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The Use of SMS in Promoting Inquisitiveness among Distance Learners

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Abstract

Poor interaction skills and ineffective communication often lead to learning difficulties and frustrations among distance learners. Thus, due to the nature of their studies, distance learners need to play a leading part in their own learning by being inquisitively to obtain own understandings. Our research explored the potential of short messaging service (SMS) as a mobile learning tool to promote inquisitive learning skill among distance learners. This study examined the implementation of an SMS-based mobile learning system, namely Pocket Education, through the query application involving 650 distance learners from the School of Distance Education, Universiti Sains Malaysia. A mixed methodology through the case study and survey methods was employed to gather inputs pertaining to their satisfaction towards the application. It was found that, while participants perceived the system positively in general, they were moderately satisfied with the query application. The main inhibitor for distance learners' satisfaction towards the SMS-based query application was found to be the technical hurdles, rather than a perception of the system value. As implication, further work can be done from these findings in order to develop an effective mobile learning tool that put forward the element of inquisitiveness towards enhancing the quality of distance education delivery.

Keywords: mobile learning, SMS, inquisitive, inquiry-based learning, distance education

Introduction

Interaction between learners and instructors is one of the most crucial factors for a successful implementation of distance education system. Instructors can help learners become comfortable with learning by providing channels for interaction to bridge the gap in distance learning environment (Zheng and Smaldino, 2003). Sharp and Huett (2006) implied that, for learner-instructor interaction, there are three tasks to be involved: to stimulate interest and motivation; to organise application of student learning; and to counsel, support and encourage each learner. It is essential to look into the quality of interaction as an inevitable tool in distance education because most of students have limited access to the traditional classroom teaching accommodation.

However, instructors need to ensure that learners are self-disciplined and self-motivated in order to acquire knowledge on their own. Poor interaction skill, in the aspect of communication difficulties such as slow feedback and unfamiliarity with group members may hinder online learning (Kim, Liu and Bonk, 2005). Poor interaction skills often manifest into conflict, problems, frustrations and failure for both learners and instructors of distance education (Hisham and Rozhan, 2003). Studies found that Malaysian distance learners are less self-directed than their western counterparts and lack the pertinent strategies to survive the learning mode (Nor Aziah and Haziah, 2005). Hypothetically, students who are less self-directed will be most likely to participate less in any activity that involves two-way interaction with instructors. This is because students who are self-directed will be more reflective towards their own learning. They are active learners who are inquisitive and interacting more with their instructors because they need to evaluate their own learning outcomes.

Hence, in order to realise such interaction between learners and lecturers of distance education, both parties need to have a mutual question-answer skill. Distance learners need to play a leading part in their own learning process by being inquisitively to obtain own understandings, rather than depend solely on lecturers' inputs. Nowadays, distance learning environment supports various forms of interface that allow students to interact with their instructors, such as forum, msn messenger, video conference, and mobile phone. However, detailed study still needs to be conducted to gain an insight

on how can the learning approach be practically implemented and whether learners are willing to embrace such intervention. In line with this need, our research explored the potential of short messaging service (SMS) as a mobile learning tool to promote inquisitive learning skill among distance learners in Malaysia. By examining their experience and perceptions, we hope to propose an emphasis on students' inquisitive learning as a core element in cultivating learners-instructors interaction, as well as introducing a breakthrough in distance education.

Literature Review

Inquisitive Learning

Student engagement in learning is necessary for skill and knowledge development, but how equipped are the students with the requisite knowledge, skills and dispositions to solve problems and issue to face this competitive world? Changes in teaching and learning process are important in providing opportunities for students to become knowledge builders, capable of creative and innovative solutions to problems (Learning, 2013). Scholars suggested that students must be instructed in an inductive process to increase student engagement, higher order thinking skills and achievement, and this can be achieved through inquire-based learning (IBL) (Furtado, 2010; Varma, Volkmann and Hanuscin, 2009; Buxton, Lee and Santau, 2008). The term inquiry-based learning, or IBL, is defined as an approach to teaching and learning that places students' questions, ideas and observations at the centre of the learning experience (Learning, 2013). IBL is also a term used to describe educational approaches that are driven more by a learner's questions than by a teacher's lessons (Education Development Center, 2016). In the IBL approach, the process of solving real-world problem is not just about students memorising facts, but they also observe, inquire, and problem-solve, which assists them in realising the importance of the facts (Furtado, 2010) and at the same time, it enhances involvement with a community of students, learning with each other and creates social interactions. This question-driven learning approach has potential to be integrated in distance education context, such as for online learning purposes.

According to Weerasinghe, Ramberg and Hewagamage (2012), inquiry-based learning approach fosters students' active engagement in online learning and this method is considered as an effective method of leading students learning process to higher-order learning in university-level educational programmes (Garrison and Cleveland-Innes, 2005). Weerasinghe and fellow researchers said that several techniques can be applied when using an IBL approach, as case-studies, problem or project-based activities, or collaborative work (Weerasinghe, Ramberg and Hewagamage, 2012). In IBL, the teacher plays the role of a facilitator in the learning activity, promoting student discussion and providing guidance instead of directing the activity (Herron, 2009; Wood, 2009) similar in the online learning context. IBL learning is directed by the students where they take charge of their learning that encourages independent learning.

In the process of IBL, students with inquisitiveness are driven by their own curiosity in which they learn by asking questions. Once the instructors provide the answers, they will continue learning at own pace, even outside the classroom. According to Uluçınar and Aypay (2016), there are various theories proposed in the literature to explain what inquisitiveness is and how it arises. The first theory given by Berylne (1966, as cited in Uluçınar & Aypay, 2016) referred inquisitiveness as a humane urge, like hunger or thirst, that triggers learning information. In the second theory, inquisitiveness represents "the inconsistency in individuals' perspective related to an event or phenomenon in a more cognitive sense" (Uluçınar and Aypay, 2016 p.252). In the third theory by Loewenstein (1994, as cited in Uluçınar and Aypay, 2016), inquisitiveness is defined as individuals' desire to fill the gap between their existing knowledge and the desired level of knowledge (Loewenstein, 1994). Therefore, in simple words, inquisitiveness refers to learners' curiosity or eagerness to acquire own understanding in learning process.

Uluçınar and Aypay (2016) supported that inquisitiveness can be used as a powerful tool to guide individuals' actions and motivates their behaviors towards solving uncertainties and reveal the unknown. One of the distinctive and defining features in inquisitive learning is questioning. According to Chin (2004), reflective learners ask questions to monitor the status of their understanding and this action will link their prior knowledge to new meaning and perception.

Mobile Learning via SMS

With the advent of mobile technologies, one aspect of distance education is starting to take root in the higher learning institutions and that is mobile learning. According to Sharples (2006), there are four categories of mobile learning definition: techno-centric, relationship to e-learning, augmenting formal education, and learner-centred. For instance, Traxler (2007) argued that the most obvious definition of mobile learning: learning delivered or supported by handheld or mobile devices, is techno-centric and purely technology-based. Sharma and Kitchens (2004) defined mobile learning as "learning supported by mobile devices, ubiquitous communications and intelligent user interfaces" (p.205). As technology advances to its wireless phase, current trends suggested that mobile technologies are the 'now' technology for education. Due to this situation, mobile learning is predicted by researchers to be a significant next wave of teaching and learning environment (Nyandara, 2012; Naismith et al., 2004).

Mobile learning is here in this country for several obvious reasons. Till now, mobile learning has an appreciable presence and beginning to gain ground in Malaysian higher learning institutions, especially in institutions offering distance learning programmes. Mobile learning has become a major topic for distance education research community in Malaysia within the last decade. Unlike most European countries, advanced mobile devices, like PDAs and palm talk, cost more than basic mobile devices in Malaysia (Syed Yahya, Syed Ardi and Zaidatun, 2008). As such, m-learning is described in the study to be more practical for distance learners than to full-time undergraduates. This is due to the fact that most distance learners are working adults who generally have their own incomes and can afford to buy those costly devices (Syed Yahya, Syed Ardi and Zaidatun, 2008). Moreover, statistics showed that mobile phone ownerships per 100 inhabitants is approximately 143% while broadband is only 22% [Malaysian Communications and Multimedia Commission (MCMC), 2013]. Ownership of a mobile phone plays a crucial role in implementing mobile learning application (Corlett et al., 2005). As such, the utilisation of such basic mobile technologies in supporting teaching-learning activities would benefit a wide range of distance learners in Malaysia.

Mobile learning is made real through various types of mobile devices, such as mobile phones, smart phones, palmtops, and handheld computers, such as laptops, tablet PCs, and portable media players. Mobile learning via the short messaging service (SMS) is generally referred as SMS-based learning. It is referred as the simplest form of mobile learning in which the learning experiences and knowledge acquisition are obtained through the SMS mobile technology (Petrova, 2007). Motlik (2008) supported the use of SMS in supporting distance learning as he claimed that SMS-based is a cost-effective and efficient for delivering the distance learning contents. Another study by Rekkedal and Dye (2007) found numerous possibilities in using SMS as a learning support for online distance learners whereby SMS was found to be among the most used and useful mobile applications for distance learners. Similarly in Malaysia, Ahmad Sobri, Wan Fatimah and Rohiza (2010) supported that SMS-based learning is a new learning phenomenon in this country which exists because of the drastic increase in the number of mobile devices used nowadays. This is proven from the survey conducted by MCMC (2008) in which it was found that the SMS usage in Malaysia is increasing from year to year. Therefore, SMS hold enormous potential to be introduced as a teaching and learning tool in distance education courses in Malaysia.

Method

Research Design

The reported study was an exploratory one and was a part of a larger study on SMS-based mobile learning project via an SMS-based learning system, namely Pocket Education. It employed a mixed methodology through the case study approach in the implementation phase and the survey method in the evaluation phase. The goal was to present distance learners' experience in using the SMS-based query tool and also to investigate on the usability of the tool in promoting their inquisitive learning. The study reported here was carried to answer the following research questions:

1. How can the SMS-based learning system be implemented for promoting inquisitive learning among distance learners?
2. To what extent is the SMS-based learning system usable for promoting inquisitive learning among distance learners?

Sample

Participants of this study were a group of 650 undergraduate distance learners undertaking Management courses in the School of Distance Education (SDE), Universiti Sains Malaysia (USM) in the academic year 2012/2013. They were purposely selected from distance learners who undertook three management subjects in the SDE, USM. Verbal consent was sought from the course lecturer and participants have agreed to participate in the project. In terms of technological experiences, they have considerably similar experience in the blended distance learning environment since they have experienced the online distance learning environment and they have at least own one mobile phone with a minimum of SMS capability. Therefore, a preliminary screening effort took place to ensure participants are those who could readily contribute to the study. This effort was achieved by requesting respondents to register their mobile number first to the system to be eligible to participate in the project.

As a written consent, respondents were given options to fill in the questionnaire forms only if they have registered in the Pocket Education system. This is for convenience of data analysis and data validity purposes since data pertaining to usability evaluation of the system have to be sought only from those who have participated in the Pocket Education project.

Instrument

In the evaluation phase, questionnaire is chosen as the main instrument to evaluate the usability of query application in the Pocket Education system. The questionnaire used for usability evaluation of Pocket Education system is the Questionnaire for User Interaction Satisfaction (QUIS). QUIS was originally developed by Chin, Diehl, and Norman (1988), a multi-disciplinary team of researchers from Human-Computer Interaction Laboratory in University of Maryland to measure many types of interfaces. It helps researchers to gain users' perceptions of interface usability which includes overall reaction to the system, screen factors, terminology and system feedback, learning factors, and system capabilities (Akıllı, 2005). For the purpose of this study, the current version of QUIS, which is QUIS version 7.0 was used to measure the usability of Pocket Education system. Since QUIS is a licensed, validated survey tool, it was purchased and adapted with permission from the University of Maryland.

The adapted QUIS contained three sections, which are demographic, mobile phone experience, and usability of Pocket Education system. In Section A, i.e. demographic, there are eight questions on respondents' personal background, which are gender, age, ethnicity, marital status, working sector, income rate, current study year, and current Cumulative Grade Points Average (CGPA). As for Section B, there are five questions that seek information pertaining to respondents' experiences in using mobile phone. Section C assessed the usability of Pocket Education system. This section was divided into sub-sections that include the aspects of usability in terms of overall user reaction and SMS-based learning applications. A final qualitative question was included at the end of the questionnaire form to seek for respondents' suggestions and comments about the system.

Data Collection and Analysis

In the implementation phase, data sources were primarily collected from the participants' inputs and system's observation details. Specifically, data were gathered through portal monitoring in which observation results were captured and system monitoring report were prepared to keep track of the implementation process for further system troubleshooting.

In the evaluation phase, participants were asked to evaluate the Pocket Education system after the system run has been completed. The QUIS questionnaire was administered face-to-face in the students' two-hour intensive class sessions which were held in the lecture rooms. The intensive classes were on the ninth week of the semester, which was before mid-term exam was held. Due to this nature, it was administered to users after they have completed the 10-weeks learning session via the SMS-based learning project. Students were informed verbally and briefly on the purpose of the questionnaire. Out of 650 questionnaires being distributed, 615 were returned and obtained useful from the survey. This gave an overall response rate of 94.62%. Data were analysed using statistical software, PASW 17.0 with a statistical significance level of $\alpha = 0.05$. Types of data analysis run were reliability and descriptive analyses.

Results

Demographic Profiles

Respondents' demographic details are provided in Table 1. Of those subjects, 32.4% were male and 67.6% were female. Majority of respondents indicated their age as from 20 to 29 years old (46.0%) and from 30 to 39 years old (47.8%). The major ethnic group indicated by the respondents was 80.8% Malays. In terms of marital status, 63.4% responded as single. While all respondents were earning from RM1,000 to RM2,000 (39.3%) and from RM2,001 to RM3,000 (36.8%) monthly, more than half of them (69.6%) were currently working in public sector. General academic profiles were also surveyed in Part A, i.e. demographic section, of the questionnaire. For the subjects they enrolled into, 38.4% were in their second year and 32.7% were in their third year. Nearly half (48.1%) of all respondents have managed to get a CGPA from 2.50 to 2.99.

Table 1 Demographic profiles

	Frequency	Percentage (%)
Gender		
Male	199	32.4
Female	416	67.6
Age (year)		
20 to 29	283	46.0
30 to 39	294	47.8
40 to 49	33	5.4
50 and above	5	0.8
Ethnicity		
Malay	497	80.8
Chinese	49	8.0
Indian	35	5.7
Others	34	5.5
Marital Status		
Married	218	35.4
Single	390	63.4
Single Parent	7	1.1

(*Continued on next page*)

Table 1 (Continued)

	Frequency	Percentage (%)
Working Sector		
Public	428	69.6
Private	168	27.3
Self-employed	13	2.1
Not working	6	1.0
Income Rate (RM)		
Below 1000	13	2.1
1000 to 2000	241	39.3
2001 to 3000	226	36.8
3001 to 4000	86	14.0
4001 to 5000	32	5.2
Above 5000	16	2.6
Current Study Year		
Year 1	54	8.8
Year 2	236	38.4
Year 3	201	32.7
Year 4	112	18.2
More than 4	12	2.0
Current CGPA		
Below 2.00	8	1.3
2.00 to 2.49	149	25.0
2.50 to 2.99	287	48.1
3.00 to 3.49	137	22.9
3.50 to 4.00	16	2.7

Mobile Phone Experiences

The next section surveyed on five general information regarding respondents' experiences in using mobile phone. Detailed breakdown of respondents' mobile phone experiences were illustrated in the following figures (Figure 1 to Figure 3). From Figure 1, majority of respondents (42.3%) responded that they own smartphone, while others have the basic standard mobile phone (26.7%), internet-enabled phone (18.2%) and tablet (12.8%). Despite the type of mobile phone they owned, it is interesting to note from Figure 2 that all respondents have owned at least one mobile phone (60.3%), while others managed to own more than two devices. In terms of technology familiarity,

as can be observed from Figure 3, almost all respondents (99.0%) agreed that they familiar with the use of mobile phone. Therefore, mobile phone ownership and technology familiarity are not critical issues among the respondents of this study.

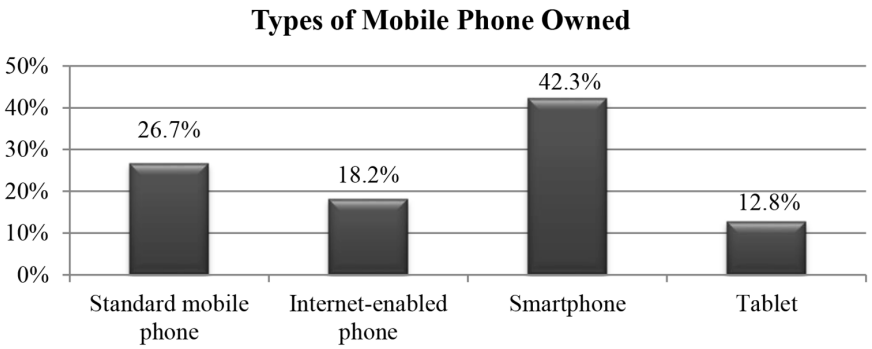

Figure 1 Mobile device ownership

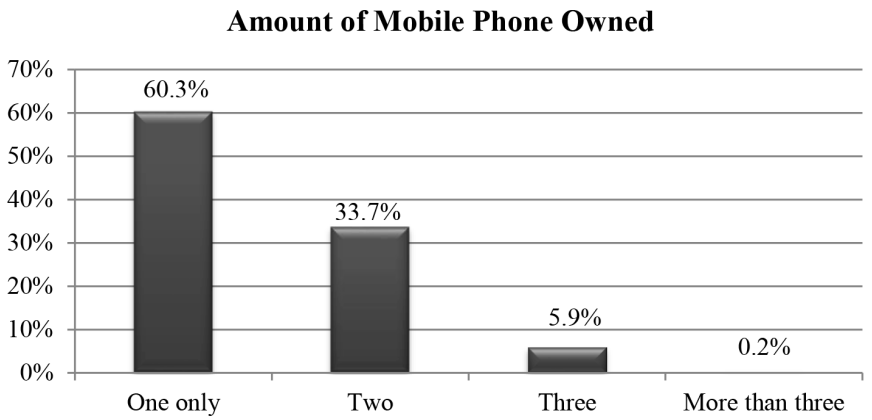

Figure 2 Number of mobile phones owned

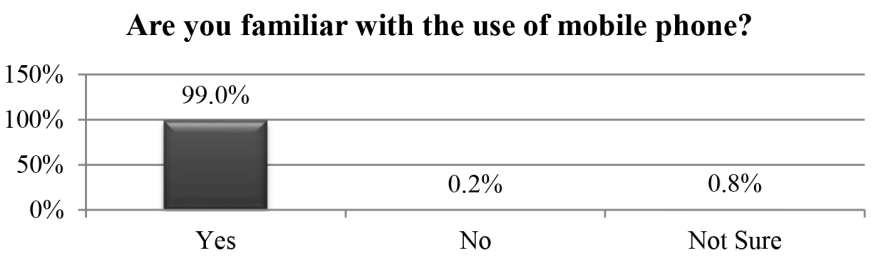

Figure 3 Familiarity with mobile phone

The Pocket Education's Query Application

The Pocket Education's query application is an interactive SMS-based application which is useful to facilitate active learning among distance learners. Unlike other applications, query works in a 'pull' mechanism which means that it is triggered by learners themselves. Learners have to initiate the communication first by sending their query about the subject contents or the system via their mobile phones to the system. Therefore, contents and the frequency of query sent by students to the system may vary depending on their needs. The lecturer or admin user can choose to reply the queries either via the web-based portal or their own mobile phone so that the answer can be sent directly to the learners' mobile phones. Hence, by having the capability to return the message, the application helps to introduce a learning method which can be experientially real to students in the sense that they can engage in personally meaningful activity/learning. A screenshot of the portal interface for query reply is illustrated in Figure 4.

To use the application, students will send the SMS code, "ASK<space>COURSECODE<space>" and followed by the question that they need to ask, within the 160 characters limit. As the system receives their query, it will send the message "Query accepted" to notify the students. Once the lecturer replies the query, students will receive the reply via SMS. Figure 5 illustrates an example of how the SMSs were sent and received by students.

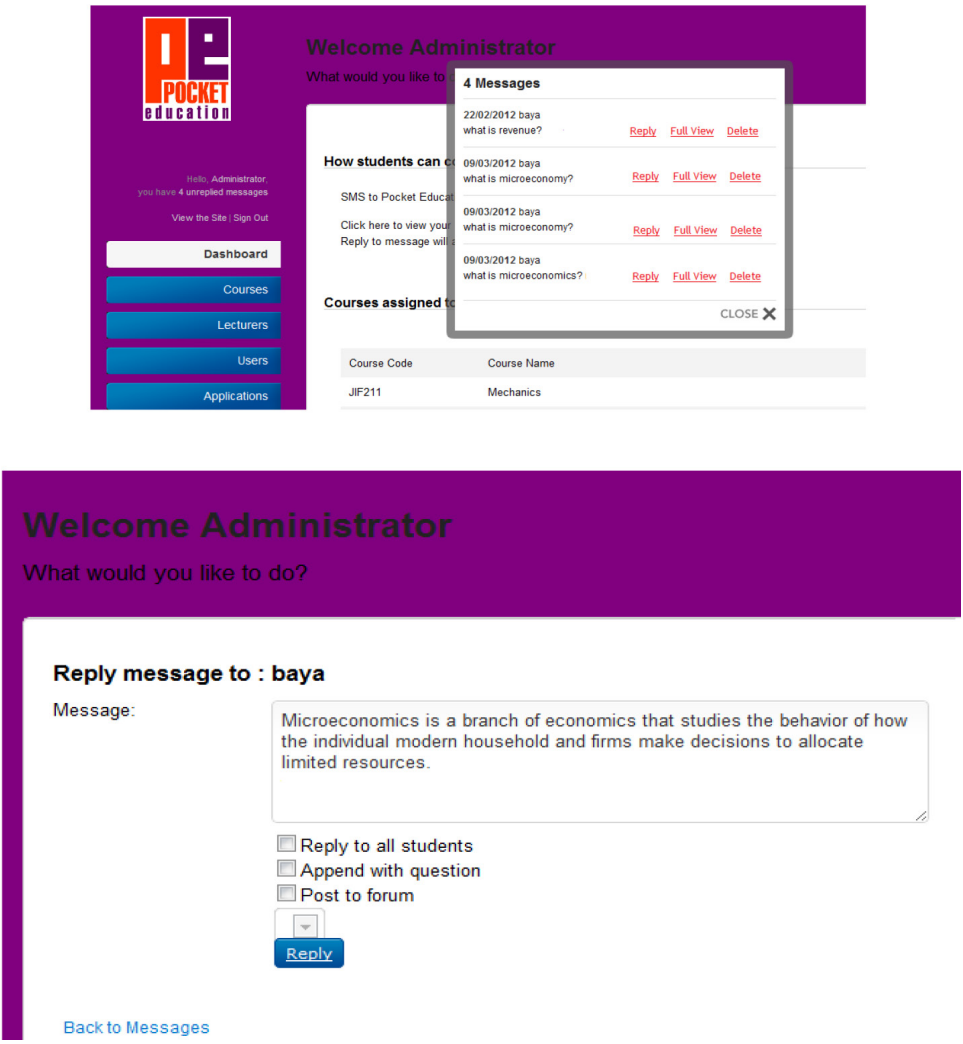

Figure 4 Screenshots of pocket education's query application page

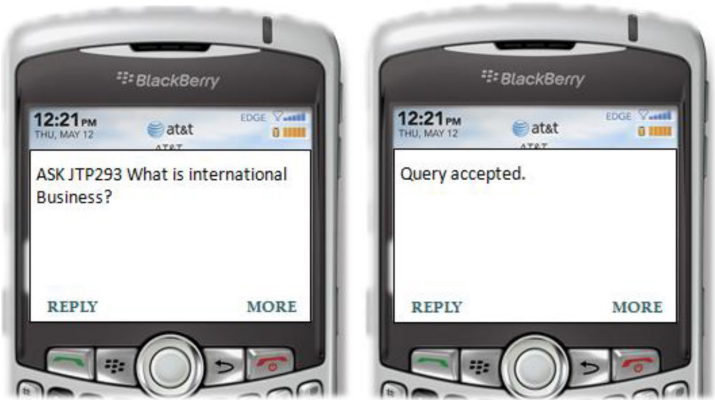

Figure 5 Messages sent and received by students

Implementation of SMS-based Learning

In this phase, Pocket Education system run was implemented whereby the Pocket Education system will be accessed by the identified participants and course lecturer who agreed to participate in the project. They were required to complete the SMS-based learning modules through the system in conjunction with their compulsory learning modules over the period. The researchers acted as participant observers and admin users who had to work through the SMS-based m-learning project, to monitor the system progress, as well as to manage the user and content databases at the portal. As part of the administrative task, the researchers also provided technical support and feedback to participants via email during the implementation process.

During the system run period, the query application was used to gather participants' feedback and questions regarding their course. Apart from that, upon lecturer's request, the query application was also used to obtain participants' suggestion regarding their course assignment. Firstly, the admin user sent an alert via the system, requesting participants to provide their inputs to suggest for their course assignment. Participants submitted their suggestions via the query application by sending the message "ASK COURSECODE Suggestion". Once queries were received, data will be updated in the portal inbox. Replies for the queries were provided manually via the portal, either by the admin user or the lecturer. The admin user sent a notification SMS to inform participants that their suggestions were successfully received via the query application.

Participants were also reminded and encouraged to communicate with their lecturer and get familiar with SMS-based learning via the query application. Participants were informed to use the query 'ASK' application flexibly at anytime and anywhere if they have any question pertaining to the system and course.

Usability of Query Application

Participants were asked to evaluate the Pocket Education system after the system run has been completed.The usability of the system was analysed by using the QUIS to study their satisfaction in terms of several aspects, which are their user reaction, system capabilities, as well as query applications.

Firstly, the questionnaire gauged respondents' feedback on how satisfied are they toward the system's usability. The first section of this part dealt with users' overall reaction toward to the system. For each item, an overall score was calculated by averaging all of ratings on overall user reaction. From statistics in Table 2, mean values for all items were ranged from 3.90 to 4.20 which are close to the point 4. In a five-point Likert scale, this is an indication of participants' agreement on the usability of Pocket Education system. Specifically, the system was considered by them respondents to be easy to use (mean = 4.20), effective (mean = 4.14), stimulating (mean = 3.99), flexible (mean = 3.98), wonderful (mean = 3.96), and a satisfying (mean = 3.90) learning experience.

Participants were also asked to evaluate the system capabilities. As presented in Table 3, participants quite agreed on the usability of the system in terms of its capabilities. They mostly agreed that the SMS-based learning tends to be helpful to them (mean = 4.23) and they found that the ease of operation through the system suits their level of skills (mean = 4.14). Thus, the system is considerably reliable to them (mean = 3.96). However, some said that it was slightly uneasy to correct their typing mistakes (mean = 3.71). Their least agreement was pertaining to the speed of receiving reply from the system whereby they did not find the system responds fast enough to them (mean = 3.55).

Table 2 Descriptive statistics of overall user reaction

Overall user reaction (Mean = 4.03, SD = 0.675 , *n* = 6)	*N*	Mean	SD
Terrible or wonderful?	615	3.96	0.754
Frustrating or satisfying?	614	3.90	0.829
Dull or stimulating?	614	3.99	0.821
Difficult or easy?	613	4.20	0.832
Ineffective or effective?	613	4.14	0.859
Rigid or flexible?	614	3.98	0.854

Table 3 Evaluation components for system capabilities

System capabilities (Mean = 3.92, SD = 0.664, *n* = 5)	*N*	Mean	SD
Speed of receiving reply from system (1 = too slow, 5 = fast enough)	615	3.55	1.010
The system is reliable (1 = never, 5 = always)	614	3.96	0.826
SMS-learning tends to be (1 = disturbing, 5 = helpful)	612	4.23	0.764
Correcting your typing mistakes is (1 = difficult, 5 = easy)	613	3.71	0.856
Ease of operation suits the level of your skills (1 = never, 5 = always)	615	4.14	0.748

Participants were then required to evaluate their inquisitive learning experience via the query application. As can be seen from Table 4, all mean scores were found to be lower than scale 4, suggesting that the query application in the system was moderately perceived positively by respondents. Specifically, respondents tend to moderately agree that they can easily understand the query feedback (mean = 3.80). They also somehow agreed that the query application is helpful to them (mean = 3.79) and it is also quite easy for them to use the 'ASK' code for the query application (mean = 3.76). However, respondents also found that it is not quite fast for them to receive feedback from queries which they have sent to the system (mean = 3.67). This is due to the fact that the query application requires lecturer's intervention and this depends on lecturer's convenience to provide the responses.

Table 4 Evaluation components for query application

Learning application (Query) (Mean = 3.76, SD = 0.784, *n* = 4)	*N*	Mean	SD
The query application is (1 = useless, 5 = helpful)	615	3.79	0.892
Understanding the query feedback is (1 = difficult, 5 = easy)	615	3.80	0.859
Feedback received from query is (1 = slow, 5 = fast)	615	3.67	0.909
Learning to use 'ASK' application was (1 = difficult, 5 = easy)	615	3.76	0.857

Views on SMS-based Learning

In commenting about their learning experiences through the Pocket Education system, many participants expressed their support and enthusiasm for the system's implementation. Due to this, they also agreed the SMS-based approach to distance teaching and learning should be continually implemented on other subjects as well. Many of them found that SMS-based learning is good and effective to support their learning activities. Some also agreed that they feel convenient to learn through SMS-based learning due to accessibility and ubiquity of this mobile learning approach. Some respondents also commented that learning through the SMS-based system is motivating to them in a way that it provides them a sophisticated learning experience as techno-savvy students. Examples of the comments were listed below:

> *"... it is more convenient to communicate with lecturers through SMS than via face-to-face (distance factor)"*
>
> *"this application is a medium for students to ask questions to the lecturer since it is easier to communicate through SMS than via face-to-face"*
>
> *"Students are more alert and thus, it helps them to learn more effectively"*

> *"This system is very good, especially for distance learners since we do not have time to read books. With this system, we can be updated with important information that are accessible at anywhere"*
>
> *"New learning method that is impressive and requires skills in IT. (It) Helps us to increase IT skills in our specialized area."*
>
> *"SMS-based learning is very helpful and (information) can be read at anytime"*

However, there seemed to be a consensus among a significant number of participants in terms of technical issues that the system posed. They commented that slow response was a major drawback of the system. For instance, a participant commented that the process for students to receive SMS reply to their query sometimes is not quite promptly. Another technical issue which posed difficulties to participants is multiple-number conflict. According to one of them, since there are many numbers used by the system, students feel confused as they do not know which number they should use to respond.

> *"The receiving SMS consistent are not really promptly"*
>
> *"The system is good.. it's just that sometimes the service is slow"*
>
> *"To use one number only because few numbers are quite confusing.. don't know should send to which number"*

Discussions

This study investigated on the use of SMS in promoting inquisitive learning among distance learners in SDE, USM. With regards to the query learning application, there was a moderate level of satisfaction among participants whereby they moderately agreed that the application is helpful and easy to use. Moreover, difficulties in understanding certain instructions or keywords and delays in getting feedbacks have presented hurdles for them to use the applications as a part of their inquisitive learning process. Moderate level of satisfaction concerning these technical problems reiterated those

qualitative comments in the questionnaire. Some of them commented on the slow response in getting query feedbacks and difficulties in receiving and understanding replies. The delay in the receiving query reply was due to the process is not an automatic process, and thus, providing reply needs to be done manually by the admin user or the lecturer. Therefore, the process depends solely on the frequency of access to the system by admin user or lecturer. Another possible reason which could attribute to the problem is the multiple-number conflict in the system, as highlighted by participants. This may not only introduced delays, but has also caused their confusion in responding to the system. These technical concerns in m-learning applications have been documented in related literature. For instance, Valk, Rashid and Elder (2010) noted the existence of delays in the auto-reply system of the SMS-based learning system due to the volume of incoming messages. Wong, Sellan and Lee (2006) also noted that slow response speed is one of limitations in m-learning and unpredictable application error has added to this difficulty. Weaknesses in SMS-based learning application were observed in a similar study by Azidah and Muhammad Faizal (2012) who reported some constraints in terms of students' confusion in understanding the codes, the system stability and other general issues which have impeded a smooth running of the system. Similarly, a study that explored the viability of SMS for non-formal distance education in the Philippines found that students' errors in entering improper keywords have led to usage problems (Valk, Rashid and Elder, 2010).

Nevertheless, despite those issues, findings of this study also suggested that SMS-based learning in general was perceived positively by participants. In terms of overall user reaction, most participants agreed that the system is easy and effective for their learning and many also found the system as stimulating, flexible, wonderful, and satisfying. As for the aspect of system capabilities, they mostly agreed that the SMS-based learning is helpful, the ease of operation suits their level of skills, and also reliable. Motlik (2008) supported the use of SMS in supporting distance learning as he claimed that SMS-based is a cost-effective and efficient for delivering the distance learning contents. Among factors that could contribute to participants' positive perception towards the integration of SMS technology are mobile phone ownership and well-familiarity to the technology. This is supported by Supyan et al. (2012) who found that students who are highly familiar and

equipped with the required technical skills would welcome the integration of m-learning in education. Learners' satisfaction towards SMS-based m-learning was also observed in several studies. For instance, Noessel's study (2004) revealed that time delay in the SMS-based learning service is not always crucial to the students since most of them feel that it was enough for them to be able to capture the information at any time. Ramos et al. (2007) found that students felt more satisfied with SMS-based learning application as it is more interesting and provides more instant feedback than the paper-based method. While there were technical issues such as problems in responding to the system and the constraint of 160-character limitation, there was a significant interest among students as they highly valued and actively engaged with the texting mode of learning (Jones, Edwards and Reid, 2009).

Even with the declining trend of usage nowadays, SMS is still regarded as a more reliable and more secure form of text communication as compared to other advanced mobile chat applications (Guerena, 2014). This is due to the fact that it is available as a default to all types of mobile phones, while other advanced texting applications are still very fragmented in nature and mostly reliant on high speed internet. In addition, this study involved distance learners in Malaysia who are generally on-the-move working adults with high preference on text messaging application. Sharples (2013) agreed that on-the-move and at-home students would benefit from non-formal learning through mobile tools and interfaces which they are familiar with, while not trespassing on their online social space. Although it might not be relevant as a standalone learning support from current practical point of view, SMS technology holds enormous potential to be integrated with other advanced mobile learning applications like social media and other advanced mobile messaging applications. Bottom line is, no matter how such learning solution is designed, four most important things to be considered by future mobile learning researchers are: the work should be in tune with new thinking about learning; the work should consider the impact of context; the work should consider different types of data and analysis; and the work should involve learners as co-designers or co-researchers (Kukulska-Hulme, 2009).

Limitations and Recommendations for Further Study

Although this study may provide meaningful results to educational researchers and practitioners, particularly in the distance education field, the findings of this research should be considered in the light of its own limitation. First, findings obtained in this research did not represent the whole picture of the potential of SMS-based m-learning system in supporting the learning process among distance learners in Malaysia since it only looked from the aspect of one public university in Malaysia, i.e. USM. Ideally, this study can be replicated amongst the same target of distance learners' population in the future to gauge how differences in students' learning requirements might have affected the design of the same learning technology developed in this study.

Another limitation of this study is that, it did not factor in how other influencing factors in learning, such as demographic characteristics, learning style preferences, and learning environment might have influenced the students' requirements to learn inquisitively via the SMS-based learning system. Since distance learners are diverse in terms of personal characteristics and learning experiences, being aware of these factors would provide a more meaningful and beneficial distance learning outcomes to learners.

Finally, another rather different future area of work in terms of SMS-based application for distance learning could be by considering other advanced mobile technologies. As SMS continues to be the most basic and popular mobile technology, we cannot deny the fact that mobile technologies are currently booming and rapidly changing. Thus, results of this study alone may not fully generalise the potential of mobile technologies as distance learning support. While the researchers maintain the potential of SMS as the most basic and accessible mobile technology that permits distance learners' freedom and convenience to learn distantly, this study did somehow shed some lights on the practicability of other advanced mobile strategies, particularly with the advent and ubiquity of smartphone technologies nowadays. Therefore, a richer set of mobile learning strategies involving more advanced mobile texting technologies and social network applications, such as WhatsApp, Twitter, Facebook, LinkedIn, and other relevant mobile apps can be further exploited, with a caution of the limitation of Internet accessibility in mind.

Conclusion

The increasing demand of mobile learning technology requires an effective tool that serves as a medium for interaction between distance learners and instructors. This study presented how SMS-based learning can be implemented to support the current modes of distance teaching and learning, and at the same time to promote inquisitive learning skills among the distance learners through the query application. Findings in this study indicated that, although SMS-based learning in general was perceived positively among participants in terms of overall reaction and system capabilities, there was a moderate level of satisfaction towards the query application. Furthermore, some technical concerns were raised pertaining to delays in feedback and unclear instructions which lent further insight into how certain usability aspects of the query application can be improved in order to be used as an effective tool to promote inquisitive learning. Most importantly, this study highlighted that, regardless of those technical hurdles, mobile learning via SMS could still bring positive impacts in the delivery of distance education. Given the evolving mobile technologies nowadays, SMS alone will definitely not be able to address every ICT challenges in Malaysian distance education system. Yet, with a creative and properly planned approach, it can still play an instrumental role as a flexible, convenient, and affordable tool to promote inquisitive learning skill among distance learners.

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