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# Readiness of Teachers and Pupils for Use of Mobile Devices as Support for Effective Pedagogy in Nigeria: Could Location be a Major Determinant?

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## **Abstract**

How prepared are teachers and pupils in Basic 6 (that is, 6th grade) to use Information and Communication Technology (ICT) such as mobile devices to aid teaching and learning in urban and rural schools at that level is a matter of concern and therefore formed the focus of this paper. The study is a survey of some urban and rural Primary schools in Benue State of Nigeria. A sample of 180 teachers (90 each for urban and rural schools) and 100 pupils (50 each for urban and rural schools) were purposively selected for the study. The instrument "State of the Art in Mobile Devices Use" (SAMDU) was used in data collection along with personal interaction (interview) on what they know, what they can do with their mobile devices (such as handsets, palmtops, iPads, tablets and smartphones) and practical demonstration of what was claimed. Analysis was done using descriptive statistics of percentages, means and bar graphs. The result shows that teachers and pupils in urban schools claimed and also demonstrated higher ability to use mobile devices to teach/learn compared with those in rural schools. However, there was a remarkable difference in what both urban and rural school teachers and pupils claimed they could do and what they actually demonstrated. Urban-rural dichotomy, low ICT literacy, poverty, electricity and prohibition by school authority were identified as major challenges to effective use of mobile devices for teaching. Implications of these findings were pointed out with regards to what is to be done and accuracy of past public statements of leaders on level of preparedness of the nation Nigeria as far as ICT is concerned. It was recommended among others that location should be considered in posting of ICT literate teachers, distribution of ICT related teaching aids and provision of ICT patrol van for mass education in schools. Provision of professional development opportunities for instructors who desire harnessing mobile devices as a teaching and learning tool should be made by schools and government.

## **Introduction**

It is becoming increasingly clear that ICT stimulated classrooms enhance academic excellence and is fast assisting to draw entire world towards becoming a global village. This

is not without obvious implications especially in the developing countries (Weinberger, 2011). Nigeria as one of the developing countries is grasping to catch up with other nations of the world even in the presence of lopsided rural-urban population with a lot of differences in social facilities and government presence to the advantage of the few (or about one-quarter) population in the urban areas. It is envisaged that the use of mobile devices to teach, an extension of ICT could help to narrow the impact of the location differences in the classroom practices in Benue State of Nigeria dominated with rural settings. What is perhaps uncertain is if location itself is a factor in how both the teachers and the learners use their mobile devices in classrooms. This is considered particularly important as researchers attributed the upward trend in improvement in distance learning compared to traditional learning to technological advances, improved access to the Internet among others (Shachar & Neumann, 2010). It may be appropriate to question the use of mobile devices as part of the technological advances.

Mobile devices according to Warschauer (2011) offer a number of advantages for education in comparison to laptops or notebooks. First, their lighter weight and orientation flexibility makes them far superior for digital reading or accessing of content. Second, their instant-on capability and fast switching among applications allow learning activities to proceed with less delay. Third, their touch screen interface allows a high degree of user interactivity. Fourth, they are much more mobile than laptops, as students can carry them inside or outside a room without having to close and reopen the screen and store them in the carry case and can also use them for mobile data collection or note taking. Fifth, since it is inexpensive to develop applications for mobile platforms, there is a rapidly growing amount of free or low-cost applications for mobile devices, many of which are suitable for education. And finally, mobile devices long battery life makes them more suitable for a school day (Warschauer, 2011).

Goundar (2011) observed that when stakeholders move from using computers to using mobile devices in education, there will be many economic advantages for the education providers. Education providers can also expect improved student learning outcomes, satisfied teachers - with technology for support and assistance, and happy parents. To start off with, Goundar further said that there will be no need to have dedicated computer labs, specific computer desks, chairs and computer lab space – which also means no IT support required, no IT staff needed, no servicing, repairs and maintenance of computers required. All other associated costs like networking equipment, ISP connections, air conditioning and huge power bills will be saved (Visser & West, 2005; Ramos & Trinona, 2009). However, subscription will be paid to the mobile phone network provider, which in many cases will be insignificant when compared to computer networks to the internet. Mobile devices, now available in abundance, are cheaper and simpler to use. New mobile applications rely on new input and output methods and allow a new population of non-expert users to use the device more cheaply and simply (Goundar, 2011) with excitement (Romas, 2008).

One-third of the world's adult population – most living in the developing world – has no access to printed knowledge, new skills, and technologies that could improve the quality of their lives (Dhanarajan, 2009, p. 46). Inequalities in access to education according to Valt, Rashid and Elder (2010) continue to pose major barriers in the developing world, and the delivery of cost-effective and quality education remains a persistent problem. In the attempt to find viable solutions to these problems, much hope has been placed in new information and communication technologies (ICTs). To the authors, it is believed that ICTs can empower teachers and learners by facilitating communication and interaction, offering new modes of delivery, and generally transforming teaching and learning processes. Of the many

different forms of ICTs, mobile phones are thought, for several reasons, to be a particularly suitable tool for advancing education in developing regions (Valt, Rashid & Elder, 2010). It is put on note that mobiles phones are the most prevalent ICT in the developing world, and the penetration rate is rising rapidly. For instance, in Asia, mobile penetration has doubled within a short span of time; in 2001, average penetration was 19.7 per 100 inhabitants while in 2005 the penetration rate rose to 40.9 (Orbicom, 2007). Relevant in this paper is the fact that mobile phone ownership is increasingly more common in the lower socio-economic segments of society (Samrajiva & Zainudeen, 2008; Ramos & Trinina, 2009). Second, mobile phones are an especially good 'leapfrogger' since they use the radio spectrum (Valt, Rashid & Elder, 2010). There is, therefore, less need for new physical infrastructure such as roads and phone wires, and base-stations can be powered via generators in places where there is no electrical grid (Economist, 2008). Finally, in addition to voice communication, mobile phones allow the transfer of data, which can be particularly useful for delivering educational content over long distances (Valt, Rashid & Elder, 2010).

A mobile device is a handheld tablet or other device that is made for portability, and is therefore both compact and lightweight. New data storage, processing and display technologies have allowed these small devices to do nearly anything that had previously been traditionally done with larger personal computers. As market conventions emerged for mobile devices, a primary class of devices became known as personal digital assistants (PDAs). Many of these share common features; such as touch screen interfaces with color displays, linking to email and desktop software programs, and access to wireless platforms. Later, as wireless networks evolved, makers started to offer another class of mobile devices called smartphones, which combined the utility of a cell phone and a PDA into one device. Now, most cellphone providers offer a range of smartphones which access the Internet over a 3G or 4G wireless network. In this paper mobile devices considered were handset (which is any other portable phone outside of), palmtops, iPads, tablets and smartphones. Therefore similarities in functions, size and sophistication would not be long drawn in this paper.

Increasingly, independent or private schools are embracing mobile devices to enhance teaching and learning. The NAIS 2012 Mobile Learning Survey Report (Thuermer, 2012) found that 75 percent of independent schools currently use mobile learning devices in at least some grades, and 12 percent of independent schools are actively planning to use mobile learning devices. It explores independent schools' use of mobile devices (laptops, iPads/tablets, and smartphones), school administrators' perceptions of mobile learning benefits, and the challenges schools face in their efforts to transform teaching and learning with the use of mobile devices. According to research carried out by Warschauer (2011) to investigate the use of iPads in K-12 schools in the US, the following observations were made: In one private school in California, students had daily access to laptops and frequent access to iPads, thus allowing the researchers to compare the use of the two. In a science class that was observed, students unanimously stated that they prefer using the iPads to the laptops due to the tablets' light weight, mobility, touch screen, and applications. Students used the iPads to read free open source Earth sciences textbook, investigate the elements and the composition of the Earth and galaxy via interactive apps, access the school's e-learning platform, log and analyse lab data, and produce lab reports. The researchers' observations suggested that the iPads were particularly helpful for laboratory work as the students carry the devices around to input data on the move.

According to Valt, Rashid and Elder (2010), mobiles, therefore, should impact educational outcomes by altering the character of education and learning because the nature of mobile technology converges with and facilitates new learning. The new learning is personalized,

learner-centred, situated, collaborative, ubiquitous, and lifelong. Likewise, mobile technology is increasingly personal, user-centred, mobile, networked, ubiquitous, and durable (Sharples, Tylor & Vavoula, 2007, p. 224).

## Research Questions

The following research questions were addressed in this study:

1. Indicate which mobile device/s is being currently or ever used by you from the list provided: handset, palmtop, iPad, tablet and smartphone.
2. Rate on a 1-5 scale (1, cannot use it at all and 5, can use it very well) extent to which you can perform the following operations with your mobile device:

### a. Pupils

- i. Record lectures( both visual and audio)
- ii. Browse materials for assignments
- iii. Submit assignment through e-mail
- iv. Edit notes taken from teacher
- v. Play games
- vi. SMS questions to teachers for brief explanation
- vii. Transfer information using blue tooth
- viii. Sought contribution from mates using face book
- ix. Capture static images of in-class activities
- x. Read e-texts
- xi. Access to library resources
- xii. Look up information while in class

### b. Teachers

- i. Produce your lessons on MP3 for your students
- ii. Engage your students through face book
- iii. Gives and collects assignment through e-mail
- iv. Use power point presentation of lesson sometimes
- v. Transfer information using blue tooth
- vi. Browse materials from internet
- vii. Undergo training via video conferencing
- viii. Open new files
- ix. Read e-texts
- x. Access to library resources
- xi. Look up information while in class

3. What 3things do you as a teacher consider as the challenges to effective use of mobile devices for teaching at the primary school level in Benue State Nigeria?

## Materials and Method

**Design:** The design of this study is survey. It is particularly a descriptive type whereby data was collected, analysed and used to describe or explain the current status of possibility of using mobile devices to teach primary six pupils in Benue State Nigeria with urban-rural

settings.

**Population, Sample and Sampling:** The population for this study was all the primary six pupils in Makurdi LGA of Benue State Nigeria. Makurdi, the state capital of Benue State is part of Makurdi LGA and therefore there are many primary schools (both private and public) with a few in the rural settlements. Out of these only 180 teachers (90 each for urban and rural) and 100 pupils (50 each for urban and rural) were purposively selected for the study. It was purposive because teachers and especially pupils without handsets were not selected. However, whatever handset anybody had qualifies such person to be selected. Also it was intentionally designed to have equal number of teachers as well as pupils from urban and rural settings. This was conceived to eliminate weakening reasons that may come up at the time of discussion of findings.

**Instrument and its Validation:** Data were collected in two ways in this study. They are by use of a questionnaire called “State of the Art Mobile Devices Use (SAMDU)” meant for both teachers and pupils. The second was the interview conducted to confirm responses of teachers and students to item 2 in SAMDU. SAMDU is a 3 items questionnaire. Item 2 has two parts: part A containing 12 sub-items is for the Pupils while part B containing 11 sub-items is for the teachers. Pupils responded to items 1 and 2A while the teachers responded to items 1, 2B and 3. The interview section was restricted to item 2A for pupils and item 2B for teachers.

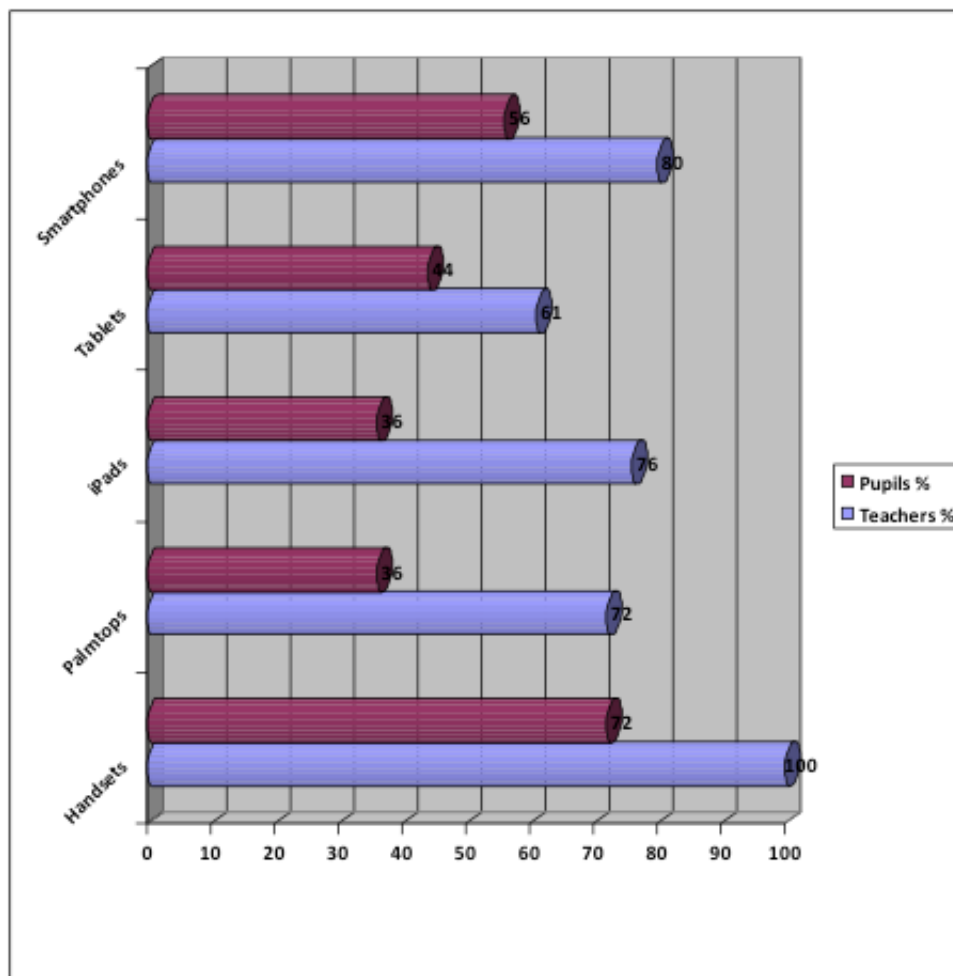
The rating of 2A and 2B are 1 (do not know how to use it); 2 (can use it at moderate level) 3 (can make above average use of it); 4 (can make good use of it); 5 (can use it very well). The upper and lower boundaries for decision making are defined as 1.00 -1.49 (do not know how to use it); 1.50-2.49 (can use it at moderate level); 2.50-3.49 (can make above average use of it); 3.50-4.49 (can make good use of it); 4.50 -5.00 (can use it very well).

SAMDU and the structured interview schedule were passed on to 3 experts; one in measurement and evaluation and the other two in computer education for vetting, determination of its appropriateness, if it addressed the research motives and suitability to the target audience. Their comments, suggested modifications and inputs were reflected in the final copy. In particular, it was suggested that item 3 should be left as a free response item so as to bring out the actual challenging factors common to the environment.

## Results

Analyses of data were done using bar graphs, percentages and means. In particular questions 1 and 3 were answered using bar graphs and percentages, while question 2(A & B) was answered using mean statistics.

Figure 1 addressed research question 1 which enquired of the mobile devices currently being used or ever used by both pupils and teachers.



**Figure 1: Mobile Devices in Use or Ever Used by Pupils and Teachers**

Figure 1 shows that about 84% of pupils (42/50) and 100% (90/90) of teachers have used or are presently using the general handsets or any other handset outside palmtops, iPads, Tablets and Smartphones. Consistently teachers had high percentage use of palmtops, iPads, tablets and smartphones compared to the pupils.

Data for answering research question 2A are contained in Table 1. Table 1 addresses the extent to which pupils could use their devices to perform certain educational operations as listed on the Table 1.

S/ No	Devices	N Urban	Mean Urban Rating X	Interview Rating X	N Rural	Mean Rural Rating X	Interview Rating X
1	Record lectures( both visual and audio)	50	4.6	3.6	50	2.8	2.0
2	Browse materials for assignments	„	4.1	3.8	„	2.5	2.1

3	Submit assignment through e-mail	„	3.1	2.5	„	1.6	1.2
4	Edit notes taken from teacher	„	2.4	2.2	„	1.4	1.2
5	Play games	„	4.9	4.0	„	3.2	3.0
6	SMS questions to teachers for brief explanation	„	2.5	2.0	„	1.2	1.1
7	Transfer information using blue tooth	„	3.5	2.3	„	1.2	1.1
8	Sought contribution from mates using face book	„	3.8	3.1	„	1.9	1.5
9	Capture static images of in-class activities	„	2.8	2.2	„	1.1	1.1
10	Read e-text	„	2.4	2.0	„	1.4	1.2
11	Access to library resources	„	2.1	1.8	„	1.1	1.1
12	Look up information while in class	„	2.7	2.2	„	2.1	1.9

Note: 1.00 -1.49 do not know how to use it; 1.50-2.49 can use it at moderate level; 2.50-3.49 can make above average use of it; 3.50-4.49 can make good use of it; 4.50 -5.00 can use it very well.

Table 1 showed consistently that pupils in urban environment claim to know and demonstrated how to use their devices to perform the 12 educational activities listed compared with those in the rural environment. Six activities (that is, 4, 6, 7, 9, 10 & 11) under rural pupils had mean values less than 1.5 for both what they claimed they could do and what actually they demonstrated. By implication these six activities are almost nonexistent in the rural schools. They include editing notes taken from teacher, SMS questions to teacher for clarification, transfer information using blue tooth, capture static images of in-class activities, read e-text and having access to library resources. However, the disparity between what the pupils claim they could do and what actually they demonstrated during interview among the urban and as well rural pupils was remarkable. In essence, if we

go by what was demonstrated, even among the urban pupils there is much for them to learn to be able to use mobile devices for learning at that level effectively.

Table 2: Extent to which teachers could use their mobile devices to perform educational operations

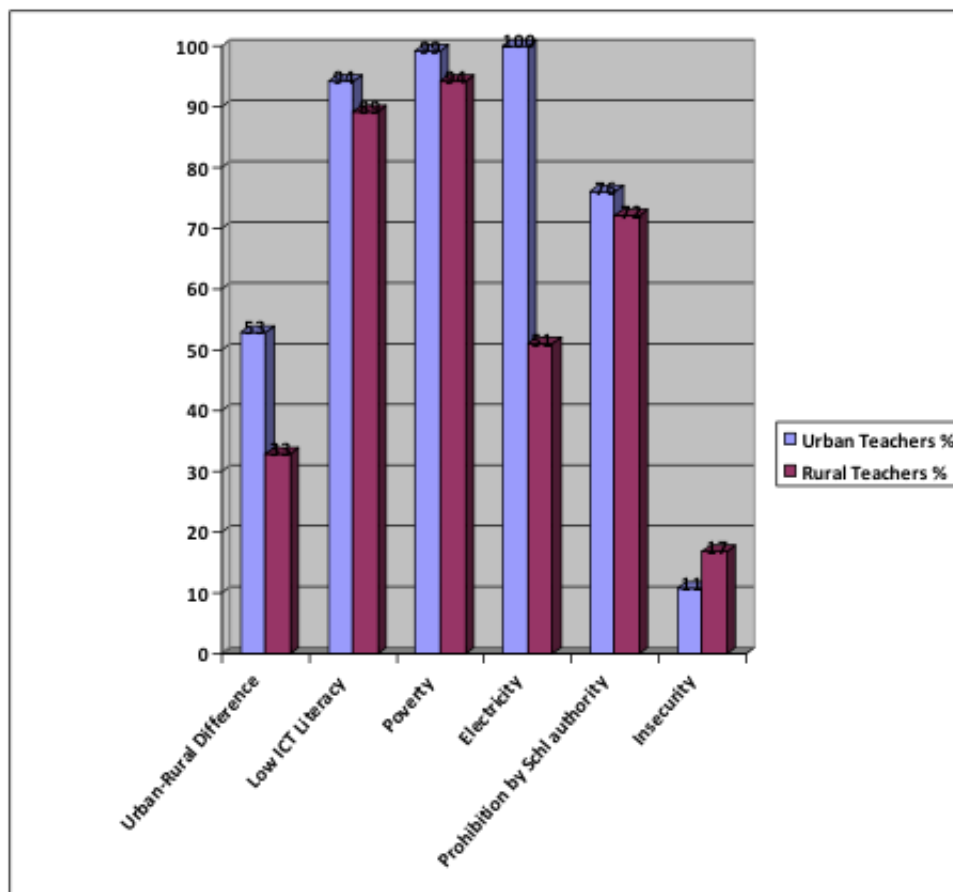
S/No	Device	N Urban	Urban Rating	Interview Rating	N Rural	Rural Rating	Interview Rating
1	Produce your lessons on MP3 for your students	90	3.1	2.6	90	2.6	2.2
2	Engage your students through face book	„	4.5	3.3	„	2.9	2.5
3	Gives and collects assignment through e-mail	„	4.4	2.8	„	2.6	1.9
4	Use power point presentation of lesson sometimes	„	2.8	2.4	„	1.8	1.4
5	Transfer information using blue tooth	„	3.5	2.9	„	2.1	1.8
6	Browse materials from internet	„	4.3	3.8	„	2.8	2.5
7	Undergo training via video conferencing	„	2.6	2.4	„	1.4	1.1
8	Open new files	„	4.8	4.2	„	3.8	3.1
9	Read e-texts	„	4.6	4.0	„	2.8	2.4
10	Access to library resources	„	3.9	3.1	„	2.7	2.2
11	Look up information while in class	„	4.1	4.0	„	2.9	2.5

Note: 1.00 -1.49 do not know how to use it; 1.50-2.49 can use it at moderate level; 2.50-3.49 can make above average use of it; 3.50-4.49 can make good use of it; 4.50 -5.00 can use it very well.

Table 2 shows that urban teachers consistently claimed and demonstrated higher ability to use the 11 educational activities listed. In general, both urban and rural teachers claimed they could and also used their mobile devices to perform the 11 educational activities listed except for item 4 and 7 (that is, use power point presentation of lesson sometimes and undergo training via video conferencing) that the rural teachers could not do or demonstrate its use.

Figure 2 addressed research question 3. Research question 3 required the teachers to freely list challenging factors to successful use of mobile devices for teaching and learning in primary schools.





**Figure 2: Factors Inhibiting Use of Mobile Devices for Teaching**

Figure 2 shows that aside insecurity, both urban and rural teachers identified the 5 other challenging factors to use of mobile devices for teaching and learning in primary schools in the study area. Therefore urban rural dichotomy, low ICT literacy, poverty, electricity and prohibition by school authorities are seen as barriers to use of mobile devices to teach and learn in primary schools.

### Discussion and Implications of Findings

Except handsets generally, consistently teachers had high percentage use of palmtops, iPads, tablets and smartphones compared to the pupils. The result shows that teachers and pupils in urban schools claimed and also demonstrated higher ability to use mobile devices to teach/learn compared with those in rural schools. However, there was a remarkable difference in what both urban and rural school teachers and pupils claimed they could do and what they actually demonstrated.

It was expected however, that teacher should be able to afford most of the mobile devices listed and also be able to use them effectively compared to their pupils on the grounds of age, financial power and maturity. However, a school of thought has identified the youths of both primary and secondary schools of being very interested, devoted in terms of time and have demonstrated ability to manipulate electronic gadgets at home, handset and know how to use handsets for a number of functions compared to their parents (in most cases the actual owner) (Agogo & Achor, 2014). The result obtained in this study could be the cumulative effect which may not rule out the fact that there exist some pupils that may do better than their teachers in the use of mobile devices. Besides, a good number of parents may not be educated as opposed to the teachers used in this study with a minimum qualification of

Nigeria Certificate in Education (NCE) which is “A” level equivalent. On the other hand, the wide gap between urban and rural teachers and their pupils’ responses in terms of knowledge and use of mobile devices is a point of worry. First is the fact the rural population far exceeds that of urban population in Benue State and Nigeria in general. Second, information given on the status of a state or nation is usually total and therefore do not demarcate rural from urban. These two points raised have obvious implications for provision of social amenities, distribution of ICT related teaching aids, financial support to teachers and pupils. There is also implication for policy statements and assessment of level of ICT use in education across the state and country made previously. It is either that those statements were wrong or that they were misleading as majority may not be at the level so quoted.

As pointed out by Ally (2009) rather than acquiring another technology to receive learning materials, people throughout the world will want to access learning materials on their existing mobile devices. As a result, educators and trainers must design learning materials for delivery on different types of mobile devices. For instance, Ally said that the nomadic learners and workers who travel frequently from place to place (mostly in rural areas) will similarly use mobile technology to access information and learning materials from anywhere and at anytime. A major benefit of using wireless mobile technology is to reach people who live in remote or rural locations where there are no schools, teachers, or libraries. Additionally these rural locations have geographic terrains that are difficult for normal networking and cabling infrastructure (Ally, 2009).

The finding in this study is in line with that reported by Nagel (2014) that outside the classroom, most learners are also using their mobile devices for school-related activities. These activities include texting with classmates specifically about schoolwork (73 percent of girls and 60 percent of boys). Other activities include taking photos of assignments, finding videos to help with homework, videoconferencing with classmates about schoolwork (Skype or iChat) and collaborating over Facebook.

Another surprised finding is the wide gap between what both teachers and pupils claim they could do and what actually they were able to do. Under short time and distracting atmosphere, this finding nevertheless, has exposed a difficulty that may be experienced in attempts to help the teachers and pupils in the study area to use mobile devices more effectively. However, this study appears like a *prima fascia* and therefore further studies could be carried out not only to determine what they could do effectively but also to determine exact areas of weaknesses.

It was also found that urban rural dichotomy, low ICT literacy, poverty, electricity and prohibition by school authorities were barriers to use of mobile devices to teach and learn in primary schools in the study area. This is precisely a challenge to government, NGOs, individuals, parents, school proprietors and parents teachers association. While most of these barriers place rural teachers and pupils at disadvantage, the revelation is timely as their neglects could mean wasting efforts to address effective use of mobile devices in the study area.

There are two limitations of this study. The first limitation is the use of subjective data. Mere opinion of teachers through a questionnaire was used to position extent of use of mobile devices. A practical test on the use could have given more exactness on their level by their ability to manipulate the devices. The second limitation is the sample size of the study. This study used a sample of 180 teachers and 100 pupils which could have been made more robust to allow for a higher generalization. However the fact that it is the opinion of specific group,

the primary six pupils and their teachers, information collected through this sample could be representative enough to pass a message on the state of the art.

## Conclusion and Recommendations

It can be concluded in this study that location is a major factor in effective use of mobile devices to teach and learn among primary six pupils in Benue state. Urban teachers and pupils claimed and demonstrated higher ability to use mobile devices effectively to teach/learn more than their rural counterparts. However, a wide gap existed between what the teachers and pupils in urban and rural location claimed they could do and what they were able to do with their mobile devices.

Based on these and other findings we make the following recommendations:

1. Continued improving mobile device interfaces and encouragement of the development of innovative teaching and learning mobile applications are advocated.
2. Location should be considered in posting of ICT literate teachers, distribution of ICT/mobile related teaching aids and provision of ICT patrol van for mass education in schools.
3. Provision of professional development opportunities for instructors who desire harnessing mobile devices as a teaching and learning tool.
4. There is need to expand access policies for pupils, including loans that span the entire academic quarter, additional equipment available for loan, and priority for students with greater financial need, so all students can enjoy the educational benefits of mobile devices. This could begin with free offer from imported dedicated cheap devices that could be distributed to pupils by state governments.
5. Attention should be paid as matter of urgency to schools in rural areas to allow their teachers and pupils brace up with those in the urban schools in mobile applications.

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