

Mobile devices as tools for implementing digital classroom in Nigeria

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Abstract: The use of Internet ready mobile devices such as mobile phones, tablets and laptop computers has made access to information readily available to users of such devices. Since the privatization of the telecommunication industry in Nigeria, competition amongst the telecom companies has led to a drop in the cost of internet resources. This, with the influx of low-cost and fairly-used mobile devices from overseas, has made it possible for many Nigerians to own internet-ready mobile devices. The objective of this study to leverage undergraduates' love for technology, to improve their participation in academic activities, and in turn increase Return On Investment (ROI), through producing graduates with technological skill. To achieve this, Some of the Courses presently in the students' curriculum were taught using android and iOS mobile apps, and course group platforms were created using WhatsApp or Telegram, depending on class size. Technology Acceptance Model (TAM) was used to assess the undergraduates' readiness to welcome the innovation of digital learning, the result showed no significant relationship between students' love for technology and their ability to learn academic content. The second hypothesis tested if the use of mobile-based applications for learning affects students' skill acquisition level. The result of this test showed that there is a statistically significant relationship, and that there exists a positive relationship between high mobile learning and skill acquisition., however, the results obtained from the two hypotheses suggest that blending Mobile device-based teaching into the present traditional mode in the absence of equipped computer laboratories is the more accepted learning method.

Keywords: Learning management system, Mobile-based learning apps, Remote laboratories, Remote learning, Social media addiction, TAM

1. Introduction

The use mobile devices as tool for digital classroom aims at deploying organized, curriculum-based knowledge seeking and knowledge contribution without time or space limitations. The idea was conceived following research outcome of a previous work (Olebara, Ezugwu, Obayi & Ukwandu, 2021), which studied the impacts social media has on students with respect to their mood, how they manage time, and their level of commitment to academic activities. The research showed that students are addicted to their phones, and

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that communication was the main reason for this addiction. Shaibani (2020) studied the prevalence of social media addiction and its association with demographic variables. The study also assessed the advantages of social media usage. The researchers found a positive / significant relationship among social media usefulness and its perceived addiction. Yayman and Bilgin (2020) examined the social media addiction and, game addiction relationship in a family functions among adolescents. They found a positive and significant relationship between game addiction, social media and unhealthy family function. Their study identified various forms of technology-based addictions, such as internet, social media, game, smartphone, television, computer; and posited that adolescents consider social media as a hideout from self and real world. While Chukwuere (2021) found that social media impacts students' social interaction with others. This study therefore, is geared towards leveraging on the established interest of students in mobile device-based applications, to contribute both practical and theoretical knowledge that will help ensure better understanding and course outline/syllabus coverage as well as give the learners the required skill to make them employable.

2. Literature review

Social media can be described as any social networking site that is used for human-to-human communication. The word "social" has its root in the Latin word "socius" meaning 'friend', or "socialis", meaning 'allied'. Social can be defined as the interaction between friends, business allies, or a group of people with common interest, while media, the plural form of medium, is the channel through which this interaction takes place. Communication between humans evolved from simple pointing and hand gestures to spoken words (Tomasello, 2010), and progressed to text, graphics, video, animation, and images. Social media therefore is the name given to internet-based communication with user-defined contents. Social media sites vary in functionalities or services they are able to offer. While some allow multiple communication channels such as voice, text, video, others may provide fewer. Transmission mode of social media applications also vary. Some execute transmission in real-time, full duplex modes, while others must follow half duplex mode in order to function optimally. Multithreading is major challenge for social media applications that share resources between communication media. Social media provide platform for creating and sharing/exchange of multimedia contents such as text, audio, video, animation, image, or ideas, knowledge, and interests in a nomadic pattern. It is an internet-based form of communication that allows people to create and share information and entertainment, and web content. Obar and Wildman (2015) viewed social media from the point of providing web 2.0 services which is associated with dynamic, user-generated content and with user generated profiles.

Learning resources in digital classroom are usually more up-to-date, as the resource sources are constantly being updated by various researches, software developments, and various technological advancements. Most digital class tools give room for feedback from students, which helps teachers understand individual challenges and address them.

Considering the role education plays in various sectors that contribute to a nation's developmental plans, it is expedient that knowledge is passed in the most convenient, conducive, and learner friendly environment. The goal of the teacher should be that a good percentage of the students being taught can carry out tasks, assessment tests, successfully, as well as practice what has been taught. According to Jyotsina et al. (2009) e-learning has various shapes, some of which are:

- Introduction of elements of e-learning into traditional teaching
- Blending programmes using elements of e-learning combined with traditional methods
- Delivering courses entirely or partially online

The authors identified facilities needed for successful online delivery of courses as: Internet ready Computer, Video conferencing tools and associated peripherals, and listed the facilities above as being required locally, while a web-based learning environment would be shared between learners and resource persons. The

learning system features would be such that allow file management services, news and information dissemination, data storage system, resource sharing, and assessment features. of the web service include file services as information base, document management services as document base, bulletin boards, discussion forum and email lists as co-operation base.

3. Methodology

3.1. Research purpose and design

The purpose of this study is to evaluate the acceptance level of using available mobile-based applications and simulation software in teaching of courses that require computer laboratories. Nigerian institutions of higher learning have in recent years experienced a draught in infrastructural development, which leaves the undergraduates with more theories even in classes that require hands-on teaching. The researcher also tries to find if learning with mobile-based apps would improve skill and in turn improve the national economy.

3.2. Study area

The participants for the study were the undergraduates of Imo State and University of Nigeria. Data from questionnaire design with Google form and administered through WhatsApp, Telegram, and e-mails to the students. The questionnaire consisting of sections made up of open and close ended questions yielded 793 responses.

3.3. Research instrument and method

Technology Acceptance Model (TAM) was adopted in evaluating the attitude of users towards social media as a Technology. TAM suggests four-section questionnaire with which to test four parameters for evaluating users' attitude towards a technology. These parameters are: Perceived Ease of Use (How easy the users find design features of the technology), Perceived Usefulness (How useful the technology is to their job), Attitude towards use (combination of Perceived Ease of use and Perceived Usefulness gives the score for Attitude towards use), and Actual use (determined by evaluating frequency of use and duration of use) (Davis, 1985). It further suggests types of questions to be presented in each section in order to effectively elicit information on user attitude towards a given technology. The survey was carried out after introducing the students to mobile-based applications for learning courses that otherwise were taught in traditional environment. The students were taught programming in C++, Quick BASIC, Hypertext Mark=up Language (HTML), Grammatica, and Computer animation using mobile apps, after which a questionnaire was presented to them in-line with Technology Acceptance Model (TAM), which suggests technology acceptance level to be evaluated by allowing the users of the technology express the feelings towards the technology by answering questions in the areas identified in the model, then, using their answers to ascertain their level of Acceptance of the technology, as well as test the hypothesis generated.

3.4. Sample size

Data for this pilot study was collected from the responses of 793 undergraduates who participated in an online survey designed with google forms. Out of about 1000 students of Imo State University who had been taught using various mobile-based apps, before presenting them with the questionnaire, only 793 from various departments and study levels responded to the survey. However, data received provided enough insight for the study to be carried out.

3.5. Research questions

1. Does students' love for technology and related devices have impact on their learning ability?
2. Does use of mobile based software for learning impact on their skill acquisition level?

3.6. Hypothesis

1. Students’ love for technology and related devices affects their learning ability
2. Use of mobile-based applications for learning affects students’ skill acquisition level.

3.7. Data analysis

Demographic data that shows frequency and duration of social media use amongst undergraduates was adopted from the work of Olebara (Olebara et al., 2021). While survey data from survey on impact of phone-based applications on students’ learning were coded into numerical data using spreadsheet. The collected data were processed and analyzed using SPSS (Statistical Package for Social Sciences) version 20.0. The findings were reported through descriptive statistics using regression analysis and frequency distribution.

4. Result and discussion

The demographic information in table 1 below, and shows that the ages of participants were divided into five categories with the following distributions: 16-18years were 26 (3.3%). 19-21years were 343 participants (43.3%). 22-24years were 269 participants (33.9%). 25-27years were 133 respondents representing 16.8% of total participants, while participants above 28years has a distribution of 22 representing 2.8% of the participants. To determine the daily hours participants spent on social media, 328 of the participants, representing 41.4% spend (0-3 hours) on social media daily, 296, representing 37.4% spend 4-8hours, 98, representing 12.4% spend 9-12 hours, while the remaining 59 spend above 13 hours on social media, daily.

Table1: Socidemographic characteristics of participants

No.	Variable	Frequency	Percentage
1	Gender		
	Female	388	48.9
	Male	405	51.1
2.	Age (years)		
	16-18	26	3.3
	19-21	343	43.3
	22-25	269	33.9
	25-27	133	16.8
	>28	22	2.8
3.	Hours on social media daily		
	0-3	328	41.4
	4-8	296	37.3
	9-12	49	12.4
	13 and above	29	7.3

Source: SPSS Frequency distribution output

4.1. Hypothesis testing

H1: Students’ love for technology and related devices affects their learning ability

TAM variables were used to test for this hypothesis. Independent variable here is the students’ love for technology, which TAM’s model suggests that Actual Using of a system be measured by the frequency of use, and the duration of use. Duration variables were captured by questions that sought the number of the students spent daily on social media, while frequency variable was captured by six questions covering how often, as well as their commitment to the activities they engaged in on social media. Sum of these scores gave the Actual use variable, its average was computed to get Average Actual Use, and a mean cut-off point was derived using descriptive statistics. Participants who score below the cut-off were adjudged to have low tendency of actually using the system and given categorical value of 0, while those that scored above the mean cut-off were adjudged as having high tendency of actually using the system, and given a categorical value of 1. These values forms the Categorical Average Actual Using variable (CatAAU). Same was done for Attitude Towards

Using variable(ATU). Components of this variable are scores on Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Scores in these domain are summed to get the Attitude Towards Using variable, ATU average is computed and mean cut-off derived using descriptive statistics. Mean cut-off is used to get categorical values of low attitude towards technology use and high attitude towards technology use with value 0 for participants who score below the mean cut0off and 1 for those with mean cut-off and above. Categorized Attitude towards Using (CatATU) is used to represent the variable. Binary Logistics was run variables, where CatAAU is independent variable while CatATU is dependent variable. The result is displayed in table 2 below.

Table2: Wald test variables in the equation

	B	S.E	Wald	Df	Sig.	Exp(B)	95% C.I for EXP(B)	
							Lower	Upper
Step 1a CatAATU	0.274	0.143	3.643	1	0.056	1.315	0.993	1.741
Constant	0.009	0.096	0.009	1	0.923	1.009		

Source: Binary logistic regression output from SPSS software

Interpretation of result

The Wald test is used to determine statistical significance of independent variables. The significance is shown in the Sig. column. Significance of 0.05 and below shows the independent variable is statistically significant, while above 0.05 shows the independent variable is not statistically significant. The binomial logistic regression shows significant level of 0.056, which indicates weak statistical significance. The column labelled Exp(B) shows odds ratio of 1.315 (95% C.I 0.993, 1.741), which shows high tendency of hypothesis occurrence. This is because odds ratio>1 shows increased occurrence of an event while <1 implies decreased occurrence of an event. Column B shows the regression weight and shows the relationship between decision variables. The B column here has a positive sign which implies a positive relationship between the dependent and independent variables. This means that increase in Mobile-based learning results in increased ability to and continue use.). The researcher therefore reject the alternative hypothesis, and accept the null hypothesis as, no significance and poor positive relationship implies that there are other factors besides love for technology (Attitude towards Using), that affect the actual “Learning ability” (Actual Learning).

H2: Use of mobile-based applications for learning affects students’ skill acquisition level

Independent variable in the hypothesis is: Mobile-based applications for learning (MAL), while dependent variable is Mobile application for Development (MAD). The Independent variable has three questions in its domain which were summed, averaged (AMAL), and mean cut-off obtained using descriptive statistics. Mean-cut off was used to categorize participants into low and high learners with mobile applications (CatAMAL). The dependent variable had two questions that were summed, averaged (AMAD), and cut-off obtained with which Categories were drawn (CatAMAD). The two categories were subjected to Binomial logistic regression analysis in order to test the hypothesis. The result is displayed on the table3 below.

Table 3: Wald test variables in the equation

	B	S.E	Wald	Df	Sig.	Exp(B)	95% C.I for EXP(B)	
							Lower	Upper
Step 1 ^a CatAMAL(1)	1.495	0.164	83.183	1	0.000	0.224	0.163	0.309
Constant	0.070	0.097	0.527	1	0.468	1.073		

Variable(s) entered on step 1^a: CatMAL **Source:** Binary logistic regression output from SPSS software

Interpretation of the result

Wald test carried out shows that there is statistical significance in the effect the independent variable has over the dependent variable, however, Odds ratio is <1 , indicating that there is decreased occurrence of this event. The table also shows that the odds of having Mobile App-based Development is 0.224 (95% C.I 0.163, 0.309), far less than expected odds ratio of >1 . This implies that the occurrence of this event is low. Regression weight of 1.495 indicates that a positive relationship exists between Mobile App learning and Skill development. We therefore accept the hypothesis which predicts that learning with mobile apps have effect on skill development. Having a positive effect implies that the higher the mobile app learning activity, the higher the skill acquired; but odds ratio of 0.224 shows that the occurrence of this event is low. We accept the alternative hypothesis that mobile learning has effect on skill development.

5. Conclusion and recommendation

The purpose of the study was to find if use of mobile apps in teaching practical courses in the absence of equipped computer labs would give the same result the computer labs give, which is: improved skill, more indigenous software, and higher learning ability. Undergraduates in various departments and levels were taught using android and iOS applications that are otherwise taught in the laboratory, after which they were presented with a questionnaire that self-reports their acceptance level and feeling towards the technology. this is in line with TAM, which was adopted model for this study. Two hypotheses were generated and tested. The first hypothesis showed that love for mobile or digital learning results in higher learning ability. This hypothesis was conceived following perceived love and near addiction undergraduates have for mobile phone. However, testing the hypothesis proved that there is no statistical significance between students' love for technology and learning using this technology. The second hypothesis tested if learning with mobile apps can give the same level of skill obtained in a fully equipped physical laboratory. Testing this hypothesis proved that there exists a positive relationship between high mobile-based learning and skill development. The reference variable used for this test is – high mobile learning, and this showed statistical significance, but with a weak odds ratio. The researcher therefore recommends that:

1. Institutions invest in Simulation software in various disciplines and encourage its use in addition to face to face instead of waiting for infrastructural development that are not forth-coming.
2. Every digital learning with mobile devices be blended with traditional face-to-face learning. Traditional face-to-face learning method involves both students and resource persons being physically present in a place provided for learning by an institution. Course outlined is introduced and topics taught. In this type of learning, the students remember the resource persons demonstrations and analogies, and can freely ask questions. However, in the absence of physical laboratories, the resource person may teach practical courses in class using Simulation software or apps, and monitor students progress using social media platform. Demonstration of this method can be seen in the students samples assignments below, they show their use of AnWriter app for writing html for web design. For this exercise, a group chat is created, and the students submit screen records of their assignment, ask questions and get answers from the resource person without waiting for class days.

Demonstration of this method can be seen in the students samples assignments below, they show their use of AnWriter , a free HTML editor for writing html web pages.

iOS users may use “code master”, which is free html editor that is compatible with apple iOS. For this exercise, a group platform is created, and the students submit screen records of their assignment, ask questions and get answers from the resource person without waiting for class days.

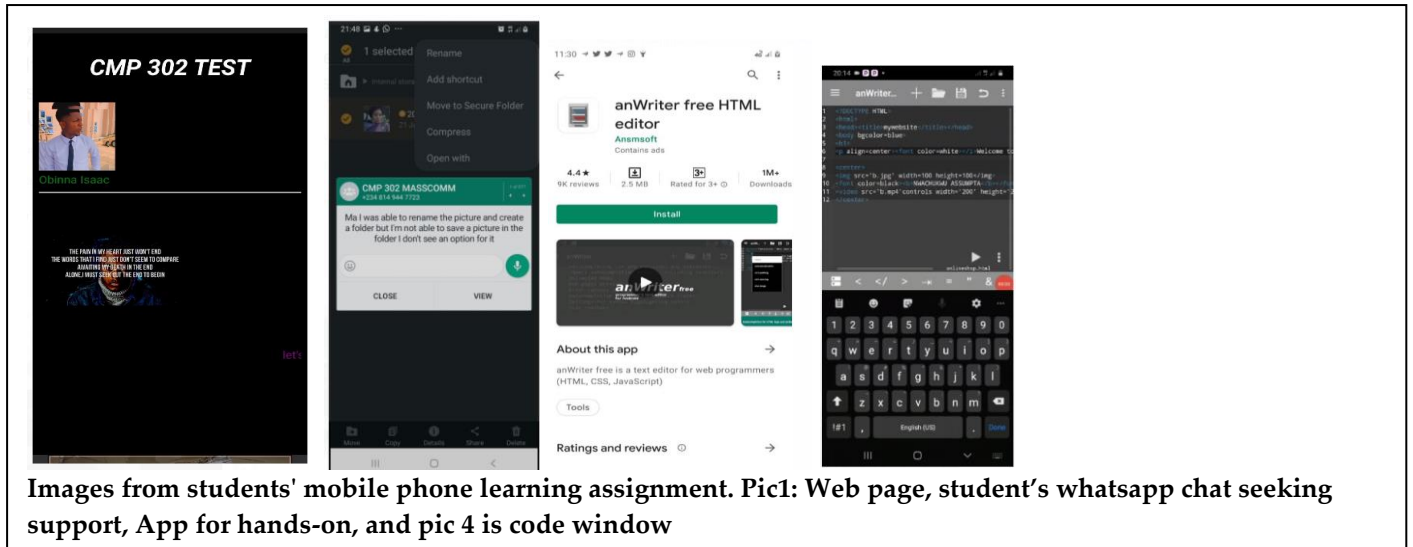


Figure 1: Sample Mobile learning outputs Source: WhatsApp group platform for CMP 302

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