IMPLEMENTING M-LEARNING WITHIN A DISTANCE BASED UNIVERSITY

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Abstract *— The outcome of this paper is to primarily survey and analyze student interactions with mobile learning (m-learning) and to reflect on the technological impacts of such a system's influence on a students learning within an open distance learning context. This pilot study is articulated within the action research methodology to generate critical reflection of collaborative, mobile environments for teaching and learning. This study aims to assess the benefits and feasibility of integrating such a system within the University of South Africa's (UNISA) current organizational structure. The findings of this study may be used as a basis for further investigation on the challenges that may face the university, if m-learning were to be implemented. It provides the potential opportunity to re-examine the current print-based delivery system and online mechanisms to devise strategies and solutions to increase the quality of learning within the organization significantly.*

Index Terms — mobile learning, open distance learning

INTRODUCTION

The pressures and challenges of integrating new technologies and methods of instruction into a South African University are outweighed by the growing competition of virtual and corporate universities. Virtual universities mimic the traditional university while corporate universities provide just-in-time training to the staff of multinational universities. These competitors have become global in the sense that a South African learner can now enroll in an online university based in a different country such as the United States of America[1]. The University of South Africa (UNISA) is South Africa's largest distance based university and is currently faced with the challenge to evolve its culture to accommodate new products and services to compete with international distance based universities. The survival of institutions like UNISA may depend on increasing accessibility via incorporating mobile learning (m-learning) in conjunction with other traditional learning mediums. M-learning is being viewed as a vital component of the distance education [2] landscape. Incorporating m-learning may influence student enrolment numbers by attracting and retaining students. Another advantage is that m-learning may improve examination marks and throughput rates [3].

UNISA has an established form of correspondence studies as a mode of education. This is a single-mode of print-based correspondence where the learners have access to course material and online assignment submission systems. Print-based systems are the foundation of distance education and the basis from which all other delivery systems have evolved. Within this form of delivery the print material is sent and returned to the students by mail, and remains a significant component of all distance education programs. Print based delivery is an easy to use, cost effective delivery system that does not require sophisticated presentation equipment. This delivery method also lacks feedback and interaction and is dependent on the student's reading ability. Numerous studies have shown that a learner requires more motivation to complete print-based courses due to their passive nature. It is therefore essential that a distance based university such as UNISA incorporate a variety of multimedia such as m-learning to enhance their learners' knowledge of the course material.

The outcome of this paper is to primarily survey and analyze student interactions with m-learning systems and to reflect on the technological impacts of such a system on teaching and learning within an open distance learning context. We isolated one specific module within the School of Computing to perform this survey. Currently, the School of Computing at UNISA does not facilitate any form of multimedia to assist students understanding of their course work. This is problematic with practical courses such as Object-Oriented Programming where the failure rate is particularly high. We considered integrating m-learning to assist students in the understanding of their course work for a first year object-oriented programming module as means of improving the throughput of students that are enrolled for this particular module.

MOBILE-LEARNING (M-LEARNING)

M-learning is defined as 'the provision of education and training on PDAs/ palmtops/ handhelds, smartphones and mobile phones'[2]. According to Keegan [2] mobile communication and collaboration in terms of education is divided into three categories:

- Voice communication:-Mobile phones and PDAs with phone capabilities provide this essential means of communication - between learners, and between tutor and learners for support and collaborative purposes.
- Learning by e-mail:-Some PDAs and smartphones are able to access email. Pocket PCs have Pocket Outlook, a scaled-down version of the PC version, which also facilitates access to email. So this implies that there is always the potential for opportunities for learning by email.

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- Learning by Short Message Service (SMS):-The use of text messaging (or SMS) was one of the early uses of phones in e-learning. This involved tutors and coaches sending reminders and alerts to students on courses, and this is still a powerful way for instructors to support their students and help to keep them on track. Another use of text messaging is sending a daily message to learners, thereby providing them with a daily dose of learning.

Wireless data communications in form of SMS have gained global popularity, yet, not much has been done to extend the usage of these devices in learning enviroment such as e-learning and m-learning [4, 5]. The primary focus of this research study is to investigate the feasibility of adopting m-learning within UNISA's distance educational environment to teach programming. This research study is based upon the SMS functionally of a mobile phone. The main advantage to considering the SMS functionality is due to the fact that SMS is the cheapest form of mobile communication. Some of the less obvious benefits highlighted by [6] includes the informality of the mode which puts the learner at ease and it allows for both independent and collaborative learning styles. UNISA has already implemented a successful SMS system through the university's Learning Management System (LMS) [3]. However it is currently only used for administrative purposes – notifying students when an assignment has been processed and the results received for that assignment. This research study will therefore investigate if it would beneficial to use this existing SMS technology within the academic environment. One disadvantage of utilizing the SMS system within the academic context is that the SMS itself must be concise. It is essential that the information within the SMS is short and informative yet value adding. It also provides an open and flexible learning mechanism as students can access information when and wherever they want to [7]. These ideals correlate strongly with UNISA's drive to becoming a truly open distance learning institution with the aim of increasing accessibility to higher education. Mobile learning can complement formal education [6]. According to [3], using m-learning may also lessen the alienation perceived by distance education learners and help them persevere with their studies.

CASE STUDY

In this study we considered how Short Message Services (SMSes) may be used to deliver learning material to students enrolled for a programming course. We considered two options; passive and dynamic methods.

The passive method is an SMS that consists of text send to the student. Three options that are included in this method include:

- Course related content
- Course administrative information
- Hints and tips

Each of these options will be briefly elaborated on in the next section. It is also vital that all the SMSs are numbered so that cross referencing could be used for maintaining a database of the SMSes sent.

Course related content

This option consists of important course related information that is provided to the student. An example of this option is the explanation of course related terminology:

```
SMS: 19/0
A constructor is a member function that
is automatically called when an object
of the class is declared. A constructor
is used to initialize the values of the
data members and to do any sort of
initialization that may be required.
The constructor has the same name as
the class and does not return a value.
The default constructor takes no
arguments.
For more info on constructors - refer
to pages 570-571 of Savitch)
```

Course administrative information

This option could be used to inform students regarding the logistics of the course. One example is to inform the students of upcoming due dates for assignments and examinations. This option could also be used for course administrative tasks. An example of this is for instance errors in the text book:

```
SMS: 19/3
Error on page 33 of text book: Answer
to 3.2 is 0.5. NOT 0.05.
```

Hints and tips

This option involves providing messages to students that could assist them with their course work. An example of this is a "Tip of the day" message, which may perhaps help students with understanding a specific section in the text book or an assignment question.

```
SMS:19/4
Tip of Day: Default Constructors->
class TimeType {
public:
   TimeType(); *
private:
   int hrs;
   int mins;
   int secs;
};
TimeType::TimeType() {
  hrs = 0;
  mins = 0;
  secs = 0;
}
The *default constructor takes no
arguments. The default constructor is
invoked when an object is declared like
this:
```

```
TimeType t; (For more on default
constructors - refer to pages 570-571
of Savitch)
```

The second option that is investigated is the dynamic method. In this method usually consist of two parts - a primary SMS with a secondary follow-up SMS after a specific time period. An example of this method is multiple choice questions. An SMS is sent with one or more questions. The answer to the question(s) is then sent to the student with a follow up SMS.

Primary SMS

The following would be example of a primary SMS:

```
SMS 19/8

Question 3: When is a constructor
called?
A)   Never
B)   Sometimes after the class is
     declared
C)   In run time
D)   Automatically when an object of
     the class is declared
```

Secondary SMS

The following would be example of a secondary SMS:

```
SMS 19/9
Answer to Question 3(SMS 19/8) - D
```

It is vital that SMSes be kept short and simple. This will ensure that students with older mobile phones that lack some functionality will still be able to view the messages. This will ensure the integrity of the SMS.

THE RESEARCH STUDY

The research study mainly consisted of a questionnaire on utilizing the SMS functionality within the m-learning environment. The questionnaire consisted of two parts:- personal background information and the student's perceptions on m-learning.

The first part of the questionnaire consisted of background information such as occupation, age and a profile on SMS usage. The second part consisted of the participants opinions about the feasibility of SMS functionality within the academic environment in terms of enhancing a student's learning experience.

The population of this study consisted of students currently enrolled at the UNISA. The population of this study was made up by students across many academic disciples, cultures and backgrounds. As this was a pilot study, the selection had to be restricted to cater for possible unknown variables that may impact the study.

RESEARCH RESULTS

The results of the study indicate that 89% of the participants own a mobile phone. From the remaining 11% of the participants, 80% have access to a mobile phone. The rest of this study will therefore be based upon approximately 93% of the total participants of the survey. The participants asked about their SMS usage behavior. The results are depicted in Figure 1.

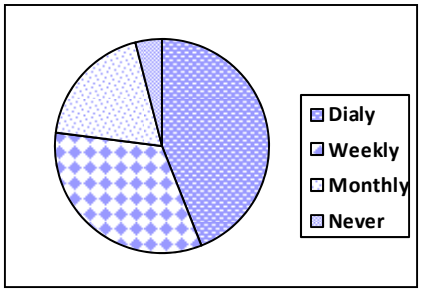

FIGURE 1.
FREQENCY OF SMS USAGE

Figure 1 clearly indicates that the SMS functionality is used by a large proportion of students and of those about 77% of the students, interacts with SMSes weekly. Notably 91% of the participants already receive SMSes from UNISA but it is only administrative in origin.

The second part of the study involved eliciting the participants' perceptions on extending the SMS functionality to enhance their study progress. The first question determined if the participants considered mobile learning (SMS) would help them with their studies. The results are depicted in Figure 2.

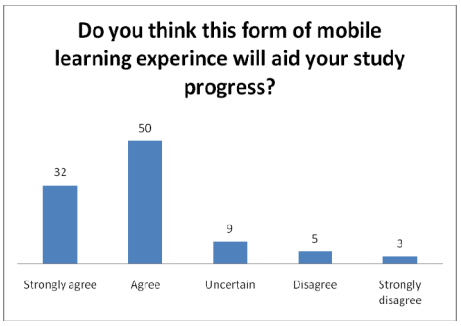

FIGURE 2.
SMS AIDING STUDY PROGRESS

The results show in Figure 2 shows that 82% of the participants agreed that using mobile learning help them in their studies. The follow up question ascertained whether students consider m-learning as an effective tool to enhancing their learning of the course work. The results are depicted in Figure 3.

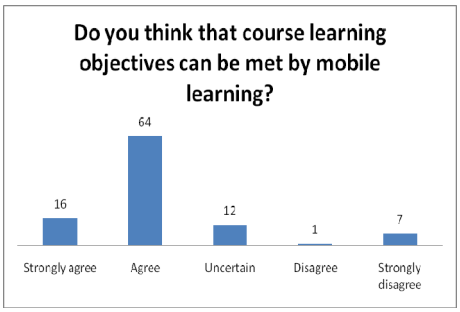

FIGURE 3.
COURSE LEARNING OBJECTIVES

According to Figure 3, 80% of the participants agreed that mobile learning could assist in achieving their learning objectives.

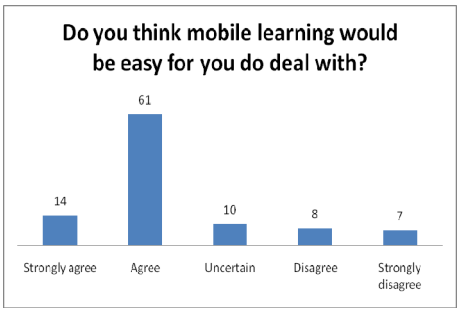

FIGURE 4.
EASE OF MOBILE LEARNING

According to Figure 4, 75% of the participants agreed that using SMSes within the mobile learning is a relatively easy facility to use and that they will incorporate it into their study environment. The participants were then asked if they expect that SMSes will increase access to education within their respective study areas. The results are depicted in Figure 5.

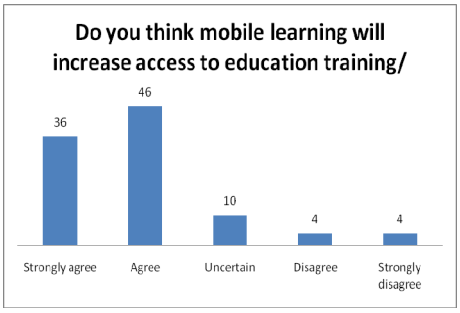

FIGURE 5.
ACCESS TO EDUCATION

Figure 5, indicates that 82% of the participants agreed that SMSes via mobile learning will increase accessibility to higher education.

From the statistics collected it is evident that a large majority of participants are very positive towards incorporating SMS functionality to their way of education.

CONCLUSION

This paper investigated the feasibility of utilizing m-learning as tool within a distance based university to enhance the quality of learning. The main advantage to m-learning is that it is not location-specific. For instance, a student could be learning even while travelling on a bus. M-learning may offer students' new insight into their study material as it will be presented in a different format. This study has conclusively shown that many students have access to SMS technology and they perceive that it would be beneficial to their study progress. In terms of infrastructure UNISA does have the capacity to provide such a service. These results generated within this research study could be used as a foundation to generate a debate within the School of Computing of possible changes in practice to incorporate mobile phone technologies.

We do not assert that students are to rely solely on mobile technologies. However a combination of blended technologies is recommended. There are some learning activities that cannot be done with a mobile phone. For example, it would be challenging to develop a large C++ program on a mobile phone. However, the student may interact with short notes and quizzes on the course work using a mobile phone. They would still have to rely on the print-based medium and e-learning tools to complement their learning. Incorporating m-learning may involve a shift in pedagogy, as lecturers may have to discover innovative ways of maximizing the positives of the technology by teaching the equivalent material in an alternative way. For example, using gaming technology to teach programming or consider mobile chat services for collaborative learning.

According to Seppälä [7] m-learning may offer other learning benefits. It could enhance experiential and authentic learning situations. This may be useful for a subject like geography where students interact with the environment whilst gaining knowledge through m-learning.

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