

# AVAILABILITY AND IMPLEMENTATION OF MOBILE LEARNING TECHNOLOGIES AMONG GHANAIAN UNIVERSITY STUDENTS: CASE STUDY OF THE COLLEGE OF DISTANCE EDUCATION, UCC.

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## ABSTRACT

In recent years, mobile learning technologies have become increasingly prevalent but there are questions as to whether these technologies have been fully utilized in universities. Integrating mobile learning technologies into the teaching and learning environment has been a challenge for Ghanaian Universities.

The purpose of this research is to identify the availability and implementation of mobile-learning technologies among university students and to educate institutions on how mobile technology can be helpful in the delivery of instructions. This paper further examines if mobile devices have positive impact on students' academics by assessing wider opinions and experiences of students with the use of such devices taken into consideration anytime and anywhere learning opportunities these devices offer.

It also provides some pointers to possible solutions and consider the role mobile learning technologies can play in instruction delivery based on the theory that Mobile learning is a combination of the interactions between learners, their devices and other people.

**Keywords:** Mobile, wireless, M-learning, E-learning, Mobile technologies, Mobile devices, Universities, University students

## 1. Background

Innovations in Information and Communications Technology has brought revolution in a typical man's life. Mobile learning advancements are continually changing what we know and how we know it, and hence what we learn and how we can learn it. Changing learner behaviours and extensive developments in communication technologies require higher educational institutions to continuously re-evaluate their approaches to teaching and learning, both in the physical and virtual classroom spaces.

The entrance of mobile devices has globally transformed teaching and learning in several universities in both advanced and developing countries. Mobile and wireless devices offered at low-cost and associated infrastructure's availability create both opportunities and challenges for educational institutions and their teachers and learners. As observed by Jacob and Isaac (2008) "wherever one looks, the evidence of mobile penetration is irrefutable: cell phones, PDAs, portable game devices, handhelds, tablets and laptops."

The term M-Learning or "Mobile Learning", has different meanings for different communities. For instance, the ability to utilize mobile devices to support instructing and learning maybe considered as mobile learning. Mobile learning technologies make learning stand out from other learning types by specifically designing learning experiences that takes advantage of the opportunities that mobility can offer us. One definition of mobile learning is, any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies.

The mobility of the learner, communicating effectively with mobile technologies and learning that shows how a society and its institutions can completely accommodate and support an increasingly mobile population is the focus of Mobile learning. This is a genuine truth since mobile devices have qualities and usefulness for supporting learners. For instance, audio and video recordings of lectures can be made accessible to students for downloading.

The Government of Ghana in its ICT in Education strategy of 2008, lays accentuation on instructive organizations to be imaginative and creative by making utilization of new and fitting advancements which are helpful in improving teaching and learning for better outcomes. The creative ways in which technology can be fully utilized in institutions in Ghana for such better outcome also includes the use of mobile technologies as a way of improving the teaching and learning experiences.

The College of Distance Education of the University of Cape Coast offers wide assortment of programmes to bunches of people all over Ghana. In addition, the College seeks to enhance its electronic-learning and teaching programme, which began some years ago, by creating an enabling environment for all. The main purpose of this research therefore

is to find out if mobile learning tools and technologies including apps are made available to students and how effectively they are implemented to facilitate teaching and learning.

## **2. Purpose of the Study**

The purpose of the study is to investigate the availability of mobile learning technologies among the students of the College of Distance Education-University of Cape Coast-Ghana and how it is being implemented to facilitate learning. This study's findings would be beneficial both to instructors as instructional designers as well as to university management teams. Teachers and professors could use this information to design higher quality didactic applications targeting university students. The administration inside higher educational foundations can utilize the discoveries in outlining programs that fuse mobile learning technologies and applications as learning and communication mechanism.

## **3. Literature Review**

### **3.1 Learning with Mobile Learning Technology**

Over the past years there has been a paradigmatic move from education and training to learning; from teacher focused way to student focused education; from rote learning to reflection learning; and from face to face to electronic and distance learning. One dominant characteristic of this move is the innovative use of mobile learning technology to enhance the delivery of education. The emergence of a new approach to learning characterized by electronic learning has led to new perspectives on learning presented through different theoretical lenses (Conole & Oliver, 2007). The pedagogical potential offered by mobile devices, is one such perspective called mobile learning.

Today mobile learning technologies are considered as offering new learning opportunities which represent a change in the strategies used by learners in their usage of learning products. According to Naismith (2004), there is considerable interest from technical developers and educators in exploiting the unique capabilities and characteristics of mobile technologies to enable new and engaging forms of learning. Mobile Use in the Developing Nations Research Approaches by Donner (2009) classified his research into three regular headings, with one of them being Mobile Impact on Education. The findings demonstrated that the mobile's simplicity, convenience and moderateness make it a solid match into instruction activities in spots where personal computers and internet might be constrained.

Considering the way that mobile devices are progressively getting common in the developing nations such as Ghana, Brown (2003) contends that it is convenient to see a future where mobile devices assume a main part in training developing nations. According to him, while there are as many people using mobile learning technologies as there are arguments on how mobile learning technologies will impact positively on education;

### **3.2 Mobile Learning Definitions**

Mobile learning maybe defined as “any type of learning that happens when the learner is not at a fixed predetermined location or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies” (O'Malley, 2003). It is not just about using portable devices for learning, but learning across contexts. Distinguishing features of mobile learning from other forms of e-learning as put forward include degree of ownership, site-specific learning and control over the learning process, self-evaluation, engagement and reflection by the learner. Learning activities supported by mobile learning also point to some distinctions which include:

- i. Exploration of the physical environment
- ii. Discussing with peers synchronously and asynchronously
- iii. Data capturing through sound, images and text
- iv. Learning in the light of feedback or comment adaptation
- v. Shared knowledge products reflection (Laurillard, 2007).

### **3.3 Mobile Systems and Technologies**

The problems posed by mobile learning devices due to their technical functionalities when used for learning has been addressed. Trinder (2005) in a well explained discussion, gave the specific circumstance and structure to understanding the technical environment and frameworks inside which mobile learning works by addressing both developing and established systems. The challenges encountered are:

1. The size of the screen as well as screen resolution.
2. Number of key buttons
3. Data and other text entry using handwriting recognition and other keyboards typing text.

4. The Central Processing Unit and memory.
5. Direct communication using wireless connections such as Bluetooth, infrared, and radio systems.
6. Recharge ability of mobile device batteries
7. Requirement for back up synchronization and updates
8. Different versions of applications are produced by many companies.
9. Questions geared towards convergence:
10. Data security.

Much evidence exist that mobile learning technologies are playing pivotal role in education and the use of such technologies is expanding. This was one of the core issues investigated by Gaskell & Mills (2010) in their research paper which was titled “Can we really learn from mobile handheld devices?” The use of handheld technologies provides a major way to improve learner support and learning opportunities in ways which will build on current methods.

### 3.4 Mobile Learning Design

Moving our attention to designing for mobile learning lies important approaches. Mohamed (2004) has proposed planning mobile learning materials standards which address:

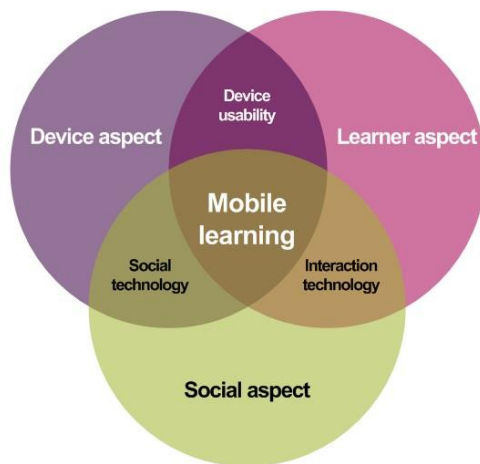
1. How learners interact with learning system,
2. How information in chunks is organized to facilitate processing,
3. How to represent information using concept maps or networks,
4. How to adjust user interfaces for future interactions with reading and learning materials

One question which has likewise caught the consideration of mobile learning originators is the subject of learning assessment. Vavoula and Sharples (2008) have turned out with three levels structure for assessing and measuring the results of mobile learning;

1. Micro level evaluation concerned with ease of use and utility components
2. Meso level evaluation in light of the educational experience and learning
3. Macro level assessment concerned with integration inside existing educational and organizational settings.

### 3.5 Conceptual Framework

A more holistic framework for mobile learning is a three-circle Venn diagram comprising the learner aspect (L), the social aspect (S) and the device aspect (D).



**Figure 1: Three Circle Venn Diagram**

Taking two or more of these together at the point at which the circles overlap in the Venn diagram: Koole (2006) provided criteria for each of the sections namely; Social aspect, Device aspect, Learner aspect, Device usability, Interaction technology, Social technology and Mobile learning. Mobile learning is, therefore, a combination of the interactions between learners, their devices, and other people. Other helpful checklist for institutions looking to adopt mobile learning technologies, include the following questions.

In a mobile learning system, the following are considered:

1. How the use of mobile devices might change the process of interaction between learners, communities and systems
2. How learners most effectively use mobile learning to access other learners, systems, and devices to recognize and evaluate information and processes to achieve their goals
3. How learners can become more independent in navigating through and filtering information
4. How the roles of teachers and learners will change and how to prepare them for that change

These questions enable the mobility of the learner rather than the device to be at the forefront of the mobile learning initiative.

#### **4. Research Methodology**

The research adopted a single-case study method with a descriptive survey as an appropriate strategy to understand in-depth the issues of mobile learning technologies in Ghana Universities. According to Yin (2003), lessons learnt on single cases can be assumed to be informative about the experiences of an average institution. Wolcott (2003) on the other hand indicated that the case study approach can be useful for understanding the process of policy development, policy changes over time and what the changes reveal.

Again, the researcher found descriptive survey design appropriate since this study involves collecting data to answer questions concerning the current status of a tool. A descriptive study determines and reports the way things are. To analyse the problem under study, questionnaires were used to elicit information to determine and assess the availability and implementation of mobile learning technologies among Ghana University students. The study area specifically covered University of Cape Coast; College of Distance Education students. The sample size was made up of 130 students from selected classes that have enrolled with the College of Distance Education. In order to collect information from the students on the research questions 130 questionnaires were sent to the study center.

Students were given self-administered questionnaires to be answered. Checklist were used to collate the information from the sample. At the end of the data collection, data analysis was conducted. The responses were classified on the basis of information provided. The analysis was done using Microsoft Excel. The purpose of the research was further explained to those who were willing to answer questions of the study. Descriptive survey was employed in this research design. The quantitative research methodology was appropriate for this study because it provides a means of testing objective theories by examining causal relationship among variables.

#### **5. Data Analysis and Interpretation**

Questionnaires were used to collect the necessary data from students. One hundred and thirty (130) students were used as the sample size. The questionnaires were administered to them and they were instructed to take approximately 15 minutes for completion. Data from the respondents were analyzed using statistical tools for analyzing data. Microsoft Excel was used to run the data and presented in the form of frequency tables, histograms, pie charts. The qualitative data gathered from the questionnaire were reviewed, reduced and coded to develop relevant information. Researcher reviewed the survey extensively until saturation was achieved. Data that was recurring in the surveys was highlighted and extracted into a single word document. To increase the rigor of the study, the data from the survey were compared against each other to ensure accurate reduction. The data extracted were then reviewed again to form codes, and these were further reduced and analyzed to form the needed themes. The descriptive nature of the study made the researcher use descriptive statistical tools for the analysis of the data. The analyzed data were then critically interpreted in relation to the research questions.

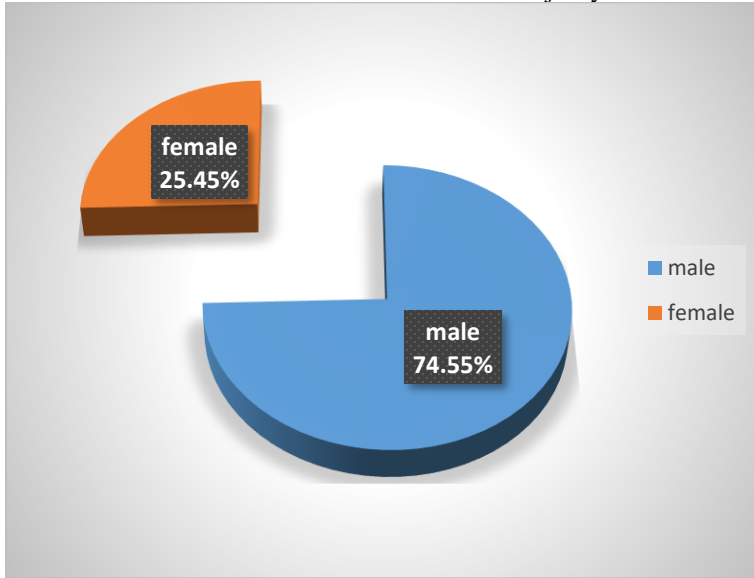
In all, one hundred and thirty (130) questionnaires were administered. A total of one hundred and ten (110) questionnaires were retrieved. This represents a total response rate of 84.62%. Data was first analyzed in order to understand the results in depth.

##### **5.1 Demographic Characteristics and Background Information**

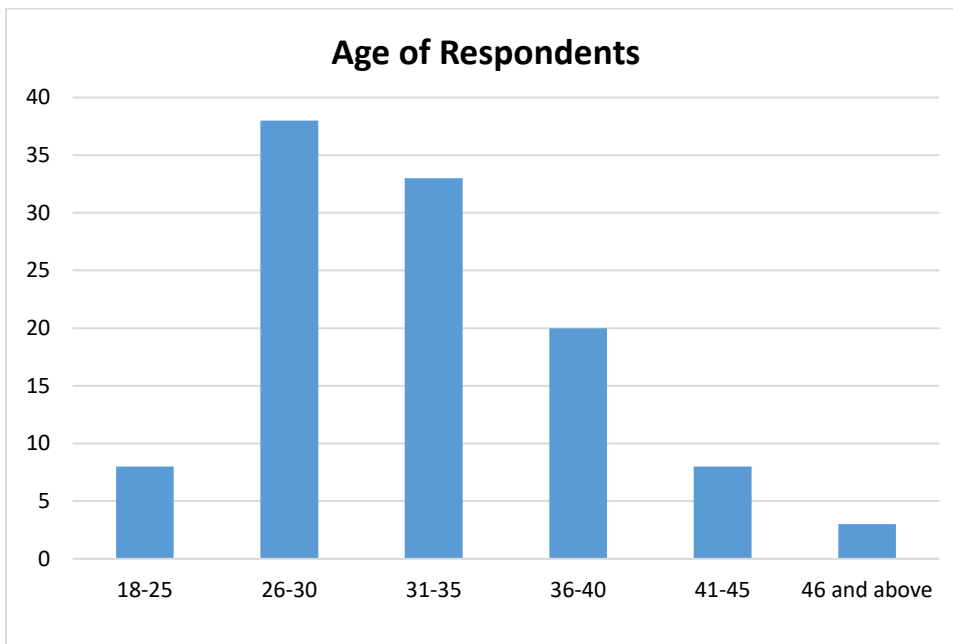
Respondents	Frequency	Percent
Male	82	74.50%
Female	28	25.50%
Total	110	100.00

**Table 1: Gender of Respondents**

Table 1 shows that as many as 82 (74.50%) of the respondents were males while the remaining 28 (25.50%) were females. From Table 1 it can be concluded that majority of the university students used in this study were males



**Figure 2: Gender of Respondents**



**Figure 3: Age of Respondents**

Figure 3 which shows the age distribution of the respondents indicates that 8 (7.27%) of the respondents fell in the 18-25 age bracket. Thirty-eight (38) (34.50%) and 33 (30.00%) fell in the 26 – 30 and 31 – 35 age brackets respectively. 20 (18.18%) and 8 (7.30%) of the respondents also respectively fell in the 36 – 40 and 41 – 45 age brackets. The remaining 3 (2.72%) fell in the 46 and above age bracket.

### **5.2 Mobile Learning Devices Available to University Students**

Respondents were asked about the type of mobile learning devices they own. Their responses are presented in Table 2

Mobile Device	Response	Percentage
Ipad	4	3.64%
Android tablet	15	13.64%
Iphone	3	2.73%
Android phone	69	62.73%
Internet capable phone	10	9.09%
Other tablet type	9	8.18%
Total	110	100.00%

**Table 2: Mobile Learning Devices Available to Students**

It can be observed from Table 2 that, 4 (3.64%) respondents had iPads. Fifteen (15) (13.64%) and 3 (2.73%) of the respondents also went in favour of android tablet and iPhone respectively as the mobile devices they possess. Sixty-nine (69) (62.73%) and 10 (9.09%) respondents respectively possessed android phone and internet capable phone. The remaining responses 9 (8.18%) went to other tablet type. A deduction from the Table 2 shows all the University students have access to mobile learning devices.

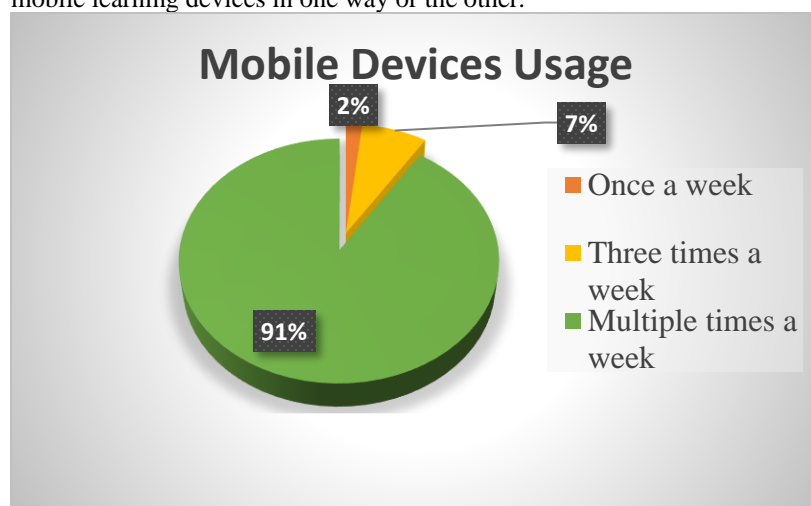
### 5.3 Usage of Mobile Learning Devices

To find how mobile learning technologies could help university students in their studies, there was the need to evaluate the student's usage of mobile learning devices including their prior knowledge of using their mobile devices for diverse tasks.

Response	Frequency	Percentage
Once a week	2	1.82%
Three times a week	8	7.27%
Multiple times a week	100	90.91%
Total	110	100.00%

**Table 3: Mobile Device Usage by University Students**

From Table 3, 100 of the university students representing 90.91% said they used their mobile learning devices multiple times in a week, eight students constituting 7.27% said they use their devices three times in a week, and two students representing 1.82% answered once in a week. This implies that majority of the students were making use of their mobile learning devices in one way or the other.



**Figure 4: Mobile Device Usage by University Students**

Statements	Number of Respondents	Percentage of Respondents
I know how to access the Internet from a mobile device	106	96.36%
I know how to download videos and audios a mobile device	80	72.72%
I know how to download a mobile application (app) on a mobile device	105	95.45%
I know how to find the definition of a word I don't know on a mobile device	104	94.54%
I know how to use a mobile device as a calculator	109	99.09%
I know how to set an alert/alarm on a mobile device	108	98.18%
I know how to translate a sentence into another language on a mobile device	55	50.00%
I know how to access a social networking site on a mobile device	105	95.45%
I know how to send an email on a mobile device	104	94.54%
I know how to post a comment to a blog or respond to a post on a mobile device	97	88.18%

**Table 4: Students Prior Knowledge on Learning with Mobile Devices**

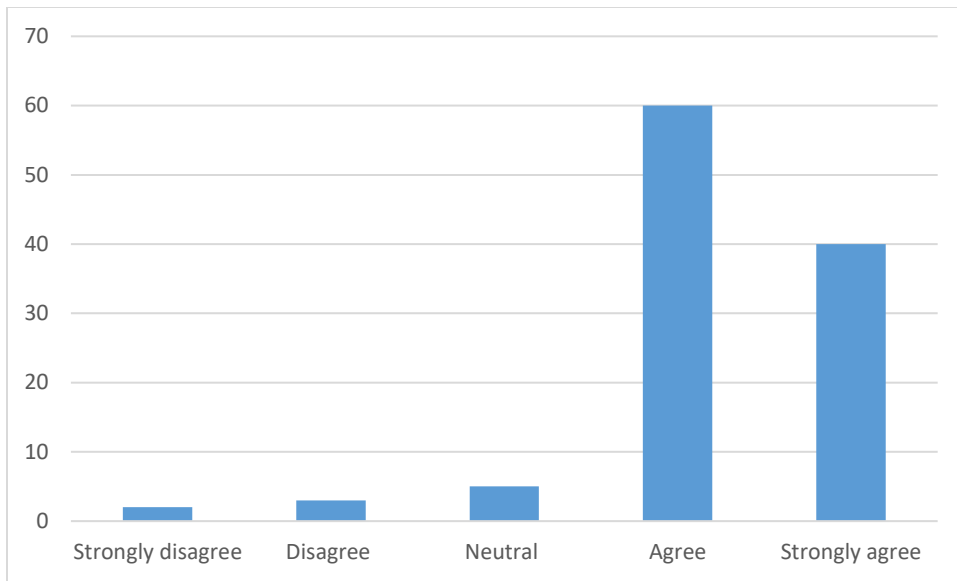
This survey asked students to report their use of mobile devices for various tasks. Students were able to respond to as many of the questions that they believed applied to their prior use of a mobile learning devices (i.e., answer “yes”). The Table 4 represents the number of respondents who could answer “yes” to each question and the percentage sample that those respondents represented.

#### **5.4 Recognition of Mobile Devices as Useful Tools for Learning**

In the next section of the survey, students were asked how using their mobile devices could impact their participation and engagement inside and outside the classroom. Survey items were designed to elicit responses based on a 5-point Likert scale whereas 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, and 5=Strongly Agree.

Response	Frequency	Percentage
Strongly disagree	5	4.55%
Disagree	15	13.64%
Neutral	20	18.18%
Agree	60	54.55%
Strongly agree	10	9.09%
Total	110	100%

**Table 5: Participation in Class Based on Mobile Devices**



**Figure 5: Participation in Class Based on Mobile Devices (N=110)**

Students responded positively to all six items indicating that university students' participation and engagement would much likely increase if they could use their mobile devices to participate in class activities.

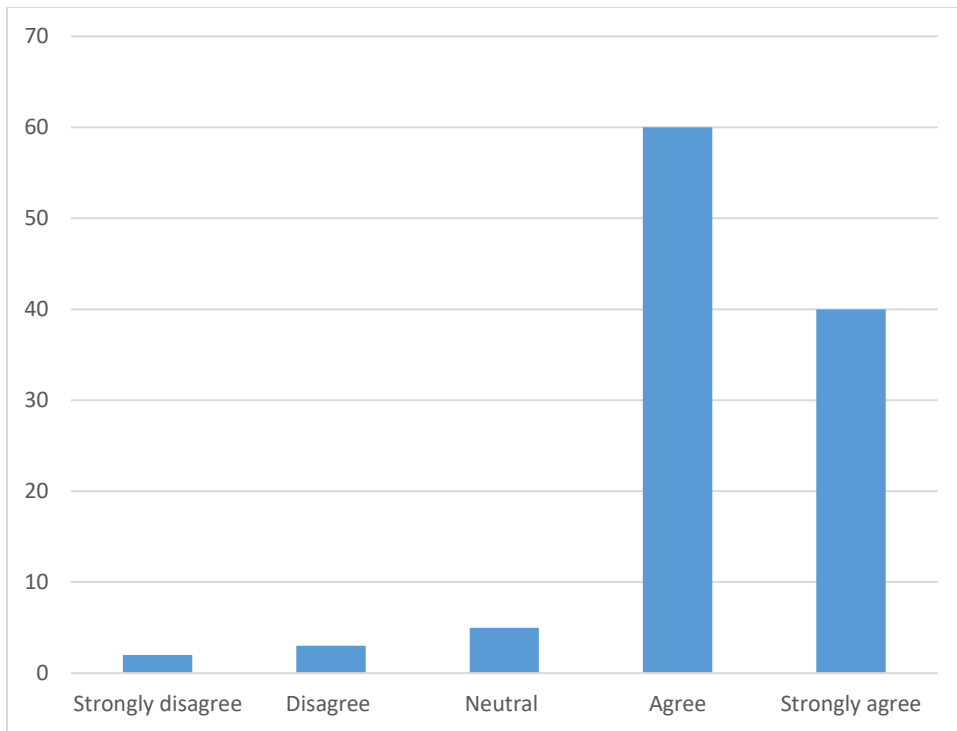
Next, students were asked to respond to six questions about their perceived use of mobile devices for educational purposes using the same 5-point Likert scale described and the results are reported in Table 6.

Having course materials such as slides, lecture notes, and practice quizzes available on my mobile device would be beneficial to my study process.

Response	Frequency	Percentage
Strongly disagree	2	1.82%
Disagree	3	2.73%
Neutral	5	4.55%
Agree	60	54.55%
Strongly agree	40	36.36%
Total	110	100%

**Table 6: Student Who Want Course Materials on their Mobile Devices**





**Figure 6: Student Who Want Course Materials on their Mobile Devices**

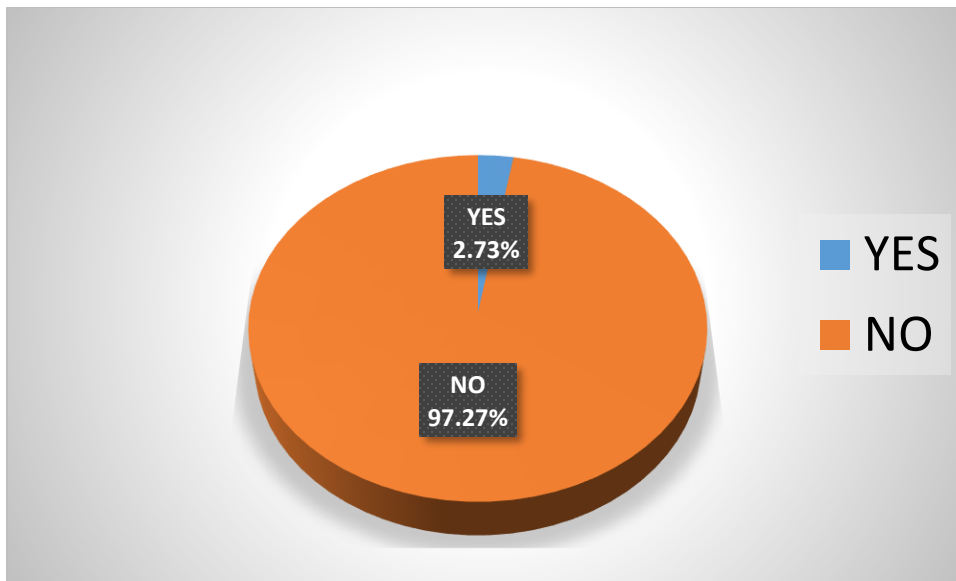
Students responded positively to all six statements. All five of the statements about ease of use elicited a positive response from students indicating that students believe that they could easily perform educational tasks on their mobile devices and that using their mobile devices would make it easier to complete classwork and assignments and enable them to learn and study in places they couldn't normally.

### **5.5 The Extent to which University Students Consider Custom Made Subject- Apps as Relevant to their Studies**

Investigation was carried out to find out if university students have access to customized mobile learning technologies provided by their institutions.

Response	Frequency	Percentage
YES	3	2.73%
NO	107	97.27%
TOTAL	110	100.00%

**Table 7: Provision of Custom-Made Apps to Help in Studies**



**Figure 7: Provision of Custom-Made Apps to Help in Studies**

In order to provide more depth and breadth to the quantitative data, the university students were asked whether their institution provides them with custom made mobile apps that can help them study on their own when they are not in classroom. Respondents were able to submit answers to this question without answering the open-ended question. One hundred and seven students said their university do not provide them with any custom-made apps to help them in their studies when they are outside the classroom.

## 6. Conclusions

The results from this research confirm that students use mobile devices for their learning activities even though this technology has not been formally included in the curriculum of universities. This might be an opportunity for teaching staff to use mobile learning technologies to enhance students' learning needs without the constraints of time and location. In light of the results of this study, it appears feasible to develop learning activities involving mobile devices. It is advisable for universities to design learning material and applications that allows access through mobile devices.

Mobile learning technology empowers learning any time at any place which implies students are not likely to forget a percentage of what they learn during lessons. Also, providing learning materials in a mobile format for learners whenever they need them irrespective of their physical locations is a more powerful offering. In addition, when learning is enabled at the point-of-need, learners are more likely to see the training as something useful rather than something they have to endure. Furthermore, the way learners interact with their mobile devices, using movement and hand gestures, gives a kinesthetic dimension to learning that can make it a more engaging and memorable experience. When used appropriately, mobile learning technology has the potential to help students learn more and comprehend their knowledge.

## 7. References

- Brown, T. 2003. *The role of m-learning in the future of e-learning in Africa*. 21<sup>st</sup> ICDE World Conference. Available in: [www.tml.hut.fi/Opinnot/T110.556/2004/Materiaali/brown03.pdf](http://www.tml.hut.fi/Opinnot/T110.556/2004/Materiaali/brown03.pdf).
- Conole & Oliver (2007). *Contemporary perspectives in E-Learning research*. London: Routledge. 2007.
- Donner, J., & Gitau, S. (2009, April 1–2). New paths: *exploring mobile-only and mobile primary Internet use in South Africa*. Paper presented at the W3C Workshop on the Africa Perspective on the Role of Mobile Technologies in Fostering Social Development, Maputo, Mozambique.

- Gaskell, A., & Mills, R. (2010). *Can we really learn from mobile handheld devices?* Theme: Social Justice. Subtheme: Scaling up Quality Education for all.
- Harteis, C., (2008). The workplace as a learning environment. *International Journal of Educational Research*. Vol. 47. pp. 209 -212.
- Jacob, S. & Isaac, B. 2008. "*The mobile devices and its mobile learning usage analysis*". Proceedings of the International Multi Conference of Engineers and Computer Scientists vol. 1, pp. 1-6
- Koole, M. L. (2009). A model for framing mobile learning. In M. Ally (Ed.), *Mobile learning: transforming the delivery of education and training* (pp. 25-47): AU Press Canada.
- Laurillard, D. (2007). Pedagogical forms of mobile learning: Framing research questions. In N. Pachler (Ed.), *Mobile learning: Towards a research agenda* (Vol. 1, pp. 33-54). London: WLE Centre, Institute of Education
- Mohamed, A., (2004). Using learning theories to design instructions for mobile learning devices. In *Mobile anytime everywhere: A book of papers from MLEARN 2004*. Attewell, J., and Savill-Smith, C., (Eds). pp. 5-8
- O'Malley et al., (2003). MOBILearn. *Guidelines for Learning, Teaching and Tutoring in a mobile Environment*. June 2003. [www.mobilelearn.org](http://www.mobilelearn.org)
- Trinder, J. (2005) Mobile technologies and systems. In: Kukulska-Hulme, A. and Traxler, J. (eds.) *Mobile learning: A Handbook for Educators and Trainers*. Series: Open and flexible learning series. Routledge: London, pp. 7-24.
- Vavoula, G. & Sharples, M., (2008). *Challenges in Evaluating Mobile Informal Learning*. In *Proceedings of the mLearn 2008 conference*. (Traxler, J., Riordan, B., and Dennett C., Eds. 7 -10 October 2008. Wolverhampton UK. pp. 296 – 303
- Wolcott, L. L. (2003). *Dynamics of faculty participation in distance education: Motivations, incentives, and rewards*. In M. Moore, & W. Anderson, (Eds.), *Handbook of Distance Education*, (pp. 549-565). Mahwah, NJ: Lawrence Erlbaum Associates.