# Use of Mobile Devices in Teaching and Learning in Traditional Higher Institutions in Nigeria

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## ABSTRACT

Studies have shown that using smart mobile devices for teaching and learning tends to complement the traditional method of teaching in schools, enhance active learning, and supports problem solving abilities of students. The main objectives of this study are to identify the level of awareness on possibility of the use of Smart (mobile) devices in learning higher institutions; if any, the extent of utilization of Smart (mobile) devices in education; the factors influencing the extent of utilization; and the strategies for effective utilization of Smart (mobile) devices in higher education in Nigeria.

Data was collected by means of a survey from 135 students on full-time study in higher institutions. The data collected was analyzed using the SPSS software. Statistical methods and processes are used to evaluate the strength of relationships between the variables measured at various levels. The result of analysis indicated that students' ownership of and readiness to use their own mobile device is a critical success factor in the implementation of m-learning. This is because it phases out the issue of cost of providing the device for the students and resolves the issues concerned with usability which was earlier identified as a challenge to m-learning.

(Keywords: e-learning, smart phones, mobile devices, digital aids, m-learning)

## INTRODUCTION

Mobile-learning (m-learning) is learning using wireless devices that can be used wherever the learner's device can receive unbroken transmission signals. The device that fall within this category of wireless technology are smart phones, tablets and personal digital aids (PDAs). The definition for m-learning contains three key components – mobility of technology, mobility of learners, and mobility of learning processes (Park, 2011). Mobility of learners means learners are no longer physically attached to one or several learning sites, and they can be mobile and learn at the same time as long as the mobile devices are around. Mobile learning involves the mobility of both the technology and learners.

Mobile learning with smart devices establishes a bridge between the formal and informal learning spaces which affords the learner the opportunity to interpret and apply what is learned from one environment to another (Looi et al., 2010). This concept provides an atmosphere that takes learning outside the classroom and even remote places. This implies learning is not location specific. In fact, the learning space is now described by the learning process unlike in the past when it was described by the location (Looi et. al., 2010; Wagner, 2008).

The collaborative features of the technology such as SMS messaging, digital cameras, and the third-party applications that can be downloaded onto these mobile devices serves as a medium for cooperation, communication and an atmosphere for teamwork between students and instructors (who may be geographically distributed). It also makes the tasks that mobile phone can handle more diverse. In-built resources such as organizers, calendars, maps etc., assist learners plan their time and creates a personalized atmosphere for the individual learning. This will provide a holistic approach to improving the learning experience using mobile technology (El-Hussein and Cronje, 2010; Merchant, 2012).

## STATEMENT OF THE PROBLEM

There are numerous reasons why a student would need to be away from school in Nigeria. During these periods, the student would

experience dead time as far as school is concerned. With mobile technology, there need not be dead time for students and teachers as learning and teaching can occur anywhere as long as the Smart device (phones, PDAs, tablets) has internet connection (Kalba, 2008)). While away from school, which occurs rather frequently for teachers and students, teachers could still give assignments, communicate with students while the students could use their mobile devices to check on course materials, take tests, submit assignments etc., while on the move.

Dede and Bjerede (2011) proposed alternative models of educational improvement that can be supported by mobile technologies. He described the use of mobile devices within and outside classrooms to enable a 1:1 ubiquitous-computing environment. If Nigerian institutions would adopt and approve these activities as part of learning while less emphasis is placed on being physically present in face to face classroom, how would this impact positively on the learner. This study is to determine from students in Nigeria higher institution, the level of awareness of the availability of this mode of teaching, their perception on its effectiveness as well as strategies for effective utilization.

**OBJECTIVES OF STUDY**

The focus of this study is the use of mobile devices to enhance learning for full time students in higher institutions in Nigeria. The population therefore comprise of student on full-time study in higher institutions in Nigeria. The main objectives of this study are to identify the level of awareness on possibility of the use of Smart (mobile) devices in learning higher institutions; if any, the extent of utilization of Smart (mobile) devices in education; the factors influencing the extent of utilization; and the strategies for effective utilization of Smart (mobile) devices in higher education in Nigeria. The laptop is not a convenient device to use on the go and is therefore excluded from this study as mobile device.

**RESEARCH METHOD**

In this study, a small survey comprising of 135 randomly selected respondents were used. The participants who are in higher institution of learning in Nigeria cut across different age groups. They are undergraduate students and teachers of a federal government owned university in Nigeria. The survey covered a period of 3 weeks at different departments and lecture halls and the participants in the survey were informed on the aim of the study. The survey instrument contained twenty- five questions.

These questions generated different types of variables. While more than half of the questions (fourteen of them: fell into the nominal or categorical variable class. Two questions fit into the variables characterized as interval/ratio (also known as numerical variables). Six questions were ordinal variables. Lastly, three questions were designed using Likert scales to capture the students' skill level in relation to the use of e-mail, word processing and internet surfing as well as their attitude towards the use of social networking sites.

The use of frequency tables and diagrams such as pie charts and bar charts were employed to present some of the findings of the work. The Pearson's chi–square value for the cross tabulation was one of the methods used in measuring the strength of association between the variable employed in the design. For example, cross tabulations were carried out between the faculties and their mode of internet access, the number of courses requiring the use of internet, their skill. Finally, a correlation matrix for multiples pairs of variables was utilized. In this work, this technique was used to check the interrelationship between variables such as Gender, Frequency of internet use, Faculty, Access to internet and others.

Reliability in this study was first ensured by testing and retesting of the data using SPSS software. Tests such as Pearson's Chi Square test were employed. In addition, the results found were compared to some results from other researchers in previous studies on the same subject. Buckingham and Saunders (2004) also maintain that results from surveys generate reliable information that sheds light on the social world provided the survey is carried out systematically and cautiously.

**ANALYSIS OF RESULT**

A total of 170 questionnaires were distributed of which 140 were returned. Five of the 140 collected questionnaires were found to be unusable leaving, 135 usable ones. The result of

such summary was then analyzed with regards to the objectives of the study. Some of the variables used in this work needed to be further categorized to enable data analysis. Table 1 shows the demography of the respondents.

**Table 1:** Demography of Respondents.

| Variables | Number of Respondents |
|---|---|
| **Total Sample Size** | 135 |
| | |
| University A | 57 |
| University B | 78 |
| | |
| **Faculty** | |
| Engineering | 16 |
| Medicine | 12 |
| Agriculture | 16 |
| Social Sciences | 7 |
| Sciences | 62 |
| Art and Humanities | 21 |
| Missing entries | 1 |
| | |
| **Gender** | |
| Male | 73 |
| Females | 57 |
| Missing entries | 5 |
| | |
| **Age Groups** | |
| ≥ 18 | 19 |
| 19 – 22 | 68 |
| 23 – 26 | 43 |
| 27 – 30 | 1 |
| Missing entries | 4 |
| | |
| **Study Year** | |
| Year 1 | 13 |
| Year 2 | 51 |
| Year 3 | 25 |
| Year 4 | 29 |
| Year 5 | 15 |
| Others | 1 |
| Missing entries | 1 |

**i:** Figure 1 shows the mode of transport of the respondents. Time spent by student in commuting to and from school daily: The means of transportation and the frequency was captured in question 7 to 9 of the questionnaire. From the response (Figure 5, Tables 4 and 5), it revealed that travelling to school by bus was found to have the highest frequency (61 students which makes up 46.7%). Seventy-five of the 124 students who responded to the question spent less than 1 hour travelling to school. Out of this, 75 students, 35 of them went by bus, therefore accounting for 57.4% of those who spent less than 1 hour travelling. 31 students commuted by walking, 15 students by bicycle and 16 students by motor bike.

The question here is, is less than 1 hour a considerable time enough to do any form of learning? Nevertheless, there are different learning activities that can be designed to fit various time frames while bearing in mind that it is difficult to delineate learning from other everyday activity but rather it should be seen as being incorporated in various non-learning activities (Sharples etc., 2005.).
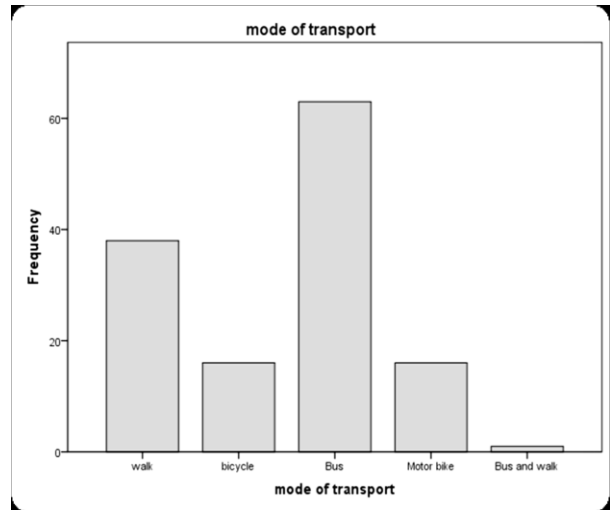


**Figure 1:** Mode of Transportation.

**ii:** Questions 23 – 25 of the questionnaire were designed to ascertain the students' level of awareness as it concerns mobile learning as at the time of the survey. The response obtained reflects that 75 students (which constituted 55.6% of the sample) had heard previously about mobile learning. The internet was shown to be the most predominant mode of obtaining this knowledge. In addition, 86 students believe that learning can be improved by the use of mobile learning. However, 35 students (that is 25.9%) answered 'maybe' to this question. (Table 2). Figure 2 shows awareness level of respondents of using mobile devices for learning.

**Table 2:** Mode of Transportation by Respondents.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | Walk | 38 | 28.1 | 28.4 | 28.4 |
| | Bicycle | 16 | 11.9 | 11.9 | 40.3 |
| | Bus | 63 | 46.7 | 47.0 | 87.3 |
| | Motor bike | 16 | 11.9 | 11.9 | 99.3 |
| | Bus and walk | 1 | .7 | .7 | 100.0 |
| | Total | 134 | 99.3 | 100.0 | |
| Missing | System | 1 | .7 | | |
| | Total | 135 | 100.0 | | |

**Heard of Mobile learning before now?**

■ yes
■ no
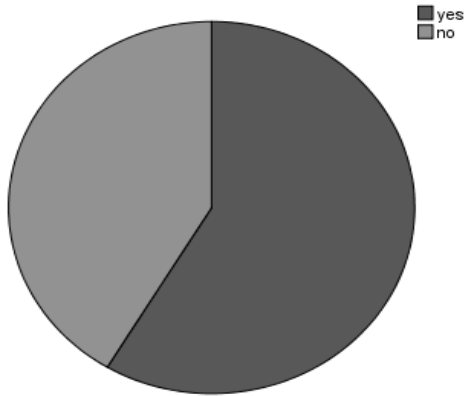


**Figure 2:** Awareness of Mobile Device for Learning Purpose.

Figure 3 shows result of the perception of respondents on whether mobile devices are capable of improving learning outcome.



■ TV
■ Internet
■ Magazine
■ Newspaper
■ Internet and others
■ combination of others
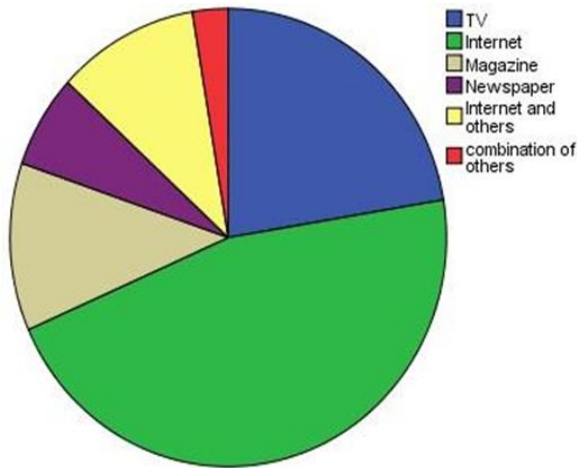
**Figure 3:** Where Respondents Heard about Mobile Learning.

**iii:** The question of the availability of the mobile device was answered in question 19. Question 20 and 21 went on to further access the type of mobile phones available to the students. The result reveals that of the 128 students who answered the question, 127 own mobile phones (Table 3). 114 students have smart mobile phones that can access the internet (Table 4).

**Table 3:** Ownership of Mobile Devices.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 127 | 94.1 | 99.2 | 99.2 |
| | no | 1 | .7 | .8 | 100.0 |
| | Total | 128 | 94.8 | 100.0 | |
| Missing | System | 7 | 5.2 | | |
| Total | | 135 | 100.0 | | |

**Table 4:** Ownership of Smart Mobile Device with Data Services.

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 114 | 84.4 | 89.1 | 89.1 |
| | no | 14 | 10.4 | 10.9 | 100.0 |
| | Total | 128 | 94.8 | 100.0 | |
| Missing | System | 7 | 5.2 | | |
| Total | | 135 | 100.0 | | |

**iv.** On the issue of whether there is any meaningful inconsistency between different disciplines in favor of m-learning. The result of the respondent from the different faculties was cross tabulated against the number of courses that required the use of the internet for completion of assignment. (See Tables 5, 6 and 7 below). The findings revealed that both the social science, the art and humanities faculties had between 1 to 3 courses requiring the use of the internet to complete assignments.

The other faculties had higher respondents tending to have 4 and more courses requiring the use of the internet for completion of course assignments. Nevertheless, the figures (and more importantly, the value of the significant level of 0.072) from the contingency table reveal that there is unlikely to be a relationship between the faculties and number of courses that require the use of the internet for completion of assignments.

**Table 5:** Summary of Cross Tabulation between Faculty and Number of Courses Requiring Internet.

| | Cases | | | | | |
|---|---|---|---|---|---|---|
| | Valid | | Missing | | Total | |
| | N | Percent | N | Percent | N | Percent |
| Faculty * Recode (Number of courses Req Internet | 127 | 94.1 % | 8 | 5.9 % | 135 | 100.0 % |

**Table 6:** Chi Square Table for Table 9.

| | Value | df | Asymp. Sig. (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 17.131a | 10 | .072 |
| Likelihood Ratio | 18.610 | 10 | .046 |
| Linear-by-Linear Association | 2.473 | 1 | .116 |
| N of Valid Cases | 127 | | |

a. 8 cells (44.4%) have expected count less than 5. The minimum expected count is .28.

**Table 7:** Cross Tabulation between Faculty and Number of Courses Requiring Internet .

| | | | Faculty | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Engineering | Medicine, pharmacy, dentistry, | social sciences | Sciences | Art and humanities | Agriculture | Total |
| Recode (Number of courses Req Internet | no course | Count | 0 | 0 | 1 | 2 | 2 | 0 | 5 |
| | | % within Faculty | .0% | .0% | 14.3% | 3.5% | 9.5% | .0% | 3.9% |
| | 1-3 courses | Count | 6 | 3 | 5 | 23 | 14 | 6 | 57 |
| | | % within Faculty | 37.5% | 25.0% | 71.4% | 40.4% | 66.7% | 42.9% | 44.9% |
| | 4 or more courses | Count | 10 | 9 | 1 | 32 | 5 | 8 | 65 |
| | | % within Faculty | 62.5% | 75.0% | 14.3% | 56.1% | 23.8% | 57.1% | 51.2% |
| Total | | Count | 16 | 12 | 7 | 57 | 21 | 14 | 127 |
| | | % within Faculty | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

Still on the subject of finding meaningful inconsistencies between the various disciplines, a look at the cross tabulation between the faculties and the students' level of awareness of m–learning (see Table 8) showed that the Engineering faculty has 53% of their students aware while 47% are not; the Medical faulty reveals 92% of their students are aware while 8% are not; Social science faculty has 71% of their student aware while 29% are not; Science faculty has 57% students are aware while 43% are not; Art and humanities has 37% of their student being aware while 63% are not.

The chi- square value of 0.075 further indicates a weak association between the two variables. Likewise, the cross tabulation between the faculties and the students' mode of internet access revealed that in the Engineering faculty; the most popular mode of access was via the cybercafé (50% of the students). In the Medical and Art and humanities faculties, the lap-top ranked as the most common (42% and 38% of their students respectively). In the Social science, Science and Agricultural faculties, the mobile phone was rated the most prevalent means of accessing the internet with 43%, 37% and 53% respectively. There was also a weak association between the two variables from the chi–square value displayed.

On their skill, the cross tabulation between the faculties and their internet surfing skills, the analysis results revealed that majority of the students from all the faculties acknowledged that they fell into the category between average to very good skill. However, the faculties of Agriculture and Social science had a few students admitting they had poor or no skill (13% and 14%, respectively).

The chi–square value did not show a strong relationship between the variables. Additional cross tabulation between the faculties and the students' ability to navigate and obtain information from the internet revealed that there is very strong association between the variables. The chi-square value of 0.955 supports this. Bivariate correlation matrix was used to correlate some of the variables against each other and this resulted in an 8 x 8 table. The aim was to find out if all the variables were a good measure of the m–learning concept.

The analysis of the correlation coefficient between the variables indicated some modest significance of (0.355 and 0.429). This implies that the students' ability to navigate and obtain information from the internet, their internet surfing

skills and where they obtained knowledge of m–learning from are to a good extent useful for describing the m–learning concept.

**Table 8:** Cross Tabulation between Faculty and Students' Awareness of M–Learning.

| | | | Faculty | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | | | Engineering | Medicine, pharmacy, dentistry, | social sciences | Sciences | Art and huma-nities | Agriculture | |
| Heard of Mobile learning before now? | yes | Count | 8 | 11 | 5 | 34 | 7 | 9 | 74 |
| | | Expected Count | 8,7 | 7,0 | 4,1 | 35,0 | 11,1 | 8,2 | 74,0 |
| | | % within Faculty | 53,3% | 91,7% | 71,4% | 56,7% | 36,8% | 64,3% | 58,3% |
| | no | Count | 7 | 1 | 2 | 26 | 12 | 5 | 53 |
| | | Expected Count | 6,3 | 5,0 | 2,9 | 25,0 | 7,9 | 5,8 | 53,0 |
| | | % within Faculty | 46,7% | 8,3% | 28,6% | 43,3% | 63,2% | 35,7% | 41,7% |
| Total | | Count | 15 | 12 | 7 | 60 | 19 | 14 | 127 |
| | | Expected Count | 15,0 | 12,0 | 7,0 | 60,0 | 19,0 | 14,0 | 127,0 |
| | | % within Faculty | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% | 100,0% |

## DISCUSSION

The research captures the wide spread use and ownership of a mobile phone by the Nigerian students. Majority of the students in the target population of this study own a mobile phone. This result attests to the current trend in the ubiquitous use of the mobile device in developing countries especially in the Sub-Saharan Africa (Sharples, et al., 2005). Thereby supporting the argument put forward by Litchfield, Kearney, et al. (2012) that the students' ownership of and readiness to use their own mobile device is a critical success factor in the implementation of m- learning. This is so because, it phases out the issue of cost of providing the device for the students and resolves the issues concerned with usability which was earlier identified as a challenge to m-learning in the literature review.

In addition, Quinn (2011) confirms the significance in owning the mobile device as they observed in their study, a situation where students were loaned PDAs and were found to be unenthusiastic in devoting time and money in personalizing and extending the device. Zhang et. al (2010) maintains that the ubiquitous technology has resulted in a growing enthusiasm among educators with regards to exploiting the benefits of m learning.

In this study, travelling by bus was observed to have the highest frequency even though most of these fell into the category of students who travelled for less than an hour. There were still other modes of transportation. The idea here suggests that different types of learning activities can be designed to suit these different modes of travel to enable the students optimize learning opportunities.

A greater number of the courses required the use of internet for completion of course assignments and also a high percentage of the students in this study obtained information about m-learning via the internet which confirms the constant desire for information. The key benefit of m-learning is observed in the ability to obtain information that is suitable and meets the timely need. In addition to this is the fact that the burden of cognitive load which is now lessened during learning activities as well as increase in opportunities for interaction first with the technology and also with people.

The notion of mobile learning for instructional purpose in education in Nigeria is basically an innovative idea and the intricacies involved will be too numerous to uncover in this study. Nevertheless, it could be said that a reasonable amount of issues relevant to the subject matter were brought to light in such a manner as to provide answers to the questions presented. In closing, this study into Smart Devices for m-learning in Nigerian universities is in an exploratory phase and as such, there are still a number of learning as well as teaching issues that need to be scrutinized.

## CONCLUSION AND RECOMMENDATION

This research does not only advocate the implementation of m-learning in the Nigerian schools but also that the mobile educational practice could be leveraged from the existing mobile use, willingness to use and ownership of the device as observed in the findings. Course resources can be designed for delivery via the mobile device. In addition, it is pertinent to choose or adopt suitable pedagogical approaches to learning activities that are appropriate for use with the students own mobile phones.

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## SUGGESTED CITATION

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