has its limitation due to the limited internet accessibility, SMS learning allows students to work without the need of internet connection. She added,

I feel that SMS learning is easy to use and I only need a mobile phone without any internet access. I usually read the short notes sent by the SMS learning system when I want to start my revision to get a brief understanding about the topics that I will cover.

As for respondent E, he said that he can easily get the information about the study via SMS learning at “*anytime and anywhere*”. The information that he got can also be read anytime that he feels to do so. According to him, SMS that was received is “*easy to remember and simple*”.

Apart from experiencing the aforementioned benefits of SMS learning, the study findings also revealed feedback pertaining to impediments or drawbacks of SMS learning. Although there are positive responses from the respondents on the use of SMS learning for the course, there are some flaws in their SMS learning experience as suggested below:

1. Disturbance of personal time or environment because of the SMS sent during inconvenient time such as working hours or night etc.
2. Difficulty in using the system due limited phone capability and storage
3. Hassles in registration process due to complexity of instructions given

Specifically, the respondents complained that the system need to be reviewed back since the message receiving time is usually at late evening which is “*not appropriate time*” as it is often too late to do quick revision before entering class. Although most students felt satisfied with the learning via SMS, some felt a little interruption because sometimes the messages were received at the inappropriate time. This is because the students mostly received the notice and information at working hour or at late evening (night).

Other than that, the problem with this system is that messages cannot be kept in the phone’s memory in a long-term period due to limited phone capability and storage. As a result, the messages or notes that they received will be typed and printed out for later reviews.

There were also some hassles during the registration process for the students to get enrolled in the SMS learning program. Respondents found it difficult to understand the instruction given when they wanted to register into the system. It is possible that the instructions given were too complex for them to understand.

5 Discussion

5.1 The Perceived Benefits of Using Mobile Learning via SMS

The results of the interview showed that the respondents perceived mobile learning via SMS as a convenient way for learning especially for adult learners. They also strongly believed that SMS learning is suitable and convenient for their lifestyle as adult learners. This is parallel to the findings by Motiwalla who reported some of the benefits of mobile learning which include convenience, ease-of-use, ability to be reminded, and the mobility factor which allowed them to utilize any dead-time for productive learning activity [44]. Kineo also mentioned the characteristic of mobile learning as ubiquitous because of its availability of access to learning via mobile devices at any time and place which provides convenience for them [45]. Other scholars also believe that SMS learning supports the convenient manner of learning [46] because the learners can learn whenever they feel like learning and delivery tool itself makes be convenience of time. Zhang et.al stated that it is more convenient to receiving small size of educational content on easily accessible mobile phone as compared to paper-based materials which enhances students learning [47]. This is also supported by Ally and Stauffer [21] and Lawrence et al. [32] who reported the majority of students agreed that the use of mobile devices to access course material was useful and provided both flexibility and convenience. Learning through mobile phone helps the student received the note or information about the study conveniently at anytime and anywhere [15].

The second theme revealed is that mobile learning via SMS is a good reminder for the course information. Specifically, respondents agreed that SMS learning via mobile phone is a useful medium for students to remind them of their studies. Students felt that the SMS system works as an alarm or reminder for them about the topic that they must study. The note or information that was received can also give them a brief view about the topic that they need to cover and understand. A study by Goh, Seet and Rawhiti noted that sending a persuasive SMS reminder to review lessons before class are more likely to encourage students to go through the materials rather than sent it as reminder just to remind regarding the class [48]. Dey and Abowd suggested that reminders can be more helpful when the important information is used to present them at suitable times in suitable places or at anytime and anywhere. The information or notes that were sent everyday can help them to remind about the future study [49]. The students also felt that the SMS learning has become a great reminder for them during revision. A review by Lai et al. mentioned that SMS well suits for delivering learning materials and reminders [50].

The third theme revealed is regarding relevance to students' learning environment. SMS learning was reported to be relevant because it changes the learning environment to be more interesting. The notes that they received are interesting which can help them in their studies. The students felt that SMS learning system is a good learning tool that provides relevant information and helps them to understand more on mobile usage. The contexts that were used in mobile technology are relevant [51]. For students, SMS learning is relevant for study environment because notes that were sent

quite simple and informative. According to Petrova, mobile learning provides the “mobility support”, “information density” and “information relevance” which plays a vital role in achieving the optimal target [52].

5.2 Students’ Experiences in SMS Learning

The results shows that the experiences gained from using mobile learning facilitate students in their learning process. The students felt very good and wonderful when they receive SMS notes or reminder through mobile phone as they felt personalized and connected with their lecturers. The students felt that SMS learning quite simple, relevant and informative. It just enough to give them a brief view about the topic that they need to cover on and memorizing process gets better since the SMS system uses the simple language which is easier for them to understand. The students are very satisfied with the SMS learning system. Traxler and Kukulska Hulme said that SMS learning uses mobile devices which are of “usable” and “accessible” that is satisfying, easy to use, and improves learning effectiveness and efficiency [53]. Kineo added that mobile learning meets the needs of users with its unique and distinctive characteristics; ubiquitous, on demand, typically blended as well as collaborative [45]. As reported by Ismail and Idrus, the SMS learning project done by team received positive responses which may has proven that mobile phones could make a strong and feasible impact in the learning environment [22]. For students, SMS learning is another innovative effort that brings new way in education system and provides them with compact informative notes which is easy to remember. The other advantage of the system is that it does not require an internet connection. So, the system will be operating much easier without the need of internet access.

6 Conclusion

As a conclusion, this study has provided useful insights on the use of SMS technology in a distance learning environment. SMS learning is found to be another innovative effort that brings improvement to the existing distance education system. SMS-based learning system can help students to get important note or information immediately as it provides students with “compact informative” notes which are “easy to remember”. The system will be operating much easier without the need of internet access. They can get their study notes at anytime and anywhere. This system also works as an alarm or reminder to the student in the study. The students also felt that SMS learning is quite simple, relevant and informative. Yet, there were some drawbacks which alarm further enhancement on the SMS learning system, which are pertaining to disturbance of personal time, difficulty due to limited phone capability and storage as well as hassles due to complexity of instructions given.

Although this study may provide meaningful results in the education technology field, the findings of this research should consider its limitations. This study is limited to one public university in Malaysia. The results are based on findings obtained from several distance education students only and thus it may not be representative enough

to describe the whole population. The method that was used in this study is qualitative method, yet the process of conducting interviews as a method of data collection was an important learning process in this study. In lights of the study findings, this study urged for a further research to enhance the SMS learning system capabilities in terms of providing a useful complementary teaching-learning tool as well as promoting effective two-way communication between students and lecturers in a distance learning environment.

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8 References

1. C. Evans, "The effectiveness of m-learning in the form of podcast revision lectures in higher education," *Computers & education* vol. 50, no.2, pp. 491-498, 2008. <https://doi.org/10.1016/j.compedu.2007.09.016>
2. D. M. West, "Mobile learning: Transforming education, engaging students, and improving outcomes", 2013, available at www.brookings.edu/research/papers/2013/09/17/mobile-learning-education-engaging-studentwest
3. A. Andersson, "Seven major challenges for e-learning in developing countries: Case study eBIT, Sri Lanka", *International Journal of Education and Development using ICT*, vol. 4, no.3, 2008.
4. I. Ismail, S. S. M. Johari, and R. M. Idrus, "Acceptance on mobile learning via SMS: A Rasch Model analysis," *International Journal of Interactive Mobile Technologies (IJIM)*, vol. 4, no.2, pp/ 10-16, 2010.
5. I. Ismail, S. S. M. Johari, and R. M. Idrus, "Technical appliance in e-learning: Student's perception on the usage of online learning," *International Journal of Emerging Technologies in Learning (IJET)*, vol. 5, no. 2, pp. 31-35, 2010. <https://doi.org/10.3991/ijet.v5i2.1145>
6. S.N. Zulkefly, and R. Baharudin, "Mobile phone use amongst students in a university in Malaysia: Its correlates and relationship to psychological health," *European Journal of Scientific Research*, vol. 37, no. 2, pp. 206-218, 2009.
7. M.Jambulingam, "Behavioural intention to adopt mobile technology among tertiary students," *World Applied Sciences Journal*, vol. 22, no.9, pp. 1262-1271, 2013.
8. H. Akour, "Determinants of mobile learning acceptance: an empirical investigation in higher education", unpublished doctoral dissertation, 2009.
9. A. Anuwar, "Issues and challenges in implementing e-learning in Malaysia," Open University Malaysia, 2008, available at <http://asiapacific-odl2.oum.edu.my/C33/F80.pdf>
10. J. Cain, "Add Destination: Mobile, Taking advantage of the new vehicle for learning", 2012, available at http://www.prophero.com/wp-content/uploads/2012/04/A_add_mobile_web.pdf
11. U. Farooq, W. Schafer, M.B. Rosson, and J.M. Caroll, "M-education: Bridging the gap of mobile and desktop computing," *Centre for Human-Computer Interaction and Department of Computer Science*, Virginia Polytechnic Institute and State University, pp. 1-2, 2002.

12. M. Muhlhauser, and C. Trompler, "Learning in the digital age: Paving a smooth path with digital lecture halls. In IEEE 35th Hawaii International Conference on System Sciences, Hawaii Cereijo-Roibas, A., & Vonderwell, S., Liang, X., & Alderman, K. (2007). Asynchronous discussions and assessment in online learning," *Journal of Research on Technology in Education*, vol. 39, no. 3, pp. 309, 2002.
13. A. Cereijo-Roibas, and I. Arnedillo-Sanchez, "Pathway to m-learning", *In European workshop on mobile & contextual learning*, Birmingham, UK, 2002.
14. K. Nyiri, "The mobile phone in 2005: Where are we now? Proceedings Seeing Understanding, Learning in the Mobile Age", 2005, available at http://www.fil.hu/mobil/2005/Nyiri_intr_tlk.pdf
15. C. Quinn, "mLearning: Mobile, wireless, in your pocket learning. LineZine", 2000, available at <http://www.linezine.com/2.1/features/cqmmwiyp.htm>.
16. S. Homan and K. Wood, "Taming the mega-lecture: Wireless quizzing", *Syllabus Magazine*, 2003, available at <http://www.syllabus.com/article.asp?id=8251>.
17. M. Virvou and E. Alepis, "Mobile educational features in authoring tools for personalized tutoring," *Computers and Education*, vol. 44, pp. 53–68, 2005. <https://doi.org/10.1016/j.compedu.2003.12.020>
18. J. Traxler, "Learning in a mobile age", *International Journal of Mobile and Blended Learning*, vol. 1(March), 1-12, 2009. <https://doi.org/10.4018/jmbi.2009010101>
19. C. O'Malley, G. Vavoula, J. Glew, J. Taylor, M. Sharples, and P. Lefrere, "Guidelines for learning/teaching/tutoring in a mobile environment", 2003, available at <http://www.mobilelearn.org/download/results/guidelines.pdf>.
20. M. Kuszpa, "The Future of mobile learning – A survey of expert expectations about learning on mobile phones", *Online Educa 2005, Book of Abstracts, Berlin 2005*, 2005, available at http://www.fernuni-hagen.de/BWLOPLA/ME/MobileEducation.com_Kuszpa_2005.12_Online-Educa-Berlin.pdf.
21. M. Ally, and K. Stauffer, "Enhancing mobile learning delivery through exploration of the learner experience," *Fifth IEEE International Conference on Wireless, Mobile and Ubiquitous Technology in Education (wmut 2008)*, pp. 128-132, 2008. <https://doi.org/10.1109/wmute.2008.44>
22. I. Ismail & R. M. Idrus, "Development of SMS mobile technology 'for m-learning for distance learners,'" *International Journal of Interactive Mobile Technologies iJIM*, vol.3, no.2, pp. 55-57, 2009.
23. D. Corlett, M. Sharples, S. Bull, and T. Chan, "Evaluation of a mobile learning organiser for university students", *Journal of Computer Assisted Learning*, vol. 21, no. 3, pp. 162-170, 2005. <https://doi.org/10.1111/j.1365-2729.2005.00124.x>
24. G. Ring, "Case study: Combining Web and WAP to deliver e-Learning", *Learning Circuits, ASTD Online Magazine*, 2001, available at <http://www.learningcircuits.org/2001/jun2001/ring.html>
25. J. S. Green, "Using mobile technologies for open and distance learning community development", *Paper presented at the Proceedings of the 6th Annual International Conference on Mobile Learning*, Melbourne, Australia, 2007.
26. A. Stone, "Mobile scaffolding: An experiment in using SMS text messaging to support first year university students", *Proceedings of IEEE International Conference on Advanced Learning Technologies*, pp. 405- 409, 2004. <https://doi.org/10.1109/icalt.2004.1357446>
27. W. R. Penuel, J. Roschelle, and L. Abrahamson, "Research on Classroom Networks for Whole-Class Activities", *IEEE International*

- Workshop on Wireless and Mobile Technologies in Education (WMTE'05)*, pp. 222-229, 2005. <https://doi.org/10.1109/WMTE.2005.56>
28. M. Freeman and P. Blayney “Promoting interactive in-class learning environments: A comparison of an electronic response system with a traditional alternative”, *Proceedings of the 11th Australasian Teaching Economics Conference*, July 11-12, 2005, Sydney, Australia.
 29. S. Siraj and M.P. Saleh, “Aplikasi teknologi dalam pengajaran dan pembelajaran peringkat sekolah menengah: Jangkaan masa depan (Technology application in teaching and learning at secondary school: a future projection)”, *Journal of Educational Research*, vol. 23, pp.123-139, 2003.
 30. S. Siraj, “ Pembelajaran mobile dalam kurikulum masa depan (Mobile learning in future curriculum)”, *Masalah pendidikan*, vol. 27, pp. 128-142, 2004.
 31. N. Nordin, M. A. Embi, R. M Yasin, S. Rahman, and M.M. Yunus, “The mobile learning readiness of the post-graduate students”, *2010 EABR & ETLC Conference Proceedings*, Dublin, Ireland, 2010.
 32. E. Lawrence, A. Bachfischer, L.E. Dyson, and A. Litchfield, “Mobile learning and student perspectives: An mReality check!”, *7th International Conference on Mobile Business*, 7 July – 8 July 2008, Barcelona, pp. 287-295. <https://doi.org/10.1109/icmb.2008.33>
 33. E. D. Wagner, “Enabling mobile learning”, *Educause Review*, pp. 41-52, 2005, available at <http://connecteducause.edu/Library/EDUCAUSE+Review/EnablingMobileLearning/40549?time=1229470759>
 34. A. Parasuraman, “Technology readiness index (TRI): A multiple item scale to measure readiness to embrace new technologies”, *Journal of Service Research*, vol.2, no.4, pp. 307-320, 2000. <https://doi.org/10.1177/109467050024001>
 35. L.L. Lominé, “M-learning: Texting (SMS) as a teaching and learning tool in higher arts education”, *ELIA Teachers' Academy 2009, Sofia*, 2009, available at http://www.elia-artschools.org/teachers_artes/_downloads/papers/Lomine.pdf
 36. W. L. Neuman, *Social Research Methods: Qualitative and Quantitative Approach*, Boston: Allyn and Bacon, 2005.
 37. J. Pyecha, *A Case Study Of The Application Of Noncategorical Special Education*, Two States Chapel Hill, NC: Research Triangle Institute, 1988.
 38. M. Saunders, P. Lewis, and A. Thornhill, *Research methods for business students*, 5th ed., Harlow, Pearson Education, 2009.
 39. A. A. Ziden, “Personal Learning In Online Discussion”, unpublished doctoral dissertation, University of Canterbury, 2007.
 40. Malaysian Communications and Multimedia Commission (MCMC), “Hand phone users survey 2008”, 2010, Available at http://www.skmm.gov.my/facts_figures/stats/pdf/Handphone_Users_Survey_2007.pdf
 41. E. Nonyongo, K. Mabusela, and V. Monene, “Effectiveness of SMS communication between university and students”, *In Proceedings of the mLearn-4th World Conference on Mobile Learning, Cape Town, Africa do Sul (pp. 1-15)*, 2005, available at <http://www.mlearn.org.za/CD/papers/Nonyongo&%20Mabusela.pdf>
 42. P. Lekkad, “SMS Short Message Service the new age communication technique!”, 2010, available at <http://www.uniglobalunion.org/unisite/events/webmasters/PDF08/PrithviLekkadSMSCommunications-en.pdf>
 43. A. Kitsantas and A. Chow, “College students’ perceived threat and preference for seeking help in traditional, distributed, and distance learning environments”, *Computers and Education*, vol. 48, no.3., pp. 383-395, 2007. <https://doi.org/10.1016/j.compedu.2005.01.008>

44. L. F. Motiwalla, "Mobile learning: A framework and evaluation", *Computers & education*, vol. 49, no.3, pp. 581-596, 2007. <https://doi.org/10.1016/j.compedu.2005.10.011>
45. Kineo, "Mobile learning reviewed", *Learning*, 2009, available at http://www.kineo.com/documents/Mobile_learning_reviewed_final.pdf
46. M. Sripriya and P.E. Thomas, "Sms as an evolving digital culture for learning", *International Journal of Technology Enhancements and Emerging Engineering Research*, vol. 2, no.3, pp. 12-19, 2014.
47. H. Zhang, W. Song, and J. Burston, "Reexamining the effectiveness of vocabulary learning via mobile phones", *The Turkish Online Journal of Educational Technology*, vol. 10, no3, pp. 203–221, 2011.
48. T.T. Goh, B.C. Seet, and L. Rawhiti, "Persuasive and affective SMS text messaging for Students' Learning", 2011, available at <https://akoaooteaoroa.ac.nz/download/ng/file/group-6/persuasive-and-affective-sms-text-messaging-for-students-learning.pdf>.
49. A. K. Dey and G. D. Abowd, "Support for the adapting applications and interfaces to context", *Multiple User Interfaces: Cross-Platform Applications and Context-Aware Interfaces*, pp. 261-283, 2004.
50. C.H. Lai, S.P. Yang, A.C. Yen, and C.G. Chou, "SMS and Emails as Class Reminders to Assist Subject Learning", 2013, available at <http://www.csroc.org.tw/journal/JOC24-4/JOC24-4-3.pdf>.
51. R. Cobcroft, S. Towers, J. Smith, and A. Bruns, " Mobile learning in review: Opportunities and challenges for learners, teachers, and institutions", *Paper presented at Learning on the Move, Brisbane, Australia, 2006*, available at https://olt.qut.edu.au/udf/OLT2006/gen/static/papers/Low_OLT2006_paper.pdf
52. K. Petrova, "Mobile learning as a mobile business application", *International Journal of Innovation and Learning (IJIL)*, vol. 4, no. 1, pp. 1-13, 2007. <https://doi.org/10.1504/IJIL.2007.011471>
53. J. Traxler and A. Kukulska-Hulme, "Mobile learning in developing countries", *Commissioned by the Commonwealth of Learning*, 2005, available at http://www.col.org/SiteCollectionDocuments/KS2005_mlearn.pdf

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