

# Investigating The Use of Mobile Technology for Educational Purpose Among Engineering Students of the Polytechnic

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**Abstract**— Mobile devices with internet connectivity which constitutes the mobile technology make it possible to extend education beyond the physical confines of the classroom and beyond the fixed time periods of the school day. The peculiarity of the engineering field requires that it make use of different technologies other than the ones used in general education for its teaching and learning process, and access to these technologies can be made easy using the mobile technology. The mobile technology if properly employed has the potential to revamp the engineering education. A survey was carried out to investigate the use of mobile devices for educational purpose among engineering students of The Polytechnic, Ibadan in Nigeria to find out whether there are significant differences in the attitude of the students towards the use of mobile devices for educational purpose with respect to their academic discipline, gender or age. The study finds out that there is a significant difference in the students' use of mobile phone for educational purpose with respect to their academic discipline which means academic discipline contributes to how engineering students use mobile devices for educational purpose. Meanwhile, no significance was recorded in their use of mobile phone for educational purpose with respect to their gender or age group

**Index Terms**— Mobile Technology, Digital content, Engineering Field, Educational sector, Internet, Students and Gender



## 1 INTRODUCTION

The mobile technology is made up mobile devices such as mobile phones and tablets which are portable handheld communication devices usually connected to a wireless network. The evolution of the mobile technology has revolutionised communication and interaction in the 21<sup>st</sup> century. At the inception of this technology, mobile phones were primarily used for sending and receiving calls and texts either using the short message service (SMS) or multimedia messaging (MMS). But, in the recent years, mobile phones has grown to include highly advanced features similar to those found on a computer such as operating system, internet access, ability to install third party applications, and much more functionality such as video recording and playback, digital camera functionality, touchscreen user interface, e.t.c. This has resulted in the smartphone terminology. In the context of this study, a smartphone is defined as a mobile phone which combines the features of a traditional mobile phones with highly advanced features similar to those found on a personal computer such as high-end operating system, internet access facilities, a touchscreen capability, ability to install third party applications, more storage spaces including Read Only and Random Access Memories (RAM and ROM) and many others. Also, a basic mobile phone that does not have high-end features earlier mentioned but can only be used to make voice calls, send text messages and perform other basic functions is referred to as a feature phone.

Mobile devices are used by students for educational purposes (Goundar, (2011), White and Mills, (2015), north, (2014)). This claim was also supported by Woodcock et.al, (2012) when he stated that mobile phones have put powerful, user-owned computing devices into the pockets of students and academic staff. This is because a mobile phone or a tablet with internet connectivity has many functionalities ranging from its size that can fit into a pocket, its incorporated computing power capable of running complex software, its memory that can store huge amounts of data, to its qwerty keyboards, cameras, audio recorders, gesture-based input, and high resolution displays. It also has the capability to incorporate a wide range of apps which include support for communication, media production, web browsing, social media interactivity, entertainment and learning. A study by Utulu (2012) on undergraduate students in Nigeria posits that mobiles phones were used by students for communicating with their lecturers, for sharing knowledge and for accessing digital content such as the accessing Online Public Access Catalogue. In addition to this, White and Mills (2012) stated that students held positive attitudes towards the use of mobile phones for language learning in Japan and had either already adopted the technology or planned to do so in the near future. Thus, the mobile phone is being used by most students and academic staff as an alternative to desktop and laptop computers with internet connectivity. It should be noted that the use of mo-

bile phones for educational purpose has brought about a new paradigm of knowledge referred to as Mobile Learning or m-Learning.

There are several definitions of mobile learning, El-Hussein and Cronje (2010) have pointed out that while many researchers have emphasized the mobility aspect of mobile learning and have defined it an educational activity that takes place when the mobile technology in use is fully mobile and when the users of the technology are also mobile while they learn; others have emphasized the learning process and have defined mobile learning as a learning that takes place whenever the user of the technology use it for educational purpose. Mobile learning was further defined as a learning that takes place by means of wireless technological devices that can be pocketed and utilized wherever the learner's device is able to receive unbroken transmission signals (Attewell and Savill-Smith, 2005). With respect to this study, the view on the learning process is adopted and mobile learning is defined as a learning that takes place whenever a mobile device is used for an educational purpose. Highlighted below are a few of the numerous advantages of the use of mobile phones for educational purpose:

- It allows students to have access to educational digital content at anytime and anywhere
- It takes learning beyond the physical confines of the classroom and supports personalized learning
- It supports learning experiences that are collaborative, accessible, and integrated with the technologies around the world.
- It enhances interaction and flow of communication between the students and instructors and among the students themselves.
- The operating system on Smartphones allows integration of applications commonly referred to as apps that supports learning.

However, despite the potential of the mobile devices to enhance learning, they are often banned from schools and other centres of education. This happens because of the fact that mobile phones have been found to be a source of distraction to students and studies have even shown that students are addicted to their phones. (Sheopuri & Sheopuri (2014), Katz and Sugiyama, 2005). Nevertheless, considering the numerous benefits of the mobile phones in supporting modern teaching and learning, educators should seek to exploit the potential of the technologies and find ways to put them into good use for the benefit of learning practice rather than see-

ing mobile phones as troublesome devices (Sharples, 2003). Thus, the objective of this study was to explore how engineering students have been using their mobile phones for educational purpose with a view to provide educators with information that will assist them in making informed decision on inclusion of mobile technology into the curriculum and the teaching methods.

## 2 LITERATURE REVIEW

Engineering is a profession in which the knowledge of the mathematical and natural sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize natural and man-made resources as well as the forces of nature for the benefit of humankind. According to Duderstadt, (2008), engineers apply their knowledge of science and technology to meet the needs of the society, to solve its problems, and to pave the way for its future progress. Engineering has been said to be a key driver of human development. The engineering profession demands a high level of precision in its decision making process and this can be achieved by access to timely and accurate information. All these can be adequately catered for by incorporating mobile learning in both its teaching and learning process, as well as when practicing on the field since modern mobile devices offers instantaneous access to information. Also, the peculiarity of the engineering field requires that it make use of different technologies other than the ones used in general education for its teaching and learning process. Examples of such technologies are 3D Printing, Remote labs, Simulators, Virtual labs, cloud computing, Augmented reality for learning, and so on (Waigandt, 2015). Moreover, it has been said that learning is moving from learning in a classroom towards learning within a communication-technology-based network of students and academic staff (Kim, et.al, 2012). This view was also supported by Goundar, (2011) in a study where he established the fact that mobile devices are already being used by educational institutions in many countries and noted that it is timely to envision a future where the mobile devices play a pivotal role in education in developing countries. Some of the mobile device technologies highlighted in the study are:

- **TeacherMate** handheld computer system is designed to support the teacher. Teacher-Mate system was developed by Innovations for Learning, a Chicago-based nonprofit organization to create which an effective system of individualized instruction that is affordable, replicable and scalable.
- **Worldreader**: a system developed for teachers and students in Ghana in which e-readers was loaded with a combination

of digitized local textbooks and storybooks along with international books that is closed to 40,000 and the effects have been pretty dramatic.

- **School of One**: this was developed in New York with the view to provide to "smart" teaching with mobile devices. The students' individualized instruction plans are produced by a "Learning Algorithm" that the teachers plug with data. This in turn leads the teachers to come up with individualized "playlists" of lessons that meet the students' abilities and interests at the needed pace.
- **BBC Janala Project** : an initiative that is providing English language lessons to citizens via their mobile phones as part of the wider English in Action program in Bangladesh.
- **BridgeIT Project**: . It is a USAID funded 3 – year pilot project with significant leverage support from private and public sectors involving 150 schools in 17 districts from 7 regions in Tanzania. The BridgeIT Project aims to significantly increase educational quality and student achievement in maths, science and life skills through the innovative use of moile phone.
- **Drona Mobile Learning Management System**: Drona is a mobile learning management system. It allows users to author content ranging from texts to images, audio and video. Different types of courses can be created, such as learning slides, multiple choice questions, multiple response questions, true/false type assessment, surveys, and feedback. With Drona, users are truly liberated from the confinement of classrooms and computers, thus providing high accessibility and convenience. It also helps users to create their own mobile applications.

Considering the peculiarity of the engineering profession where a high level of accuracy and precision is required in design and implementation decisions, it can be succinctly said that the profession needs urgent incorporation of the mobile technology in its teaching and learning as well as practice. This therefore necessitates that important stakeholders both in

the engineering profession and the Nigerian education system, namely the academic staff, the students, their parents, and the ministry of education should look into successful deploying of classroom curriculum through mobile devices for the engineering disciplines in Nigeria.

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## 3 METHODOLOGY

### 3.1 Research Questions

The research questions that guided this study are highlighted below:

- What type of mobile phone is owned by Engineering students?
- Is there a difference in the use of mobile phone for educational purpose among engineering students with respect to their academic discipline?
- Is there a difference in the use of mobile phone for educational purpose among engineering students with respect to their age group?
- Is there a difference in the use of mobile phone for educational purpose among engineering students with respect to their gender?

### 3.2 Hypothesis

**H0:** There is no significant difference in the Engineering students' use of mobile phones for educational purpose with respect to their academic discipline

**H0:** There is no significant difference in the Engineering students' use of mobile phones for educa-

tional purpose with respect to their age group

**H0:** There is no significant difference in the Engineering students' use of mobile phones for educational purpose with respect to their gender

The research design adopted for this study was the social survey research design. It was adopted because it involves a systematic and comprehensive collection of information about the opinions, attitudes, feelings, beliefs and behaviors of people, Aina (2001). It also allows for a selected sample size of a population to represent an entire population of study. The targeted population in this study was engineering students of The Polytechnic, Ibadan. This was because owing to the nature and peculiarity of the engineering field which demands access to timely and accurate information, there is the need to examine how students have been using the technology to support their learning, and to encourage the educational facilitators in the engineering field to formally incorporate the mobile technology into the teaching - learning process. The purpose of the study was explained to the participants to get their Informed consent. Also, the researcher assured them of anonymity and confidentiality of their responses

The sampling procedure employed in this research was the two-stage Cluster sampling. It is a sampling method which takes place by dividing the group into clusters and randomly selects a subset of the selected cluster for inclusion in the sample as oppose to one-stage cluster sampling where all the elements within the selected clusters are included in the sample. The data collection instruments used for this study was the questionnaire. The choice of questionnaire was based on the fact that it is a very useful tool that can be used to gather data from respondents within a short period of time and it has also been employed in previous similar research. The questionnaire was constructed using a five-point Likert scale including Strongly Disagree (SD), Disagree (D), Undecided (U), Agree (A) and Strongly Agree (SA). The instrument was made up of 23 questions that address the various aspects of the use of mobile phone for educational purpose.

An assessment of the survey questions was conducted for content validity. The survey questions were clear and understandable. They thus passed the fundamental requirement for content validity. To determine the reliability of the instrument, a pre-test was conducted and the instrument proved to be reliable with a Cronbach Alpha's score of 0.864 which is greater than the general limit of 0.7. The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was used to measure sampling adequacy and appropriateness of the factor analysis. The result was a KMO score of 0.834, which approaches the top of the scale at 1.0, indicating a high degree of sampling adequacy. Also, the Bartlett's Test of Sphericity was used to determine whether the original correlation matrix is an identity matrix. If the

correlation coefficient value is less than 0.001, then the R-matrix is an identity matrix and indicates that the factor analysis is appropriate. The result of the Bartlett Test showed a Chi-square value of 4402.213 with a df value of 990 resulting in a significant value of 0.000, which is less than 0.001 and thus supporting the factor analysis. In other words, the model is a good fit for the purpose of the study. A total of three hundred and twenty (320) copies of the questionnaires were administered. Out of this, two hundred and fifty two (249) copies were retrieved out of which forty seven (47) were not found usable because they were not properly filled. The rest 86.67% were used for the data analysis.

#### 4 DATA ANALYSIS AND RESULTS DISCUSSION

The Statistical Package for Social Science (SPSS) version 18.0 was used in analyzing the data. This involved a descriptive analysis of the variables using frequency, percentage distribution and graphs. Also, the null hypotheses used to drive the study was tested using bivariate level Analysis of variance (ANOVA) to test the differences between any two variables. Table 1 presents the demographic characteristics of the respondents. Among the 202 questionnaires filled, 157 respondents (77.7%) were male while 45 (22.3%) were females. A higher percentage of the respondents (41.1%) were between 21 and 25 years old, while 23.8% were 15 to 20, 30.7% were 26 to 30, and 4% were above 30 years old. The majority of the respondents who completed the questionnaire were Full-Time (73.8%) ND II (50.5%) students.

**Table 1.0 Demographic Characteristics of the Respondents**

Variables	Measurement	Frequencies	Percentage
Department	Electrical Engineering	35	17.3
	Mechanical Engineering	27	13.4
	Civil Engineering	36	17.8
	Computer Engineering	65	32.2
	Mechatronics Engineering	39	19.3
Sex	Male	157	77.7
	Female	45	22.3
Age	Between 15-20	48	23.8
	Between 21-25	83	41.1
	Between 26-30	62	30.7
	Above 30	8	4.0
Mode of Programme	Part-Time	44	21.8
	Full Time	149	73.8

<b>Level</b>	ND I	60	29.7
	ND II	102	50.5
	ND III	16	7.9
	HND I	8	4.0
	HND II	10	5.0
	HND III	4	2.0

**Percentage distribution of Types of Phones owned by students**

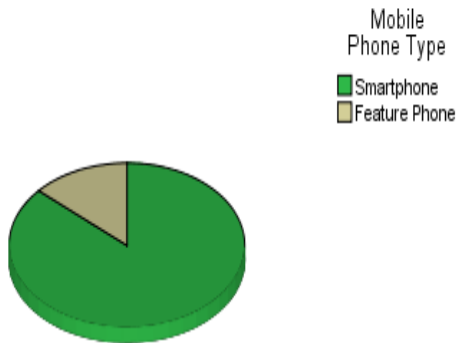


Fig. 1.1 (a) and 1.1 (b) show that a higher percentage of the students (73.3%) owned a Smartphone and a classification of phones by the Operation system shows that Android Phones (55.5%) are the most commonly used among the students. This is because in Nigeria today, android phones are the most affordable with a lot of mobile phone producers trying to win the market. Also, the numerous applications that are offered by Google Playstore is second to none with respect to other mobile phone operating system platform.

Fig. 1.1(a) Classification of Phones by Generic Term

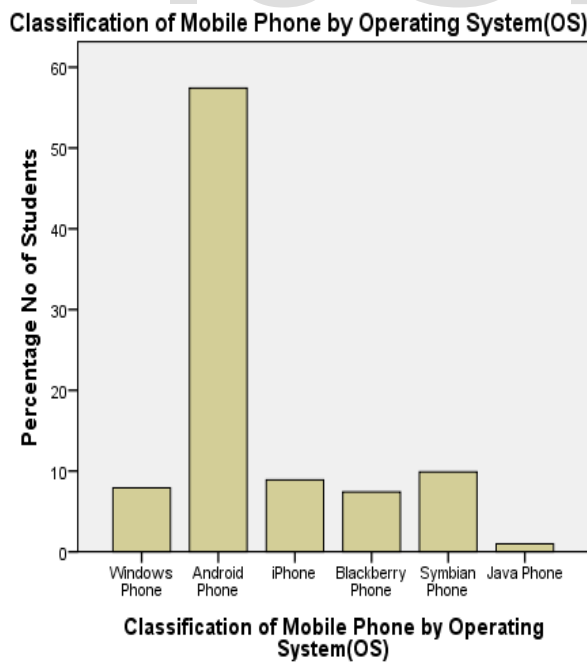


Fig. 1.1 (b) Classification of Phone by OS

**Test of Hypotheses**

**Hypothesis one:** *There is no significant difference in the Engineering students' use of mobile phones for educational purpose with respect to their academic discipline.*

The ANOVA analysis result for hypothesis one presented in Table 2.0 reveals that the variable Educational use of mobile phone was significant (  $F(4,197) = 4.835, p < 0.05$ ). This implies that academic discipline contribute to how engineering students use their mobile phones for educational purpose. Hence, reject the null hypothesis.

**Hypothesis Two:** *There is no significant difference in the Engineering students' use of mobile phones for educational purpose with respect to their age group.*

The ANOVA analysis result for hypothesis two presented in Table 3.0 reveals that the variable Educational use of mobile phone was not significant with respect to students' age group (  $F(4,197) = .182, p < 0.05$ ). This implies that engineering students' age group does not contribute to their use of mobile phones for educational purpose. Hence, do not reject the null hypothesis.

**Hypothesis Three:** *There is no significant difference in the Engineering students' use of mobile phones for educational purpose with respect to their gender.*

The ANOVA analysis result for hypothesis three presented in Table 4.0 reveals that the variable Educational use of mobile phone was not significant with respect to the gender of engineering students (  $F(4,197) = .182, p < 0.05$ ). This implies that the rate at which male engineering students use mobile phones for educational purpose is same as that of the female. Hence, do not reject the null hypothesis

**Table 2.0 Analysis of Variance between Educational use of Mobile Phone and Academic discipline**

ANOVA					
Educational use of mobile phone					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	8.219	4	2.055	4.835	.001
Within Groups	83.717	197	.425		
<b>Total</b>	<b>91.936</b>	<b>201</b>			

**Table 3.0 Analysis of Variance between Students' Educational Use of Mobile Phone and Age Group**

ANOVA					
Educational Use of mobile phone					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.338	4	.085	.182	.948
Within Groups	91.597	197	.465		
<b>Total</b>	<b>91.936</b>	<b>201</b>			

**Table 4.0 Analysis of Variance between Students' Educational use of Mobile Phone and Gender**

ANOVA					
Educational Use of mobile phone					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	1.338	1	1.338	2.954	.087
Within Groups	90.598	200	.453		
<b>Total</b>	<b>91.936</b>	<b>201</b>			

**5 CONCLUSION**

The results of this study suggest that engineering students use the mobile technology to support informal learning even though the technology has not been formally included in the curriculum. Meanwhile, its importance and potential in supporting formal teaching and learning cannot be overemphasized, it is therefore necessary for educators, most especially in the engineering profession to incorporate it into formal teaching and learning. Also, rather than seeing mobile devices as troublesome devices, they should seek to exploit their potentials and engage the students in ways that will enable them to put mobile devices into good use.

In the light of this, it recommended that

1. Academics should get involved in the use of these technologies themselves by getting to know about the different educational platforms through which the mobile technology could be explored and integrated into teaching-learning process.
2. Academics should engage students more in the use of mobile technology. For instance, instructional materials or assignments could be given to students through chat apps like whatsapp. .

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