

# Adoption of Mobile Learning Among Distance Education Students in Universiti Sains Malaysia

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**Abstract**—This study was carried out in order to investigate whether mobile learning using Short Message Service (SMS) was a method of learning adopted by the students enrolled in the School of Distance Education, Universiti Sains Malaysia. As adult learners who are in vocation, time and isolation are the bane of self-study. Since all the students own a mobile device that can receive SMS, educational messages can be sent directly to their devices. This experimental study explored the impact of learner's characteristic, learning design and learning environment to their adoptability. This study utilised two models of data analysis, the Statistical Package for Social Science (SPSS) Version 12.0 and the Rasch model analysis for measurement. The analysis was conducted on a sample of 105 students based on gender, age, ethnicity, programme of study and mobile device ownership. The students were from four different courses which are Bachelors of Science, Bachelor of Arts, Bachelor of Social Science and Bachelor of Management. The questionnaire-answer session were administered by the respective course managers in their tutorial sessions during the annual residential intensive course in the main campus of the Universiti Sains Malaysia. The result indicated that mobile learning has helped them to pace their studies. By using mobile learning, learners easily get any information that they need at anytime anywhere. Learners would also like to take another mobile learning assisted course if the courses are relevant to their learning needs. Furthermore, the SMS educational content received through their hand phone are easily remembered.

**Index Terms**—Mobile learning, distance education, SMS,

## I. INTRODUCTION

Emerging technologies are leading to the development of several new opportunities which enhance and guide the learning process to higher level compared to unimaginable conditions in previous years. The use of these technologies turns out to be well aligned with strategic educational goals such as improving student retention and achievement, supporting differentiation of learning needs, and reaching learners who would not otherwise have the opportunity to participate in education [1]. Rapid developments in handsets, networks, and mobile applications can make educational implementations using mobile phones can be a risky one [2]. A great deal of effort has also been devoted in understanding how mobile technologies are related to both traditional and innovative ways of teaching and learning, showing the applicability of mobile learning across a wide spectrum of activity [3][4] as well as highlighting the most important emerging issues [5]. Studies done by Malaysian Communications and Multimedia Commission [6] found that in Quarter 2, 2009, the pene-

tration rate for cellular phone in Malaysia is 100.8 %. Penetration rate over 100% occurs because of multiple subscriptions. The mobile phone is multipurpose device. It is not only used to transmitting voice communication but also can provide a number of other functions and services. The one of that is a short messages service. Previous studies have examined ways in which everyday life activities influence mobile phone use and to a certain extent SMS usage [7] [8].

For mobile users as well in all mobile applications, SMS messaging is found to be the most useful and convenient way of technology. SMS is inexpensive, supported by almost all phones as an unlimited offering, familiar to students, and rapidly gaining worldwide acceptance. SMS is a low-threshold application used widely by students to quickly send concise, text-based messages at any time. Text messaging, also known as the short message service or SMS, is changing the communications landscape on college campuses [9]. According to the International Association of the Wireless Telecommunications Industry, the number of SMS messages sent in the United States each month now exceeds 48 billion, up from just 10 billion per month in 2005 [10]. The aim of this research is to investigate the problematic of designing mobile learning among the students enrolled in the School of Distance Education, Universiti Sains Malaysia. The responses are viewed from three factors, via, learner characteristic, learning design and learning environment.

## II. MOBILE LEARNING

Mobile Learning commonly referred to as, M-Learning, is a form of e-learning that specifically employs wireless communications devices to deliver content and learning support [11]. Mobile learning represents exciting new frontiers in education and pedagogy [12]. With the features of “wearable” computing and multimedia content delivery via mobile technologies, mobile learning becomes feasible and offers new benefits to instructors and learners [13]. M-learning is the exciting art of using mobile technologies to enhance the learning experience. It refers to the use of mobile and pocket IT devices, such as PDAs, mobile phones, Pocket PCs, laptops and the Internet in teaching and learning process. It helps people to learn and gain information just from their pocket devices.

## III. LEARNING TRANSFER

From the educational psychologist's view, learning is defined as the relatively permanent change in behavior [14]. Learning transfer is the application of knowledge, attitudes and skill that are learned from one situation to another learning situation. It is because the learning con-

text is often different from the context of application as the goal of training is not accomplished unless transfer occurs.

Successful transfer of learning requires that training content be relevant to the task, that the learner must be motivated and that the learner must learn the training content. There remains considerable controversy about how transfer of learning should be conceptualized and explained, whether it relates to learning or whether it exists at all [15].

#### IV. LEARNING DESIGN

A 'learning design' is defined as the description of the teaching-learning process that takes place in a unit of learning (e.g., a course, a lesson or any other design learning event) [16]. Due to the rapid emergence of wireless communications technology and mobile devices, the use of handheld technology in education has increasingly been the object of study in recent years. The key principle in learning design is that it represents the learning activities and it supports activities that are performance by different individuals (learners, teachers) in the context of a unit of learning. Due to their small size and familiarity, mobile phones in the classroom can be unobtrusive [17], requires no technology training, and are not intimidating to most users. All students can ask questions and comment (simultaneously if needed) without interrupting the in-class activities; interaction can continue after class [18].

#### V. LEARNING ENVIRONMENT

The presence of interactivity in the classroom is reported to yield benefits in relation to the promotion of more active learning environments, the building of learning communities, the provision of greater feedback for lecturers, and it also contributes towards student motivation [19] [20]. It is possible to study any where and any time with the development of wireless mobile network and the improve of the mobile communications equipment, within educational environments, students frequently move venues, [21]. The learner's mobility creates an ever-changing environment for learning:

"...the mobile technology, while essential, is only one of the different types of technology and interaction employed. The learning experiences cross spatial, temporal and/or conceptual borders and involve interactions with fixed technologies as well as mobile devices. Weaving the interactions with mobile technology into the fabric of pedagogical interaction that develops around them becomes the focus of attention". [22]

The learner's location positively affects the learning contents and method as well in constructive mobile learning.

#### VI. RESEARCH METHODOLOGY

This study was conducted in February-April 2009 by sending course content using SMS to students who have registered with the SMS learning programme. The survey was conducted for two week before the final examinations for the semester of 2008/2009. A total of 105 questionnaires were distributed to student from four different courses which are Bachelors of Science, Bachelor of Arts, Bachelor of Social Science and Bachelor of Management. The data was collected using simple random sample through secondary data based on the online databases and

past researchers studies. The questionnaires were administered by the respective course managers in their tutorial sessions during the annual residential intensive course in the main campus of the Universiti Sains Malaysia.

#### A. Instrument

The questionnaire consisted of 6 parts which are demographic data, learning transfer, system elementary, SMS-learning services, technology acceptance and effectiveness of SMS-learning. For demographic data, it focused more on the respondent's demographic information and personal background such as gender, age, ethnic group, the courses types, year of study, monthly income, marital status, current CGPA and others. Learning transfer was viewed from the perspective of information on the learner characteristics, learning design and learning environment. System elementary investigates the accessibility, while SMS-learning services captured more on facilities, satisfaction of M-learning services and teaching and learning style. Technology acceptance investigated the perceived ease of use, security and privacy, perceived usefulness, amount of information, perceived enjoyment, social influence and new technology usability. The final component was the effectiveness of SMS-learning captured from the course package, usability and students responsiveness. All questions were measured using a 5-point Likert scale, which 1 stands for 'strongly disagree', 2 'was for 'disagree', 3 was for neutral, 4 was for agree and 5 was for 'strongly agree' except for questions on demographic. This study utilised two models of data analysis, the Statistical Package for Social Science (SPSS) Version 12.0 and the Rasch model for measurement.

#### B. Analysis and Finding

Statistical Package for Social Science (SPSS) Version 12.0 was used to analyze the data. The data was run by an analysis of variance (ANOVA) test.

TABLE I.  
DEMOGRAPHY OF THE RESPONDENTS

		Frequency
<b>Gender</b>	Male	31
	Female	74
<b>Age (years)</b>	20-29	44
	30-39	46
	40-49	12
	50 and above	3
<b>Ethnicity</b>	Malay	60
	Chinese	11
	Indian	27
	Other	7
<b>Programme</b>	B. Science	2
	B. Arts	1
	B. Social Science	2
	B. Management	98
<b>Mobile Device Ownership</b>	Mobile Phone	96
	Both	6
	PDA/Pocket	
	PC/Palmtop	3

TABLE II.  
STATISTICS FOR THE PROBLEMATIC OF DESIGNING MOBILE LEARNING

Item	Statement	Infit MNSQ	Outfit MNSQ
Design 18	I can easily remember the term that I received on my mobile phone	1.38	1.41
Learner 6	This course by mobile learning experience was fun	1.13	1.28
Environment 28	I would like to see the SMS learning to be used in next semester as well	1.12	1.04
Design 17	I found the SMS learning enjoyable	1.10	1.04
Design 14	Mobile learning is convenient for communication with other course students.	1.25	1.24
Learner 7	I would take another mobile learning assisted course if relevant to my learning needs.	.86	.83
Design 15	The daily SMS messages assisted in my studies greatly.	.89	.89
Design 12	Using mobile learning, it is easy for me to access course content.	.85	.85
Learner 8	Mobile learning increases the quality of my distance education course.	.74	.73
Learner 9	Mobile learning has helped me pace my studies in my distance education course.	.68	.64
Mean		.99	1.00
S.D.		.21	.24

CRONBACH ALPHA (KR-20) PERSON RAW SCORE  
RELIABILITY = .93

A total of three scenarios represents (10) ten items were analyzed in Learning Transfer. One scenario represents four items were analyzed in 'learning characteristics', second scenario represents five items were analyzed in 'learning design' and third scenario represents one items were analyzed in 'learning environment'.

A specification for the person center, or mean, to be located at zero was entered into the Winstep (version 3.57.1) code. For comparison purpose, an analysis was conducted and examined with and without this specification [23]. To determine the measure of stability and accuracy, the review begins with fit statistics to assess whether the assumption of uni dimensionality holds empirically (Linacre, 2004). OUTFIT mean-square fit statistics (MNSQs) are equivalent to a chi-square statistics value greater than 2.0 indicate unexplained randomness throughout the data [24].

Table 1 illustrate that all items included in the learning transfer measure fits the expectations of the Rasch model. The data shows that infits MNSQ and outfit MNSQ are

not more than 2. From here we can conclude that the infits MNSQ is .99. This is almost perfect because it nears to 1, while mean for outfitMNSQ is 1 which is a perfect result. Standard division (S. D.) for both also good because more than 2.

Reliability is the degree to which measures are free from error and therefore yield consistent results. Sekaran stated that, the closer the reliability coefficient (Cronbach's Alpha) to 1.0 the better it is and those values over 0.80 are consider as good [25]. Values in 0.70 are acceptable while below than 0.60 considered as poor. In the reliability analysis, the alpha value that is closer the reliability coefficient to 1.00 is the better. Related to the table, reliability for this analysis is 0.93, which is good because it is closer to 1.0 and shows that respondents answered all questions consistently. From this study also we can see that six items were deleted from a total of ten (10) items, meaning that only 10 items that were include in range 0.7 until 1.4 logit.

The item and person map in Figure 1 displays a hierarchy of design, learner and enviroment preferences as rated by the participants and indicates the participant's willingness to endorse the items is generally very high and the item endorsability is quite easy, as noted by the mean, m, of items and person. The characteristic which participants rated as most preferable in a counselor was "a good listener". The characteristic which participants rated as the least preferable in a counselor was "a good listener". The characteristics which participants rated as the least preferable in a counselor were "sympathetic", "validates my thoughts", "uses humor" and "comfortable talking about issues of diversity" [23].

Design 9, stated that mobile learning has helped me pace my studies in my distance education course. The results show that mobile learning has assisted the learners in their study. This concept is also similar to other place like Open Universiti Malaysia. They use SMS as their supplementary learning tool. According to Nurhizam, SMS service which will be provided to learners are as follows; multiple choice questions with feedback, pre post self- test, quizzes and assignment notification, crucial assignment reminders, access to examinations and test

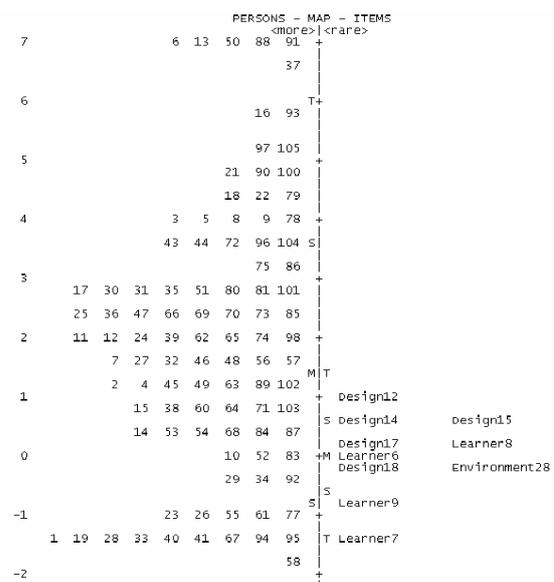


Figure 1. Hierarchy Map of Person and Items

marks, fact of the week, web links, reading materials lists and courses registration [26]. Mobile learning is the methods that were used to make their study more interesting and the learners can easily get any information that they need. Now, this is important to improve the mobile learning system that provides satisfactions to the students and having them enjoying and benefit from the use of this system.

Due to that, in design 7, the learners would take another mobile learning assisted course if relevant to my learning needs. This is shown that the learners were required more mobile learning course in their study. They are interested in pursuing in this method of learning if there is any opportunity offered. It is the future of mobile learning.

Unfortunately, in design 12, there is a constraint in mobile learning. The bigger constraint in using mobile learning existed as the learners find it difficult to access the course. This finding is consistent with our system. It is because our system does not provide the system which enable learners to access the course. However, according to study done by Hassan, W.Z. & Sulaiman, W.A., the results showed that the enjoyment with regards to the use of SMS is related to behavioral intention of SMS [27]. This indicates that, the learners still enjoy using SMS in their study although the system is not easy to access.

While design 14 suggested that mobile learning is convenient for communication with other course students. However, the results show that the respondent disagree about the item. Consistent with our research, currently we did not provide the system which can communicate with other course students. Currently, mobile learning that has been offered in this case is a one way communication, whereby students are not allowed to communicate with the server. Therefore, learners need to participate with the combination of e-learning method. M-learning, is a form of e-learning that specifically employs wireless communications devices to deliver content and learning support [11]. Most existing typical e-learning systems are tailored toward PC-based web access and are not customized to be used through mobile devices (Woukeu et al., 2005; Goh and Kinshuk, 2006). Thus, by using this combination, the learners can get more information about their study easily and make their study more interesting.

For design 17 on the other hand, it shows that on average, respondents stated that SMS is less exciting. Currently, related with our research, we only send facts to our learners. For the future plan, we plan to insert more fun elements that will increase learner effectiveness like MMS, GPRS and many more.

## VII. CONCLUSION

The result that we can derive from this study is that SMS is determined by the perception of usefulness. The terms that are received in mobile learning are easy to remember and very helpful for the learners in their study. The learners are also very excited to take another mobile learning assisted course if the courses were relevant with their learning need. However, the bigger constraint using mobile learning is not easy for learners to access course content. This finding is consistent with our system. This is because our system does not provide the system which can allow the learners to assess. The learners also said that SMS is less exciting. It is because currently, related with our research, we only send facts to our learners. In our future plan, we plan to put more fun elements like MMS,

GRPS and many more. The SMS features in the future will have more desirable functions as it can perform better. The more learners are recommended to use SMS, it shows that more learners believe in the effectiveness of SMS. SMS are identified as an easy mechanism in manipulation and navigation, ubiquity and instantaneous response. Cooperation between mobile phone service providers has given a great impact on the SMS ease of use. Perhaps, SMS in Universiti Sains Malaysia is in the early stage of adoption. The benefits such as usefulness and can help learners in their study would be the most important drive of mobile learning and should not be unheeded in the development of new functions and enhancement of service features. It has some desirable functions that it can perform the more they would use SMS in the future.

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