

## Effectiveness of 5-Category Pedagogical Model for Mobile Learning Using SMS

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*The use of mobile technologies in recent years has exceeded the proliferation of personal computers and 98 percent of Open University Malaysia (OUM) learners own a mobile phone. Considering this, OUM advanced the pedagogical use of these devices through SMS text messages. Philosophy is important in designing learning content delivered by means of information technology. Nonetheless, this often has been undermined in the processes of using technology for the sake of its availability. As such, a 5-category pedagogical model was designed in an attempt to provide useful learning through mobile phones via SMS. The model comprised of five main categories namely, Forum, Content, Motivation, Tip, and Course Management. The conceptual foundations of the model, feedback from the learners and findings are included in the paper.*

**Keywords:** mobile learning, SMS, pedagogical model

### Introduction

Mobile phones usage had extensively penetrated into the world. In Malaysia itself, the phone subscription phenomena had greatly expanded from 16,243 million in 2005 to more than 30 million (a penetration of 106 percent) at the start of 2010 when the nation's population is of approximately 29 million only. This connoted Malaysia has the second highest mobile penetration in South East Asia after Singapore.

It is believed that the mobile phone usage trend will continue to rise. The escalation of such figures shows that mobile phones are here to stay and therefore it is only rational that the advantages of these technologies are maximised.

Unlike personal computer, mobile phones are more affordable and can permit easy access for communication especially when the Internet infrastructure availability is a challenge and hinder e-learning. Visser and West (2005) suggested that when cost creates barrier to learning, mobile learning can widen access to learning in particularly in the rural or remote areas. In fact, many developing countries are sidestepping the development of costly infrastructure for fixed telephone line and prefer to invest in the mobile phone networks (Sharpley, Taylor, & Vavoula, 2007). A United Nation's programme in battling poverty, provided access to mobile phones by connecting close to half a million people in 79 villages in 10 African countries to cellular

networks with aim to improve healthcare, education and local economies (Connections, 2008). Mobile phone ownership is progressively more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008). Also relevant is the fact that mobile technologies promote new learning by delivering education in cost effective manner while providing ubiquitous learning environment (Motlik, 2008).

Never in history has been any technology that is able to support learning owned widely like mobile phone and yet there are lack of teaching models solely designed for these devices. This circumstance shows the need of pedagogical models to enhance learning through mobile phones.

## **Mobile Learning**

Mobile learning is an emerging trend in today's learning as it is easily accessible to the learners. Mobile learning is about delivery of learning through mobile devices (Parsons & Ryu, 2006). The devices used for mobile learning are mobile phones, Personal Digital Assistants (PDAs), smart phones, pocket and tablet PCs (Shih & Mills, 2007).

Kambourakis, Kontoni, and Sapounas (2004) defined mobile learning as, "The point at which mobile computing and e-learning intersect to produce an anytime, anywhere learning experience". Though, online learning has prevalently professed the advantage of learning anytime and anywhere, but until the advent of mobile learning technologies, it was not an anytime, anyplace environment (Caudill, 2007).

According to Vavoula and Sharples (2002), there are three ways in which learning is considered mobile: "learning is mobile in terms of space, i.e. it happens at the workplace, at home, and at places of leisure; it is mobile between areas of life, i.e. it may relate to work demands, self-improvement or leisure; and it is mobile with respect to time, i.e. it happens at different times during the day, on working days or on weekends". While mobile learning can be accessed just-in-time (Traxler, 2007) at the demand of the learners' needs, it also has the potential to facilitate situated learning and authentic learning (Kukulaska-Hulme & Traxler, 2007 and Traxler, 2007). Learners also tend to increase enthusiasm, motivation, confidence and a sense of ownership (BECTA 2003). The inherent characteristics of mobile learning allow the technology to be useful in distance education.

## **Short Messaging Services (SMS) for Learning**

Short Messaging Services is one of the "most useful and most used" application in the mobile phone (Abas, Lim & Woo, 2009) and its usage has surpassed all expectation (Markett et al., 2006). The SMS usage has grown exponentially in the Asian countries. It is a fact that text messaging, known as one of the most popular communication medium has become more affordable than before. According to MIS Asia (2009), Asia Pacific recorded a 40 per cent growth with a total of 6.36 billion messages traffic over the Christmas and New Year 2008/2009 period. Philippines lead the ranking with 2.36 billion messages (with a subscriber base of just 66

million), followed by Indonesia (1.193 billion), Malaysia (1.075 billion) and Pakistan (763 million). In USA, SMS messages volume in the month of December has proliferated over the past six years with 2.1 billion (2003), 48.1 billion (2007) to 110.4 billion (2008). In these six years, the subscription number has up surged to 70 percent from 159 million to 270 million (Tech Crunchies, 2009).

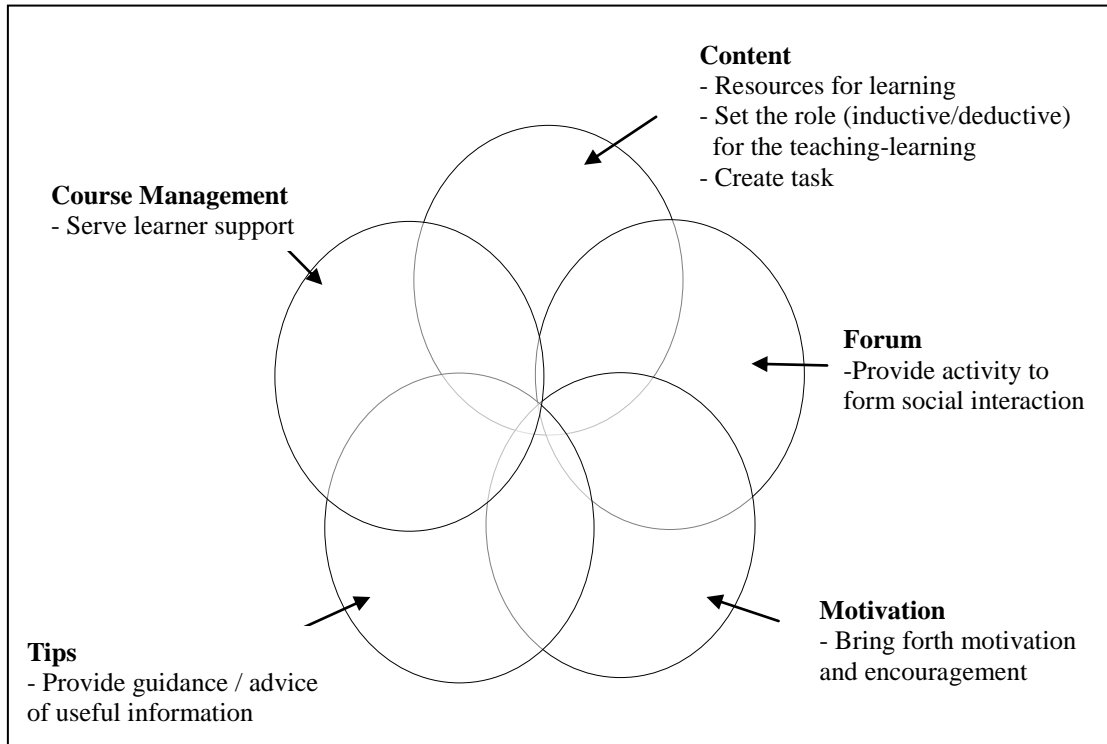
“These figures demonstrate that SMS is still the preferred choice for communicating ...” (Acision, 2009). However, can SMS technology be applied for learning? In a study by Ramos (2008), SMS-based distance education curriculum facilitated an increase in the knowledge of learners, although they pointed problems with message delays. In another study, SMS was used to improve learning performance in laboratory instruction (Martinez-Torres et al., 2007). Rozhan and Issham (2008) reported that the learners benefited from the short lessons in physics received via SMS.

The SMS is an asynchronous form of communication with learner while fostering a sense of connectivity between the learner and facilitator (Mackay, B.J., 2007). In addition, it provides expansion time for learners to reflect and to react to the information (Abas, Lim & Woo, 2009). Keegan (2007) concurred that SMS enables learners to be prepared for their classroom discussions.

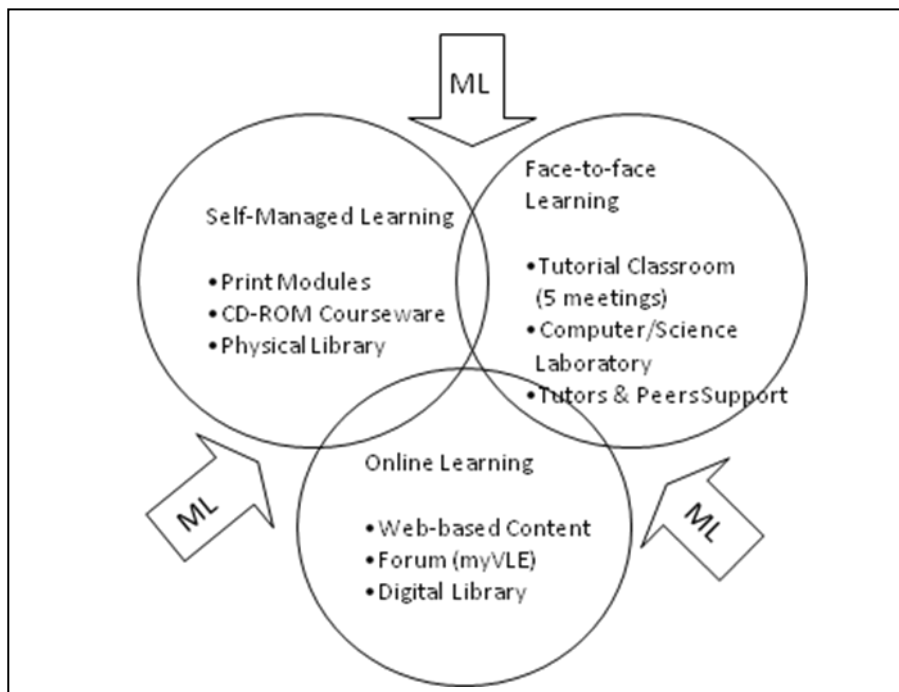
## **The 5-Category Pedagogical Model**

Being a distance learning university, Open University Malaysia (OUM) needs to be at the forefront in providing learning means that are both effective and affordable to its profile of learners who are employed adults. As reality it may be, many of these learners do not have a computer and many more do not have easy access to the Internet from home, but 98 percent of learners (Abas, Ch'ng and Mansor, 2009) own at least a mobile phone. Due to the inherent features of mobile learning and its' potential to provide more flexible access to learning than the conventional e-learning models, it was inevitable but to consent mobile learning into the present learning modes at OUM.

The 5-Category Pedagogical Model (Figure 1) composed of Content, Forum, Motivation, Tips and Course Management are categories of SMS text messages, and was designed to enhance the learning experience of the learners at OUM. The mobile learning model was constructed to complement the blended learning modes at OUM (Figure 2), which includes face-to-face tutorial sessions, online learning environment (e.g. learning management system with asynchronous forum and other supporting online material) and self-managed learning using the print and digital materials. Mobile learning “should not be seen as an isolated activity of phenomenon but something that works best as part of other forms of education” (Tétard, Patokorpi & Carlson, 2008).



**Figure 1.** 5-Category Pedagogical Model for Mobile Learning



**Figure 2.** Mobile Learning (ML) Support the Blended Learning Modes at OUM

## **The Design Principles and Conceptual Foundations**

The five components of the model had to project into bringing about learning rather than combating with the technology adoption. The pedagogy model, the technological tool and the content should function in harmony (Tétard, Patokorpi & Carlson, 2008). Each category served a purpose and has envisaged outcomes as shown in Table 1.

Effectiveness of learning depends on the instructional design and not the technology of delivery. Thus, it was necessary that the pedagogical design was able to promote effective mobile learning experience. The foundation of the design had incorporated a unique blending of the five SMS categories that emphasised: learner-centred, knowledge centred, community-centred and assessment-centred as well as the time and pacing of the messages.

- **Learner-centred:** The learner can access information anytime, anywhere in order to build their skills and knowledge. The learner is empowered to participate in the learning process cognitively and constructively.
- **Knowledge-centred:** The SMS text are in small bites of key information from the course content, allowing learners to construct knowledge through integration and assimilation with their prior learning.
- **Community-centred:** The SMS message provided a context where the learners were required to collaborate and share their views on the discussion topic enhancing constructive learning experience.
- **Assessment-centred:** Though indirectly, the learning community involving the tutors and peers, continually provided feedback during the forum discussions.

### **Content**

The 'Content' messages play varied teaching roles (inductive or deductive) depending on how the messages are constructed. The messages could serve as the repository of key content and/or cognitive teaser tasks or activities. This is based on the cognitive learning theory where the learners use their memory and thinking processes to organise, integrate, store and manipulate mental representation of the information received through listening, watching, touching, reading, or experiencing (Ausubel, 1980). Reading SMS text message might seem to be a passive learning method but the learner can be active in a cognitive way through processing and remembering the new information as well as practice applying it in some context. The cognitive approach is suitable to help learners recall new information and comprehend how to use the information (Davis & Davis, 1998). In addition, SMS messages that are in the question format are designed as self-reflective learning exercise to help create awareness of what the learner does not know yet, a process known as meta-cognition learning. The act of being aware of one's own thinking and learning will help them learn better (Bransford, Brown, and Cocking, 1999). Majority of the SMS messages send out were from 'Content' category followed by the 'Forum' type.

**Table 1. 5-Categories of SMS Messages, Goals and Examples**

Category	Purpose	Envisage Outcome	Example
Content	To help learners locate/remember important course facts easily. To review important content in module To provide inductive/deductive teaching-learning To create task/activity for cognitive participation	Help learners to achieve learning outcomes	SQ3R reading method is useful for preparing exams. Do you know how to apply it? Refer to Topic 3.2.
Forum	To provide suitable stimuli for discussion in myVLE To remind and motivate learners to participate in discussion forums.	Contribute to an increase in learner participation in forum discussions	Setting goals and time management are important to your studies. What is your goal? How do you apply time management? Share in myVLE.
Motivation	To motivate learners to persevere in the learning process	Contribute to retention of learners	Motivation Quote: “When you believe something can be done, really believe, your mind will find the ways to do it” by Dr. David Schwartz.
Tips	To provide hints/strategies to learners on how to do well in their studies	Help learners manage their studies	For your reference a list of previous SMSes is available at <a href="http://twitter.com/oumh1103">http://twitter.com/oumh1103</a> Do check it out.
Course Management	To provide timely announcements / reminders on assessment and other aspects related to course management	Help learners to remember important dates and actions to be taken to the course	The exam date for OUMH1103 is ...: 9.00-10.30 a.m. Topics covered are 5 to 10. Be prepared for the exam.

## Forum

Under the ‘Forum’ category, the messages provide an incitement for the learners to interact, participate and collaborate on the learning issue with their tutors and peers in forum discussions at the virtual learning environment (myVLE). The basis of having discussion forum is to promote constructive learning. Learning is an active process in which learners construct new ideas or concepts based on their current and past knowledge (Bruner & Haste, 1987). Similarly, according to the social-cultural theory, knowledge is best constructed when learners collaborate together by supporting one another and encourage formation, construction and reflection on learning (Vygotsky, 1978). Though the interaction and collaboration does not take place through the mobile phone device itself, but the messages has often triggered in fostering collaborative learning and develop communicative skills in myVLE

## Motivation, Tips and Course Management

The occasional ‘Motivation’ messages are intended to encourage learners and maintain their enthusiasm in studying the course. It is hoped that this will increase learner retention. The ‘Tips’ messages are more towards providing guidance and advise of useful information that will benefit the learners in their learning. As reported by Visser and Keller (1990), “motivational messages” in the form of “study tips” to the learners gave positive impact to their confidence and achievement. Likewise, in order to provide the continuous administrative support, the

‘Course Management’ messages are handy information that assists coordination of learners and resources for supporting learning. In a study using SMS to support administrative communication, it was found that learners were highly satisfied with the “quantity and content of the text messages and tutors reported changes in behaviour that were directly attributable to the use of text messaging” (Naismith, 2007).

## Implementation

OUM uses a SMS application system that was developed in house. The process flow of sending the SMS is briefly outlined as follows:

- The administrator keys in the SMS message into the OUM SMS Application System and set a predetermined date and time that the system will send out the SMS.
- The administrator inputs the mobile phone numbers into the SMS Application System by downloading the .txt file format. The phone numbers were obtained from the Registry records.
- Once the SMS message is send out, the SMS application will connect to the SMS Gateway.
- The SMS Gateway will forward the SMS to the mobile/Telco operators which learners are subscribing the service from.
- The Telco providers send the SMS to the mobile phone of the learners.

The SMS messages are upto a maximum of 150 characters in length includes information that it is free of charge (RM0.00) and the course code (OUMH1103) as shown in Figure 3.



**Figure 3.** Snapshot of the SMS text message

The learners received 2-3 SMS messages per week with mix categories, which means one SMS could be for the category Content, another two could be for the Forum and Motivation categories. The SMS message and its category was pre-set in the form of a time-table schedule which indicates which day of the semester the SMS is to be send out (Table 2).

**Table 2. Template for SMS Schedule for September 2009 Semester**

DAYS	Week 3 (12 – 18 Oct 2009) (Topic – ...)	Week 5 (19 – 24 Oct 2009) (Topic – 1)	Week 6 (26 Oct – 1 Nov 2009) (Topic – 2)
MONDAY	Welcome to OUM! A series of FREE SMSes related to OUMH1103 will be sent to you during the semester to help you in your studies. Enjoy! CM	What are the strategies & advantages of the blended learning mode used in OUM? Discuss in Forum. F	How does the LMS support you in your learning? Refer to Section 2.3 to find the answer. C
TUESDAY	Discussion on SMS topics will be in Facebook. Register as a member & go to www.facebook.com/oumh1103 to be a Fan. Guide is available in LMS. CM		
WEDNESDAY	It is advisable to read the module before tutorials. You will understand better. Do read Topics 1 & 2 for Tutorial 1. T	Setting goals and time management are important to your studies. What is your goal? How do you apply time management? Share in Forum. F	Do you know all the functions of the tools in myLMS? Which is the one most useful to you? C
THURSDAY			
FRIDAY			
SATURDAY		TUTORIAL 3 (23 - 26 Oct 2009)	

C = Content  
F = Forum  
M = Motivation  
T = Tip  
CM = Course Management

The text messages were pre-set to go out at 8.00pm. It is important to determine when to send out the message and how frequently it should be, when considering working adult learners who certainly would have other commitments as well. A pilot focus group study was conducted earlier to ascertain learners’ preferred time and frequency of SMS messages. Learners begun to receive SMS messages at week 3 of the semester as these learners are quite new to the distance learning environment hence, it will give them some time to settle down. Table 3 shows the total number of SMS messages send out for May and September 2009 semesters.

**Table 3. Total Number of SMS Messages**

Semester	No. of learners involved	No. of SMS sent per course
May 2009	1863	31
September 2009	1173	25

## Evaluation of the Mobile Learning via SMS

The main concern remains that is, can this mobile learning model be effective for learning? Thus, this paper intends to investigate whether the intended expectations of the pedagogical model was well received by the learners.



A questionnaire survey was administered to the learners who registered for the Learning Skills for Open and Distance Learners (OUMH1103) course, which is the compulsory course at OUM. The questionnaire was in bilingual (English language and Malay language) and consisted four sections: Demographic Data (Part A), Perceptions (Part B), Impact on Learning (Part C) and Overall Impression (Part D) with a total of 35 items including three open-ended questions. 712 learners from May 2009 semester and 656 from September 2009 semester responded to the questionnaire.

## **Feedback from Learners**

Findings from this study indicated that high percentage of the respondents perceived the SMS messages have been useful in their learning and had motivated them to learn with an average percentage of 85 percent and 75 percent respectively (Abas, Lim, Harvinder, Wei, 2009) for May semester, and in a similar trend, 81 percent and 72 percent respectively for September semester.

Figure 4 show that 56 - 80 percent of the respondents agreed that all the five SMS categories had served the intended purposes. The findings revealed that the pattern of response between the two semesters May and September 2009 were almost alike. The 'Course Management' category reported the highest percentage of responses for meeting the expected outcomes, with 77.9 percent and 80.2 percent for May and September semesters respectively. The findings also revealed that 64 percent (May Semester) and 69 percent (September Semester) of the respondents agreed that the 'Motivation' type of SMS messages had achieved the intended purpose. It sure indicates that learners tend to like receiving motivational quotes, as expressed by one learner to a response done by another study, "I think this (sic) kind of words really motivate" (Abas, Lim & Woo, 2009).

However, as revealed by the survey, majority (May – 30.4 percent and September – 31.6 percent) of the learners reported that only 'sometimes' they participate in the forum (Figure 5) after receiving the SMS. The frequency of respondents reading the module was higher than their participation in the forum. This was shown by higher responses for 'often', 'very often' and 'always', for getting learners to refer to the course module. The main reason for investigating these two factors is because OUM learners are expected to do self-study using the module and participate in the discussion forum due to the limited face-to-face learning sessions, and it is hoped that with the mobile learning support it would encourage learning in such modes.

Hence, this necessitates a question to the idea in the pedagogical model and further queries the capacity of the text messages in the SMS. Will learners be motivated enough to get into collaborative learning by merely providing a topic for discussion? In addition, could there be other possible factors influencing learners' participation in the forum such as, lack of access to computer and the Internet or could it be lack of self motivation of the learners. Interestingly, in a different study at OUM, it was found that by applying the 5-category pedagogical model for a course on company law, number of postings were higher after implementing SMS tutoring into the course (Mohamad, Tuan, Naranjan, Wei, 2010). Therefore, It is not justifiable as yet whether the SMS tutoring was successful indeed or vice-versa for creating effective discussions in the forum until and less further researches are carried out to investigate on the quality of the

postings and pattern of learners' participation in the discussion forums for the OUMH1103 course. Furthermore, there is definitely a need in ascertaining the underlying reasons of why learners were not so keen in getting into the forum after receiving a message to do so.

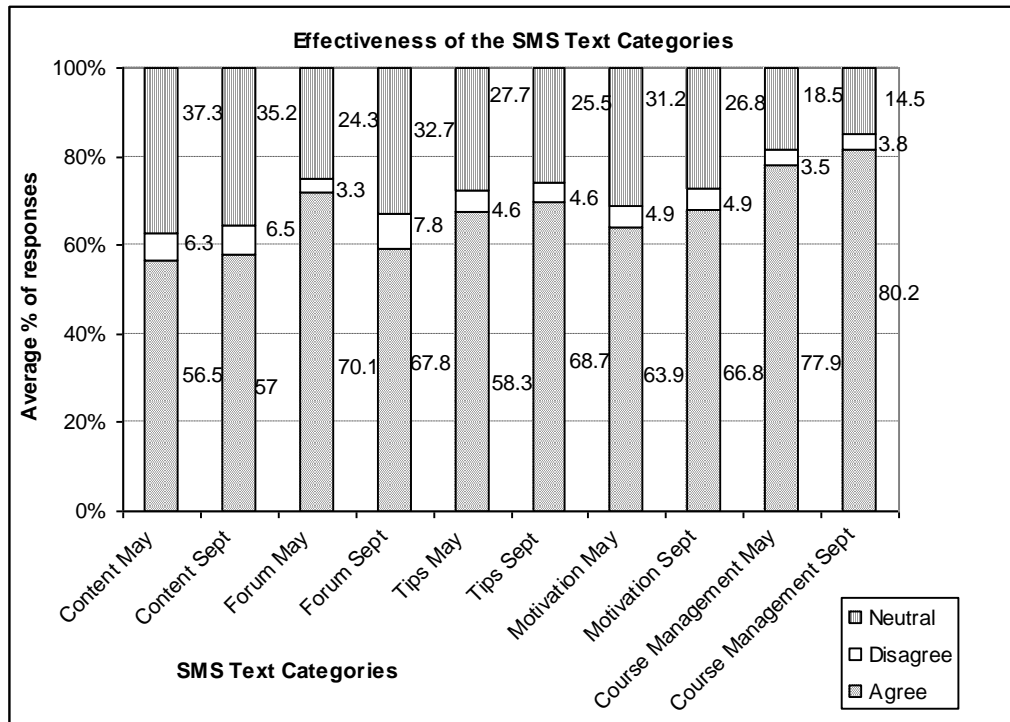


Figure 4. Perceived Effectiveness of the 5-Category SMS for May and September Semesters

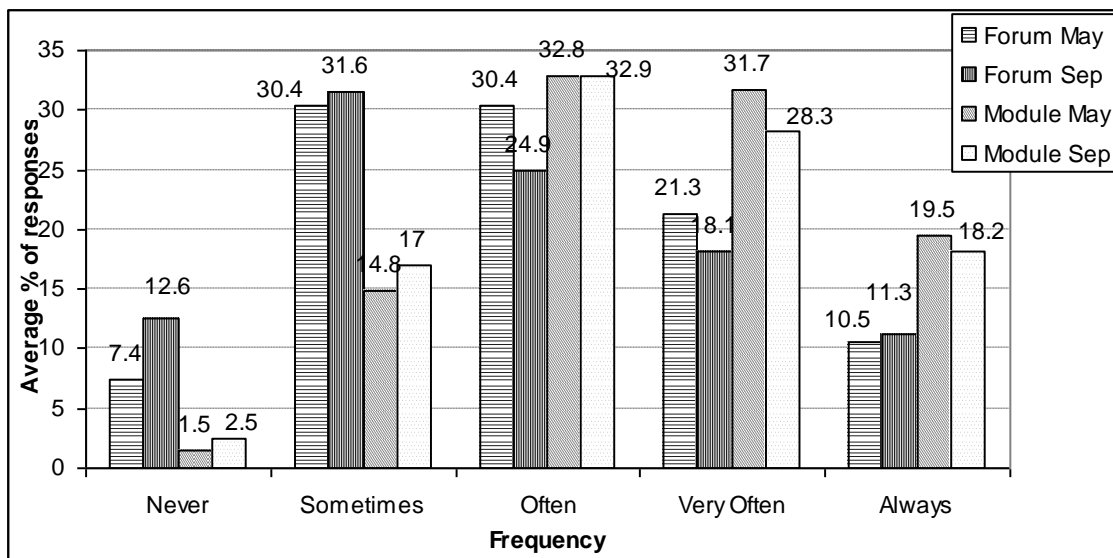


Figure 5. Learners' Response for Forum Participation and Reading the Module

Nevertheless, in both semesters May (77.3 percent) and September (76.7 percent), learners signified that mobile learning using SMS technology had made a positive impact to their learning experience and 72.5 percent for May semester and 81 percent for September semester felt more satisfied with the learning experience for this course as compared to their other courses. The overall feedback with above 70 percent of the learners agreeing, suggested that the mobile learning using the SMS technology had added value to their learning, encouraged them to be more focused in their learning, assisted them to be a better self-managed learners, sustained their interest in the course and most importantly had successfully given them the learning flexibility. More than 90 percent of the learners in study said “yes” when asked if the SMS tutoring ought to be extended to other courses in the future.

### **Challenges with the SMS System**

Like any other teaching-learning media, the SMS technology was not spared from the challenges. Among the key issues were, that the SMS messages were one way ‘pushed’ bites of learning and therefore it was not able to provide immediate means of feedback or interaction which may be required by the learners. Due to this it was necessary that the online forums conscientiously supported the discussions on the SMS text messages and it was decided that interactive SMS (that gives automated response to the learners) to be incorporated for administering self-assessment quiz questions.

The other setback was that the SMS system depended on the services provided by the telecommunication vendor. Hence, at times whenever there was data congestion, it would either delay the time of receiving messages or never reach the learners. Due to this, the bulk messages cannot be preset for sending ahead, but the text messages were send out one at a time according to the schedule.

Besides that it was quite costly to continue sending SMS text messages especially for courses that has large number of learners registered every semester. The cost incurred could not be obviously justified if there was any direct impact on the teaching-learning exercise.

### **Conclusion**

The mobility, accessibility and ubiquity factors inherent to mobile technologies provide potential opportunities of using them in distance education. One such application in mobile phones, the SMS has proved its capabilities in shaping successful mobile learning experience in particularly for supporting the blended learning approach in OUM. This study revealed that the mobile learning pedagogical model lies beyond the SMS text messages. It is an integration of learning philosophies via means of a technological tool. The learning is triggered by pushing SMS messages that are related to content or seeking learner participation in the online discussion forum. The implications of using SMS for effective learning may result to beneficial educational outcomes as long as the pedagogical design of the messages and support towards the main learning modes helps in attaining the intended goals of learning. However, there is a need for further investigation in validating the model beyond the perceptive claims from

learners.

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