

## Determinants in the Use of Mobile Communication Technology for Content and Pedagogical Skills Development of Technical Teachers in Anambra State of Nigeria

Onwusuru I. M<sup>1</sup>, Uka C.S<sup>2</sup>, Ogungbenro A.O<sup>3</sup>

<sup>1</sup>Electronics Development Institute, Awka, National Agency for Science and Infrastructure, Federal Ministry of Science and Technology, (Nigeria)

<sup>2</sup>Federal College of Education (Technical) Umunze, Orumba South LGA Anambra State, (Nigeria)

**Abstract:** Most mobile phones possess features and applications that perform many digital functions. Unfortunately, Nigerian teachers who possess these phones do not know and utilize these capabilities. Hence there is need to train them on how to make efficient use of the phone features especially for professional development purposes. The major purpose of this study was to identify the determinants in using mobile communication technology for subject matter knowledge update and pedagogical skills improvement of technology teachers in Anambra state. Five research questions and five hypotheses, guided this study. The major findings of the study, among others include: browsing with phone provides net service to rural teachers and this helps in updating their knowledge; mobile phone enhances short message data collection for teacher projects and this supports immediate knowledge update; using phone, teachers can download materials which could be used for classroom explanation thereby concretizing and supporting pedagogy. The study concluded that mobile communication technology which is affordable, cheap, accessible, etc, now possesses some enhanced feature which can be used to fill some professional development needs for teachers. It was however recommended among others that workshops and seminars should be organized regularly to create awareness and train teachers on the capabilities of mobile phones and how to use the features for educational purposes.

### I. Introduction

#### Background of the study

Mobile communication technologies (MCT) are modified computers with the features to simplify their usability, accessibility and portability. These are one of the fastest and on-going growing telecommunication technologies in the world. These devices have the capability of transmitting, processing and receiving data, voice and video signals through wireless link. According to Darby, (2005), mobile communication technologies can be defined as those technologies which depend upon the broader phenomenon of internet protocol (IP) convergence when data, voice and video travel over a single channel. There are numerous mobile communication technologies which include laptop and notebook computers, palmtop computers or personal digital assistants, mobile phones (GSM) and 'smart phones', global positioning system (GPS) devices, wireless debit/credit card payment terminals, etc. One of these technologies which is by far the best and most widely used in mobile communication is mobile phone.

Mobile phone is a type of mobile communication technology with the capacity of sending and receiving data at rates up to 9600 bps, to users on POTs (Plain Old Telephone Service), Packet Switched Public Data Networks, and Circuit Switched Public Data Networks using a variety of access methods and protocols, Scourias (2007). It is a digital network which does not require a modem between the user and the network, rather an inbuilt audio modem interworks with POTs. Mobile phone system exists in every continent thus the acronym GSM which aptly stands for Global System for Mobile communication (Scourias, 2007).

There are different versions of mobile phone. Some are more sophisticated than others. Specifically, third generation (3G) phones are embedded with enhanced features that enable its wide range of usability. Among others, some features of 3G mobile phone include wireless fidelity (Wi-Fi, a type of wireless local area network technology for internet browsing), MP3 playback, memo recording, personal organizer functions, E-mail, instant messaging, built-in cameras and camcorders, Push-to-Talk (PTT), Infrared and Bluetooth Connectivity, ability to watch streaming video or download video for later viewing, general packet radio service (GPRS) data services, i.e data networking services for mobile phones, radio frequency identification (RFID), video calling, dial-up services i.e data networking services using GSM as modems, virtual private networks i.e secure access to a private network, even connectivity to television stations. It is therefore possible to network the mobile device to a home office or the internet even while on transit.

The total value of mobile data services exceeds the value of paid services on the Internet, and was worth 31 billion dollars in 2006 (Netsize Guide 2008). Some of these features of mobile phone have been explored by many people from different parts of the world. Apart from the telephony services, the features have been utilized and found relevant in educational system. Bridget (2007), made a trial in initiating the use of mobile phone in his training with some teachers in developing countries. This program was launched in 2003 in the Philippines under the name text2teach. The situation was such that teachers in remote areas received training and used mobile phone to access the state-of-the art learning materials. These teachers accessed an extensive library of science, math, and language videos simply by sending SMS message via a mobile phone. This they achieved by sending SMS which signals a satellite that then delivers digital files to a video recorder connected to a television in the classroom. The technology has thus, allowed high quality content to be delivered in remote areas at the cost of a cell phone SMS.

Nevertheless, the hints above have highlighted the fact that mobile phones (GSM) can be manipulated as education enhancing devices. These efficiencies and capabilities of mobile phone have been identified and utilized by advanced countries. In Nigeria, there are over 1.3 million subscribers of GSM including technology teachers. To majority of these teachers, GSM is a device meant for just making and receiving calls. Some view the acquisition of highly enhanced phones as an avenue for showing off. The thought of utilizing GSM for teachers' professional development purpose has rarely been envisaged in Nigeria. Characteristics of GSM such as independence to main power source, portability and small size, affordability, battery operated and rechargeable, less power requiring liquid crystal display (LCD), downloadable for upgrade and file transfer, memory expansion and its wireless connectivity to network and internet has offered it the advantage of being useful anywhere and anytime within the IP convergence area. This paper therefore identifies the determinant issues in using mobile communication technology to improve teacher's expertise for enhanced student's achievement through subject matter knowledge update and pedagogical skill improvement.

**Purpose of the Study**

The main purpose of this study is to identify the determinants affecting the use of mobile communication technology (MCT) for subject matter update and pedagogical skill improvement for professional development purpose of technology teachers. Specifically, the study identified the:

1. Issues on the use of MCT for updating subject matter knowledge of practicing technology teachers.
2. Ways in which MCT can be used to improve pedagogical skills for technology teachers.

**Research Questions**

The study will find answers to the following questions:

1. What are the issues pertaining to the use of MCT in updating subject matter knowledge of practicing technology teachers?
2. How can MCT support pedagogical skills improvement of technology teachers?

**Research Hypotheses**

**H<sub>01</sub>:** There is no statistical difference in the mean of the responses of teachers with NCE and B.SC/B.ED qualification on the use of MCT in updating subject matter knowledge of practicing technology teachers.

**H<sub>02</sub>:** There is no statistical difference in the mean of the responses of male and female teachers on the use of MCT in improving pedagogical skills for technology teachers.

**Research Design**

The study adopted survey research design. The population of the study comprised all the 137 technology teachers in 10 technical schools in Anambra state of Nigeria. According to the data collected on 3<sup>rd</sup> March 2008 from the State Education Commission headquarters Awka, there are 10 technical schools in Anambra state which include GTC Umunze (12 technology teachers), GTC Umuchu (12 technology teachers), GTC Umuleri (18 technology teachers), GTC Enugwuagidi (16 technology teachers), GTC UTU (16 technology teachers), GTC Nnewi (14 technology teachers), GTC Nkpor (12 technology teachers), GTC Alor (8 technology teachers), GTC Osamala (3 technology teachers), and GTC Onitsha (26 technology teachers). Since the population of this study is not very large, the study did not make use of sample, rather, the entire population was studied. A researcher designed questionnaire was used for the data collection. The questionnaire was made of three sections; section A, B and C. Section A consisted of items on the background information of the respondents. Section B was made of items eliciting information on MCT as an instrument for update of subject matter knowledge of teachers. Section C consisted of items on improvement of pedagogical skills for technology teachers through MCT. The questionnaire was validated by three experts from Industrial Technical Department, University of Nigeria Nsukka, and two experts in information communication (ICT) from Management Information System, (MIS), University of Nigeria Nsukka. A 5-points Likert rating scale of strongly agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly disagree (SD) was used with values of 5,4,3,2 and 1 respectively. Mean and standard deviation was used to answer the two research questions. In analyzing the hypotheses, t-Test was used.

**II. Results**

**Research Question one**

What are the issues pertaining to the use of MCT in updating subject matter knowledge of practicing technology teachers?

**Table 1**

Mean and Standard Deviation of Respondents on MCT and subject matter knowledge update of practicing technology teachers.

S/ N	ITEM STATEMENT	Mean	Std. Deviation	Decision
1.	Downloading many materials on phone memory card saves the problem of carrying text-books around and this supports knowledge update at any time.	4.04	1.10	Agree
2.	Browsing with phone provides net service to rural teachers and this helps in updating their knowledge.	4.20	0.87	Agree

3.	Downloading and reading materials with phone necessitate subject matter knowledge update for teachers anytime, anywhere.	4.02	0.96	Agree
4.	Sourcing information using mobile phones provides quick personal subject matter knowledge up-date.	4.07	0.97	Agree
5.	Learning to use the features in mobile phone will enhance teachers' proficiency in the use of other ICT for subject matter knowledge update.	4.16	0.83	Agree
6.	Mobile phone enhances short message data collection for teacher projects and this supports immediate knowledge update.	4.17	0.83	Agree
7.	Storing course content and other reading materials in phone enables the teacher to read at anywhere and anytime thereby supporting their knowledge update.	4.09	1.05	Agree

**Research Question two**

How can MCT support pedagogical skills improvement of technology teachers?

**Table 2**

Mean and Standard Deviation of respondents on MCT and improvement of pedagogical skills of technology teachers.

S/N	ITEM STATEMENT	Mean	Std. Deviation	Decision
1	Using mobile phone in teaching will motivate learning thereby supporting teachers' pedagogy skills.	3.58	1.28	Agree
2	Using phone, teachers can download materials which could be used for classroom explanation thereby concretizing and supporting pedagogy.	4.23	3.75	Agree
3	Asking students to answer certain questions through SMS will enable the teacher to give immediate feedback and this enhances learning.	3.72	1.11	Agree
4	Answering questions through SMS will give the teacher avenue for instant monitoring of the level of students' understanding thereby necessitating proper pedagogy adjustment.	3.88	1.02	Agree
5	Teachers can create online library on the net and allow students access it via mobile phone for further reading and this supports pedagogy.	3.98	0.98	Agree
6	Using mobile phone-enabled video projector, mobile phone can be used to deliver the contents to a classroom and this will act as motivating factor to students thereby enhancing pedagogy.	3.94	1.09	Agree
7	Mobile phone can be programmed to allow students to access curriculum and course content on the net easily and this encourages reading ahead, thereby supporting pedagogy.	4.12	1.03	Agree
8	Through mobile phone teachers can easily get linked with students for scheduling of lecture time and this aids teacher in fixing convenient time for teaching.	4.05	0.96	Agree
9	Contents of lessons can be programmed in phone as games and simulations and teachers can use this to increase interest in learning thereby supporting their pedagogy.	3.90	0.98	Agree
10	Teachers can use mobile phone to give multiple-choice quizzes via the net with immediate feedback and this will supports their teaching skills.	3.82	1.15	Agree

Table 1 shows that the teachers are in agreement that all the items listed were issues pertaining to the use of MCT in updating subject matter knowledge of practicing technology teachers in technical schools in Anambra state.

In table 2, it was also agreed that all the researcher's items were ways in which MCT can support pedagogical skills improvement of technology teachers.

**III. Hypothesis one**

**H<sub>01</sub>:** There is no statistical difference in the mean responses of teachers with B.SC/equivalent and NCE/Equivalent qualification on the use of MCT in updating subject matter knowledge of practicing technology teachers.

Among other respondents, there were seventy four (74) technology teachers with B.SC/Equivalent and thirty six (36) teachers with NCE/Equivalent. The responses of each of the groups were recorded and the mean and standard deviation of each of the group were calculated.

**Table 3**

T-test Analysis of Mean and Standard deviation of Reponses of Technology Teachers with B.SC/equivalent and NCE/Equivalent

S/N	NCE/Equivalent		B.Sc/Equivalent		t-cal	Sig (2-tailed)
	X <sub>1</sub>	S.D <sub>1</sub>	X <sub>2</sub>	S.D <sub>2</sub>		
1.	3.78	1.29	4.09	1.02	-1.40	0.17
2.	3.94	0.92	4.24	0.82	-1.71	0.09
3.	3.64	1.10	4.12	0.89	-2.47	0.02*
4	3.83	1.16	4.22	0.82	-2.00	0.05*
5.	3.89	1.01	4.26	0.76	-2.14	0.04*
6.	3.78	1.01	4.32	0.69	-3.33	0.00*
7.	3.64	1.20	4.24	0.93	-2.90	0.01*

df = 108, level of Significant = 0 .05

**Hypothesis two**

**H<sub>02</sub>:** There is no statistical difference in the mean responses of male and female teachers on the use of MCT in improving pedagogical skills for technology teachers.

**Table 4:**

T-test Analysis of Mean and Standard deviation of Reponses of male and female Technology Teachers

S/N	MALE TEACHERS		FEMALE TEACHERS		t-cal	Sig(2-tailed)
	X <sub>1</sub>	S.D <sub>1</sub>	X <sub>2</sub>	S.D <sub>2</sub>		
1	3.57	1.23	3.58	1.34	-0.04	0.97
2	3.91	1.02	4.67	5.63	-1.15	0.25
3	3.76	1.051	3.67	1.20	0.44	0.66
4	3.93	1.08	3.82	0.95	0.63	0.53
5	4.00	0.92	3.95	1.08	0.31	0.76
6	4.08	1.11	3.75	1.19	1.74	0.08
7	4.09	0.96	4.16	1.14	-0.38	0.70
8	4.09	0.90	3.98	1.05	0.65	0.52
9	4.00	0.90	3.76	1.07	1.36	0.18
10	3.79	1.13	3.85	1.19	-0.33	0.74

DF = 128, level of significance = 0.05

In the analysis, “sig (2-tailed)” are the figures showing the probability/significance level in which the calculated t-value were significant. From table 3 above, the significance levels of items 3, 4, 5, 6, and 7 are less than or equal to the stated 0.05 level of significance therefore the null hypothesis is rejected. On the other hand, the significance level of items 1, and 2 are greater than 0.05 therefore the null hypothesis is accepted. From table 4, the analysis revealed that the significance level for all the items are greater than the stated 0.05 level of significance, therefore the null hypothesis were accepted.

**IV. Summary of Findings**

Based on the outcome of the study, the following are the listed major findings of the study.

1. Browsing with phone provides net service to rural teachers and this helps in updating their knowledge.
2. Mobile phone enhances short message data collection for teacher projects and this supports immediate knowledge update.
3. Using phone, teachers can download materials which could be used for classroom explanation thereby concretizing and supporting pedagogy.
4. Mobile phone can be programmed to allow students to access curriculum and course content on the net easily and this encourages reading ahead, thereby supporting pedagogy.

Through mobile phone teachers can easily get linked with students for scheduling of lecture time and this aids teacher in fixing convenient time for teaching.

**V. Discussion**

Mobile phone technology is the handiest and simple technology which can be utilized any where anytime. Previous studies have shown that advanced countries have identified the advantages obtainable in mobile phone if utilized for educational purpose. As it was discovered in the literature that the thought of using mobile phone for academics purpose has not been raised in Nigeria, the findings of this study revealed the determinant issues in integrating mobile phone into academics in Nigeria, especially for subject matter knowledge update and pedagogical skill improvement for teachers professional development purpose.

The findings as regards the issues pertaining to the use of MCT in updating subject matter knowledge of practicing technology teachers revealed that; Browsing with phone provides net service to rural teachers and this helps in updating their

knowledge; Downloading and reading materials with phone necessitate subject matter knowledge update for teachers anytime, anywhere; Using phone, teachers can download materials which could be used for classroom explanation thereby concretizing and supporting pedagogy. These findings corroborate the view of Thomas (2005) as he described mobile phone as device that has the potential of enabling knowledge update through a network of devices, people, and situations that allow complex learning experiences to play out. Presenting knowledge update as anywhere and anytime learning, simple mobile phone technology which a teacher has at hand can be used to create relevant and meaningful knowledge update situations that a teacher authors himself, in a location that the teacher finds meaningful and relevant.

This fact that mobile phone can support knowledge update at anytime and anywhere has however earlier been disclosed by Lonsdale, Baber, Sharples, Byrne, Arvanitis, Brundell and Beale (2004) when they noted in their study that Mobile devices are especially well situated to context-aware applications simply because they are available in different contexts, and so can draw on those contexts, to enhance knowledge update activity. On this premise still, Shih, Chang, Chen, and Wang (2005) had also hinted that the self-regulated system of mobile phone thus provides those engaging in education with a portable and personalized learning environment, thereby cultivating a self-motivated, self-directed, and self-regulated subject matter knowledge update for teachers.

Furthermore, pertaining how MCT can support pedagogical skills improvement of technology teachers, it was found that Mobile phone can be programmed to allow students to access curriculum and course content on the net and this encourages reading ahead, thereby supporting pedagogy. Roschelle (2003) supported the above findings when he remarked that the use of mobile phone and even other mobile devices for pedagogy gives rise to a change in the nature of the teaching, as a catalyst for motivated and richer discussion of the pertinent topics. Equally, the study found that through mobile phone teachers can easily get linked with students for scheduling of lecture time and this aids teacher in fixing convenient time for teaching. This goes in line with the view of Naismith (2006) that using mobile phone, content and feedback can be tailored to suit particular curriculum areas. Further on this finding, Naismith (2006) had also earlier discovered in his study that in higher education, mobile phones can provide course materials to students including due dates for assignments and information about timetable changes or lecture venue changes.

## VI. Conclusion

Teachers need to be away of the possibilities and the way of utilizing there most handy technology to update their subject matter knowledge and improve their pedagogical skills for their professional development purpose. The findings of this study revealed that some teachers in Nigeria do not really know the possibility of utilizing mobile phones for educational purpose. Mobile phone, a mobile communication technology which is affordable, cheap, accessible, etc, now posses some enhance feature which can be used to bring some professional development needs to the door step of some teachers. This study found that this simple device has been integrated into educational programmes in some other countries like Philippine and was confirmed very helpful and useful. Most teachers in Nigeria especially those in the rural areas have these devices and use it for just calling and receiving calls without knowing all its other capabilities. Should the capacities of these devices be explored and be made known to the teachers, their benefit in other professional development programmes will be maximized. In line with the findings of this study, the following recommendations were made: Findings of this study should be made available to teachers so as to let them know that their mobile phones can do more than just calls and can be utilized for professional development; Workshops and seminars should be organized regularly to enable teacher know the capabilities of mobile phones and be trained on how to use the features for educational purposes; The teacher trainers, in their teachings to meet the demands of the society, should stress the importance of exploring the features of mobile phones and utilize them for educational purpose.

## References

- [1] Darby, G (2005). Opportunities and issues of M-learning in Asia-pacific development. Report on International workshop on Mobile learning for Expanding Educational Opportunities 16-20 May 2005, Tokyo, Japan. ICT in Education Unit, UNESCO Bangkok, 2005. UNESCO Asia and Pacific Regional Bureau for Education 920 Sukhumvit Rd, Prakanong Bangkok 10110, Thailand.
- [2] Lonsdale, P, Baber, C, Sharples, M, Byrne, W, Arvanitis, T, Brundell, P and Beale, H (2004). Context awareness for MOBILEarn: creating an engaging learning experience in an art museum. Proceeding of MLEARN 2004. Bracciano, Rome: LSDA.
- [3] Naismith, L, Lonsdale, P, Vavoula, G, & Sharples, M. (2004). Literature review of mobile technology and learning . A report or NESTA Futurelab. University of Birmingham. Retrieved on 3<sup>rd</sup> February 2008 from <http://www.nestafuturelab.org/research/review>.
- [4] Netsize Guide (2008). Mobile phone. Retrieved on 23<sup>rd</sup> February 2008 from "[http:// en.wikipedia. org/wiki/Mobile\\_phone features](http://en.wikipedia.org/wiki/Mobile_phone_features)" \o "Mobile phone features.
- [5] Roschelle, J. (2003). Unlocking the learning value of wireless mobile devices. *Journal of Computer Assisted Learning*. 19 (3): 260-272.
- [6] Scourias, J (2007). Overview of the Global System for Mobile Communication. Retrieved on 23<sup>rd</sup> February 2008 from [jscouria@www.shoshin.uwaterloo.com](mailto:jscouria@www.shoshin.uwaterloo.com).
- [7] Thomas, M. (2005). *E-learning on the move*. Guardian.co.uk. (Retrieved <22/02/2008>) <http://education.guardian.co.uk/elearning/comment/0,10577,1490476,00.html>