The Impact of Mobile Technology in Education: A Focus on Business Information Systems at the International University of Management in Namibia

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Abstract. This paper is about implementing mobile technology to improve teaching and learning. Mobile technologies include laptops, smartphones, tablets, smart devices and PDAs. Research has shown that there appears to be some gains to both lecturer and students when mobile technology is incorporated into teaching-learning. Mobile technology can also be used by teachers as a tool to deliver lectures to students through recorded materials. The assumption is that all students possess a mobile device adhering to minimum standards be it their own or supplied by the institution. A study was conducted to establish the impact of such devices in the teaching and learning situation focusing on Business Information Systems at the International University of Management (IUM) in Namibia. Mixed methods research paradigm and the quasi- experimental method were used based on the positivistic philosophical approach. The results showed that use of mobile technology can have a positive effect on academic performance.

Keywords: Mobile technology · Education · University · Teaching · Learning · Mobile devices

1 Introduction

Low graduation rates in Higher Education Institutions (HEIs) have been observed for decades and Namibia is no exception. HEIs strive to achieve high pass rates all the time. HEI's educate the future generation and citizens that while they carry their professional activity, they will at the same time deal with human problems [1].

It is common knowledge among the educators around the world that the massification of education and decrease in government subsidies to HEIs, (and Namibia is not different [2]) HEIs among other measures to cut down on spending, increase income, and improve graduation rates they turned to technology. The advent of the Internet justified further the use of technology in education to decrease costs as well as enhance the teaching and learning situation [3].

The last decade or so the use of mobile technology in education has become more intense. According to Hoare [3], the use of technology can be highly motivating, adding value and content in opening up entirely new teaching scenarios. Pillay and Ramdeyal [4],

G. Vincenti et al. (Eds.): eLEOT 2015, LNICST 160, pp. 76–83, 2016.
DOI: 10.1007/978-3-319-28883-3_10

state that mobile technology, in developing countries (and Namibia, an African country, is a good example), is seen to be more cost efficient than other technologies which are necessary for eLearning as they are portable and can be used anywhere any time.

The study took place at the International University of Management (IUM) of Namibia. The aim of this study is to determine the effects that mobile technology has in the teaching and learning situation at an HEI.

1.1 Mobile Technologies and Education

Mobile technology can be defined as the combination of hardware, operating systems, networking and software that enables technology to be portable [6, 7]. Devices that store these are called mobile devices. Hardware includes PDAs, like Palm Pilot or Handspring, mobile phones, and video game players. Applications are phone books and calendar programmes.

In the last decade or so, the availability of mobile technologies amongst humans has increased [8]. Many people, nowadays own at least one mobile device [4]. Steinbacher [5] found that college students are armed with smartphones, iPads, laptops and the like, and the colleges themselves are trying to keep up with campus mobile applications and mobile websites.

Although features differ amongst mobile devices, most could have some of the following features: camera, video support, games, email, Internet, SMS, MMS, uploading and storing information and support for apps which add additional functionality to the core functions of the device. These features may assist us in combining work, study and leisure time in meaningful ways.

Mobile technology can then be used in education in many different ways and these include, recording lectures, accessing blogs, conducting online research, downloading study materials, practical sessions and simulations in and outside the classrooms and communication purposes [5].

Mobile devices have many advantages as well as disadvantages. Among the advantages are, creating an environment that encourages student-centered learning [8], cost effective [4], enhance students' sense of individuality and community [9], it is a motivating tool which encourages collaborative learning and socialisation [9], and stimulates a sense of ownership of the content [4]. These advantages can be used to augment the teaching and learning. Pillay and Ramdeyal [4] view the ubiquity of mobile phones as a means that educational services can be delivered and rendered with students' existing mobile devices.

Among the disadvantages are, low storage capacity, small screens and relatively low processing speed [10]. Schreurs [10] sees these as an obstruction to learning when he states that: "Nevertheless, they [mobile phones] have very small screens, limited memory capacity and the large diversity of mobile devices obstruct a good learning experience." El-Hussein and Cronje [11] concur with these.

Since mobile devices are relatively new the research done on its effectiveness in education is inconclusive. For example studies done by [10–13]. found that mobile technology enhances teaching and learning while Hu [13] criticised the claims as samples used in most of the studies were small samples and thus the validity and

reliability of the findings can be questioned. Although this could be statistically true, if a great number of small samples arrive at the same conclusions it could be argued that there is a degree of validity and reliability.

2 Research Design

This study involved both qualitative and quantitative data and as a result, the mixed method approach was adopted [14, 15]. As a rule, the sample for the study was a convenience sample, and comprised of 2nd and 4th year students Business Information Systems (BIS) and Digital Communication Technology (DCT) respectively at IUM. The study complied with all academic and research ethics as stipulated by IUM.

Qualitative and quantitative data was collected using interviews, questionnaires, quasi-experiment and observations. Quasi-experimental method is based on the positivistic philosophical approach [16]. Collected data was processed and analysed using qualitative and quantitative appropriate techniques. Qualitative data was analysed using the deductive approach where data collected was explored to see which themes or issues to follow up and concentrate on [16]. The aim of analysis of qualitative data was to discover patterns, concepts, themes and meanings [17].

The process followed in analysing and presenting the data was based on the model derived from the logic model approach based on Actor-Network theory (ANT), a philosophical approach used to comprehend complex social phenomena [18].

2.1 Data Collection and Analysis

2.1.1 Questionnaires

The sample comprised of 48 students (25 DCT and 23 BIS) of which 25 were males and 23 females. The categories shown in Table 1 comprised of various themes and the total of answers for each are shown. The questionnaire comprised of 23 questions covering the categories shown in Table 1 using a 5 point Likert scale.

Looking at Table 1 it appears that the respondents as a rule agree or strongly agree with most of the statements made about various factors when asked in a positive manner. However, in three of them (Internet access, Mobile fluency and online library) they are not very happy about it.

Mobile tech factor is about knowledge of mobile technology. Mobile devices factor deals with the choice of the type of a mobile device that the students prefer. Mobile fluency factor deals with how comfortable the students are when using mobile devices. Mobile ownership factor establishes who owns a smartphone.

Time creation factor is based on the assumption that mobile devices can minimize the time spent on some tasks and be used in other more important tasks such as discussions, practical lectures and collaboration, by eliminating writing of notes. Online library and campus libraries were factors to establish preference between use of mobile devices and the physical availability of a library. Each question which contained one of the categories was designed in such a way so that the respondent will relatively agree or disagree. As all questions were designed to carry a positive

message it was easy for the students to make a decision. For example: In order to do assignments using IUM's wi-fi or Intranet the service is always reliable. 20 respondents disagree. This means that it is not very reliable.

The data was analysed using frequency tables and one-way ANOVA. The coefficient of significance varied from 0.000 to 0.037. This means that between 96.7 % and 100 % of the students are pro technology, like to use mobile technology for lectures and university networks as well as for their studies. Only one student did not possess a mobile device out of 48.

Table 1. Results of the questionnaire

Categories (N = 48)	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
Mobile tech	1	1	2	30	14
Mobile devices	1	2	1	23	21
Networks	1	1	4	37	5
Lecture delivery	2	2	11	26	7
Educational reasons	1	1	1	19	26
Using mobile devices					
• Social	1	1	1	18	27
• Educational	1	3	2	17	25
• Communication	1	1	1	18	27
Internet access	1	3	2	17	25
Mobile ownership	11	16	2	12	7
Mobile fluency	1	19	3	5	3
Mobile disturbance	1	19	3	5	3
Online access	18	7	4	20	16
Online library	1	2	1	25	19
Campus library	1	3	2	27	14
Paperless tech	2	20	2	10	5
Time creation	11	4	5	22	16
Motivation	1	7	9	20	11
Understanding	3	5	13	20	7

2.1.2 Interviews

The sample comprised of 43 students of which 20 were in their 4th (DCT) year of study and 23 were in their 2nd (BIS) year of study. Structured interviews were conducted on a one to one basis. The interview template contained 9 questions, of which question 1 was used to obtain students' personal data. The other 8 aimed at cross checking the answers of the questionnaire as well as deriving more information about students' perception and feelings about the use of mobile devices and determining any barriers for such a use.

It was found that most of the students felt good about their progress (53 %) while 30 % found it hard or boring. Their comments varied from studies are, "enjoyable and wonderful", "I love the field I am studying", "interesting" to "boring", "hard", "difficult".

With respect to using mobile technology all students agreed that such technology has many advantages such as "you carry a computer with Internet in your pocket", you can have it "anywhere anytime", "use it for research" and if connected to University's network then it can be perfect as "[mobile technologies [here a cell phone] can be used to connect to the world", "portable", "convenient", "efficient and inexpensive", "communicate and entertain" or as another student described it as "a tool used for interactions" among people and content.

Furthermore the results from the interviews correlate highly with the data collected from the questionnaire in number of aspects. For example all interviewers saw the educational value in the usage of technology in their studies to 40 (93 %) of the respondents of the questionnaire, and use the networks for downloading materials.

2.1.3 Summary Review of Experiment

A quasi-experiment was conducted to compare the group using mobiles (Group 1, the experimental group, with mobile devices) with the group not using mobiles (Group 2, the control group, no mobile devices). Equal numbers (25) were chosen whereby the students volunteered to belong to either group. In this experiment, mark of a test was the dependent variable. For this particular experiment by mobile devices is meant to include smartphones only so that certain variables (like speed, screen size, and memory capacity, though the service provider could differ and could have an effect on the results) could be controlled. The data gathered from this experiment were analysed using frequency tables and one-way ANOVA. The values obtained were **$F = 121.1$ and p-value $0.000 < 0.05$.**

The two groups were given exercises to do and were assessed on two occasions (mark 1 and mark 2). The marks for Group 1 varied between 58 % and 98 % (Std.Deviation 11.06) while for Group 2 between 14 % and 34 % (Std.Deviation 20.37). The one-way ANOVA analysis of the data collected from the experiment gave the statistical coefficient of significance differences of .000 that is **$F(1.48 = 121.242$, p-value $.000 < .05)$** meaning that there are significant differences in students' performances when mobile technology is used. The data obtained from the experiment was also tested for reliability using SPSS and Cronbach's alpha showed that the experiment was 69.4 % relevant to the study.

2.1.4 Summary of the Observations

More data was collected for the study using observations. The researcher observed the students behavior during and after classes. Some observations were made during the experiment. Group 1, which was using mobile technology, showed more interest in their work than Group 2. It was also observed that during the day the network was very slow as most of the students make use of it during that time. The network connection was used predominantly for academic work while smart phone for socializing. It was also observed that students looked relaxed and comfortable using their devices. They seemed to know how to operate their mobile gadgets without any difficulties.

Finally, more data was collected from the University on success rates on the subject BIS. The number of students enrolled and passes the exam on BIS for the years 2012, 2013 and 2014, the year that this experiment was conducted, were 57 %, 55 % and 70 % respectively.

3 Discussion of Findings

After the data analysis phase, different findings were made from the study. Most of the findings support the hypothesis that students are interested in mobile technology. Many of the respondents suggested the mobile devices should be used to eliminate the shortage of materials (insufficient computers) which they currently are faced with. These findings are in line with Schreurs' [10] and Davies et al. [19] findings.

The findings also showed that the use of mobile technology benefits both students and teachers and thus concur with Davies et al. [19] findings. The majority of the students' opinions supported the use of mobile technology in education. They believe, if properly used in classrooms and outside, mobile technology can improve their understanding and thus become more motivated. Such motivation leads to persistence and subsequent graduation [20]. Some students who do possess the devices before going to a university in a way they expect the lecturers to allow them to use these devices just as El-Hussein and Cronje's [11] had found.

It was also learnt from the study that most of the students own at least one or more mobile devices, are comfortable in using them and have knowledge of other mobile devices (Mobile literate). Pillay and Ramdeyal [4] states that, "Mobile technology, in developing countries, is seen to be more cost efficient than other technologies which are necessary for eLearning." Steinbacher [5] and Pillay and Ramdeyal's [4] also arrived at the same conclusions. Soloway and Norris [21] established that over 90 % of the students preferred a mobile device small enough for them to carry with them at all times such as a smartphone."

After a comparison of results from the experiment and the results obtained by IUM students in the last three years, it was found that students who use mobile technology perform academically much better and these findings concur with Richtel and Stone [22] findings.

Respondents' answers about some uses of mobile technology are similar to those suggested by Sharples et al. [8]. These are: Use them for educational purposes, downloading of study materials, practical classes, research purposes, storage of study materials as soft copies, communication via email and e-learning.

Most students believe that the use of mobile technology coupled with educational software and some rules can be effective in classrooms. This is in agreement with Schachter [23] and Jimmy's [24] thinking that smartphones by themselves represent only half of the requirements for using this new technological platform in the cla.

One important limitation of the study was the size sample and thus these findings are applicable to a particular group and context and cannot be generalized.

4 Conclusion

This case study at IUM in Namibia, a developing country, confirmed research that almost all students possess a mobile device and would not mind using it for educational purposes more than they already doing. This implies IUM does not need to supply such equipment. Using mobile technology it can augment the teaching and learning situation and it is relatively an inexpensive educational tool. It was also established that it can have a sequential effect. If a student likes and knows how to use that form of technology, the more (s)he uses it and the more (s)he benefits in his/her studies, the greater the motivation and persistence to succeed. Depending on how the lecturer uses that tool it can increase student engagement which is a recognized factor that contributes to academic success.

Students do not necessarily need learning managements systems to collaborate as the mobile device has sufficient tool/apps to enhance collaborative learning. What was of a kind of surprise is that a few students that did not own a mobile device they were keen to use them as they saw value. It is true that such devices can be used anywhere anytime and can carry 'their books' in it obviously provided there is reception.

Finally the results showed that mobile devices can have a positive impact on the students' academic success.

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