

Evaluation of Private and Public Senior Secondary Geography Teachers' Use of ICT in Mangu Local Government Area of Plateau State, Nigeria

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Abstract - *The study evaluated the application of Information and Communication Technology (ICT) among private and public senior secondary geography teachers in Mangu Local Government Area of Plateau State, Nigeria. Using the cross-sectional research design and the stratified randomized sampling method; data was collected from 20 geography teachers in private and public secondary schools using structured questionnaire. Three research questions and two hypotheses were postulated. Percentage and chi-square statistics were used to analyze and present the results of the study. Results of the study indicated that ICT was largely not applied in geography education despite the introduction of ICT policy in schools in Nigeria since 2001, resulting from unavailability of ICT hardware and software and human resources. The results also revealed that no variation existed between teachers of different qualification categories in the extent to which they employed ICT in teaching and learning. Though it was further revealed that private school teachers out-weighted their public school counterparts in the extent of ICT application, such difference was evidently not significant. It was therefore recommended that government should provide the enabling environment for ICT application in secondary schools; and teachers should avail themselves to ICT capacity building workshop and seminars organized by government, non-governmental organizations (NGOs) and professional associations so as to develop ICT skills and knowledge relevant for its application in teaching and learning.*

Keywords: *evaluation of ICT, Geography teachers, senior secondary geography education, teaching and learning geography.*

INTRODUCTION

Information and Communication Technology (ICT) is the use of technological tools and resources for communication and for creation, storage, management and dissemination of information. Similarly, Gusen [1] opined that Information and Communication Technology is the combination of computers and telecommunication systems to improve teaching, learning, research and communication in education. It is also important to keep in mind that Information and Communication Technologies (ICTs) in education are a potential double-edged sword which extend and empower teachers and students to access information irrespective of geographic regions. There is also the danger that such technologies may further widen the gap between the educational *haves* and *have-nots*. However, technology is only a tool and the success of ICTs in enhancing the delivery of quality education to the needy, without widening the gap, will depend largely on teachers' competency in implementing ICT policies that have direct bearing on school education.

ICT permeates diverse spheres of human endeavour today as well as enhancing the quality of education in several ways: by increasing learner's motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner centered environment [2]. It is clear that ICT, whether it's a mobile phone, iPod or personal computer, influences how young people make sense of their world today by exploring it. Educationally, Siddiqui [3] opined that ICT adds value to the process of learning and in the organization and management of learning institutions. It also offers a range of tools such as Geographical Information System (GIS) to

support their geographical understanding of the whole atmosphere of the world. Internet resources also enable students to gain up-to-date information.

ICT can help students to: (a) enhance geographical knowledge and improve geographical enquiry skills, (b) develop graphical, statistical and spatial analysis skills, (c) develop mapping skills, (d) experience alternative images of people, places and environments and how environments change, (e) simulate or model geographical systems and environments, (f) communicate with other students in contrasting localities by email, webcams and video conferencing, (g) improve the appearance of work by enhancing presentation, (h) increase awareness of the impact of ICT in the changing world [4].

These propositions underscore the significance of ICT in today's process of learning and consequently the attainment of curricular objectives and invariably that of social development and progress. Thus, ICT has transformed teaching and learning to a more effective and viable mode that the purpose of learning is easily realized. The importance is emphasized variously as: teacher's ability to convey his thoughts, state his facts clearly and evaluate his students by means of ICT [5]; teachers' taking advantage of the dynamics of ICT to soundly demonstrate difficult concepts, theories and principles [6]; Gain in stimulating students' critical thinking and general competence, expert work, handling of dynamic situations and effective communication [3].

Synthesis of various research findings on the use of computers in education which also speak of its importance as presented by UNESCO Office in Bangkok: definition, guidelines, tools [7] include: - less directive and more students-centered teaching, more time engagement by teachers in advising students, stimulating interest in using multimedia, increasing teacher and administrator use of ICT for planning in achieving maximum productivity, increasing use of ICT for greater participation and collaboration with colleagues and parents.

Considering the vital role of ICT in education against the backdrop of a global drift towards technological advancement achievable through science education, the National Economic Empowerment and Development Strategies [8] sets six goals for education in Nigeria to promote the use of ICT capabilities at all levels, covering primary, secondary and tertiary education. Among the targets are: ensuring that 80 percent of secondary school graduates are computer literate; ensuring that 50 percent of secondary schools have functional ICT

facilities and ensuring that 50 percent of the teachers at all levels are trained in computer literacy in the curriculum at all levels of learning, planning and development of curriculum for teaching computer education at all levels of learning and providing schools with ICT equipment and facilities.

In line with the NEEDS' aspiration, [9] pointed out that the Federal Government of Nigeria through the Federal Ministry of Education in collaboration with Nigerian Educational Research and Development Council [10] in 2007 introduced computer studies for primaries 1-6 and junior secondary school (JSS) 1-3. [9] also pointed out that the National Teachers' Institute (NTI) and the Universal Basic Education Commission (UBEC) also developed a manual for capacity building workshop for teachers to promote teachers' skills and knowledge in the use of ICT in primary and secondary schools in Nigeria as a prerequisite for university education. The fundamental question is, to what extent are these aspirations for ICT education being accomplished in the domain of geography education at the senior secondary level?

Geography is a spatial science, dealing with earth's space, content of space, and use of space, variation in space, how the observable spatial pattern evolved over time, human behaviour and decision, relationship and interactions on the earth surface.

It is a physical and social science since the earth space contains both physical and cultural aspects, both of which geography is concerned with understanding. Geography education is deals with geography teaching, learning, thinking and related cognitive and educational processes [11]. The three distinct sub-domains of geography education according to Bednarz [11] include: (a) Research learning and building theoretical understanding of the learning/teaching/educational process. (b) Research on teacher education, the process of preparing practitioners and building of knowledge base for the preparation of teachers. (c) Researches the improvement of practice, whether it is in the classroom, in administration, or in the development of policy related to education.

Computers are today at the heart of what has come to be known as Geographic Information System (GIS). GIS according to Getis [12] is a computer-based set of procedures for assembling, storing, manipulating, analyzing and displaying geographically referenced information. GIS is also defined by Chang [13] as a computer system for capturing, storing, querying, analyzing and displaying geographically referenced to data. Any data that can

be located spatially, according to them, can be entered into a GIS. The major component of GIS according to Getis et al. [12] include: A data input component that converts maps and other data from their existing form into digital or computer readable form; A data management component used to store and retrieve data; Data manipulated function that allow data from disparate sources to be used simultaneously; Analysis function that enables the extraction of useful information from the data; A data output component that make it possible to visualize maps and tables on the computer monitor or as hard copy (such as paper). GIS is seen as tool to improve spatial thinking and support fieldwork.

Geographically, data can as well be collected and stored in CD-ROM which are used for teaching. Data collected during field teaching and research is analyzed using computer spreadsheet. Geographical lessons are also presented using PowerPoint. A variety of Internet search engines are used to browse, download and save documents to teach students. ICT is widely used in geography education to increase and improve the quality and standard of education [2]. Many authors including Ali et al. [14] see ICTs not only as catalysts for change in working conditions, handling and exchanging information, teaching methods, learning approaches, scientific research, but also as a catalyst for accessing information. Therefore, lecturers could use ICT to facilitate learning, critical thinking and peer discussions [1]. ICT as opined by Ali et al. [14] which provides opportunities for teachers and students to operate, store, manipulate, retrieve and share information and resources that will encourage independent and active learning. Ali et al. [14] assert that ICT is a versatile instrument that has the capability not only of engaging students in instructional activities to increase their learning, but also help them to solve complex problems. It is therefore clear to every mind that if ICT is properly applied in the teaching and learning of geography in the secondary schools, students are most likely to perform better in public examinations. This is unfortunately not the case as students' results in the subject in the recent past left much to be desired, and so the motivation for the study.

Statement of the Problem

The current status of teachers' attitude towards applying ICT resources in geography education at the secondary school level in Nigeria is left much to be desired. Geography teachers rarely make use of simple instructional tools such as plastic globes, rain

gauge, wind vane, topographical maps, atlases as reported by Filibus [15]. Dakur [16] reported that most of the prescribed teaching methods and teaching aids were not employed by geography teachers for the teaching of the subject. Consequently, geography students tend to perform poorly in their subject's public examinations.

Joel [17] for instance found that constraints to students' effective learning of maps reading in Adamawa State, Nigeria stemmed mostly from the poor teaching methods used by geography teachers and gross inadequacy of instructional material. Yet it is widely believed among educationists that effective teaching can largely be accomplished with the application of ICT resources [1]. For instance, Mangal [18] pointed out that learning depends not only on the nature of learning experience, but also on the competency of teachers in using ICT to enhance different methods of teaching. This means that where any of these strategies is in deficit supply, either in quality or quantity, students' performance is most likely to be poor. Similarly, Ololube et al. [19] asserted that dilapidated buildings, chronically inadequate funding, a lack of ICT instructional materials and a lack of qualified ICT-literate faculty are some of the setbacks to the poor performance of students.

Consequently, students' performance in geography's public examination as stated in the chief examiners report of West African Senior Secondary School Certificate Examination for May/June 2004 has been very poor [20]. According to the Obudigha [21], the poor performance of most candidates during examinations stemmed from inadequate coverage of syllabus; inadequate knowledge of the subject; poor presentation of answers; inability to draw good outline of maps of Nigeria, West Africa and Africa; inability to locate and name given features on map of Nigeria, West Africa and Africa; and poor presentation of map outline and inability to use keys/legend to the features indicated in the map resulted into examination malpractice. As a way forward, the Joint Admission and Matriculation Board -Unified Tertiary Matriculation Examination (JAMB-UTME), [22], [23] and [24] decided to employ the use of JAMB Computer-Based Testing (CBT) method in the conduct of its examinations to minimize the poor performances of students in its examinations and to curb Exam Malpractice since 2013/2014. The leading question in this study therefore is, 'what is the status of ICT application as a current innovation in the

teaching and learning of geography as a means of improving performance of students?

Purpose of the Study

The purpose of the study was to evaluate the application of Information and Communication Technology among private and public geography education at the senior secondary school level in the study area. The following specific objectives guided this exploration:

1. To determine the extent to which private and public geography teachers applied ICT in the teaching and learning of geography.
2. To find out the challenges that private and public geography teachers faced in applying ICT in the teaching of geography.

Null Hypotheses

Two hypotheses were postulated and tested during the study as follows:

1. There is no significant difference in the mean score of private and public geography teachers' use of ICT in teaching geography.
2. There is no significant difference in the mean scores of the challenges faced by private and public geography teachers in the application of ICT in their subject area.

Research Design and Sample Frame

The cross sectional survey research design was employed for the study. This enabled the researchers overcome the constraints inherent in whole-population study and conveniently collected data from representatives of the population. The sample frame for the study was made up of all the 54 geography teachers in the study area consisting of 28 private and 26 public schools.

Sampling Procedure and Sample Size

The stratified sampling method was used to determine the sample for the study. The whole list of geography teachers were thus obtained from the Statistical Department of the Area Directorate of Education in Mangu. These were sorted into two classes (private and public school teachers). Each of the teachers in the separate groups was assigned a serial number. This was followed by a random process in which a table of random numbers was employed to select 10 private and 10 public school teachers each respectively for the study. Thus, a total number of 20 out of 54 geography teachers representing about 37% of the population constituted the sample for the study.

Research Instrument and Validation

A three sectioned questionnaire made up of 25 items was developed, validated and applied in the study. The three sections of the instrument – A, B and C were committed to collecting data on demographic attributes of the respondents, application of ICT and its challenges respectively. Three experts, one in test and measurement, one in curriculum theory and evaluation and one in computer application, all in the Faculty of Education of the University of Jos, Nigeria validated the instrument. They carried out content validation of the instrument. Content validation is a form of validation that determines how much of the content of an instrument is representative of the universe of the content of the trait being measured [25].

Procedure for Data Collection

The instrument was personally applied by the researchers for collecting data from the teachers in their various schools within four working days between 8.00am and 2.00pm being the beginning and ending of each day's work. The researchers administered the questionnaires to the respondents and collected them back on the spot giving a return rate of 100%.

Method of Data Analysis

The data collected for the study via the questionnaire was analyzed using descriptive statistics of frequency tables and simple percentages of SPSS statistical package. The percentage was used to analyze the research questions. Chi-square statistics was used in testing the two hypotheses in order to measure if there is a relationship between two categorical variables.

RESULTS

Research Question One: The question probes the difference that might exist between geography teachers in private and public schools in terms of ICT application in teaching and learning.

The data from the table one signifies that private school teachers' positive response ranges from 5% to 45% while those of the public's is from zero to 35%. More so, the private school teachers responded negatively on four items(1,3,5,10) in contrast to those of the public's that responded negatively on 13 items(1,2,3,4,5,6,7,8,9,10,11,12,14).

Table 1: Response distribution of private and public geography teachers on the application of ICT in teaching and learning of geography

Items	Description of Application	Private		Public	
		Yes	No	Yes	No
1.	Use of CD-ROM to collect and store data for teaching.	3(20%)	9(45%)	1(10%)	8(40%)
2.	Use of variety of Internet search engines to collect data for teaching.	4(25%)	5(25%)	1(5%)	9(45%)
3.	Use of PowerPoint in teaching geography.	1(5%)	9(45%)	2(10%)	8(40%)
4.	Teaching the concept of geographical information system (GIS)	7(35%)	3(15%)	1(5%)	9(45%)
5.	Using geographic software for designing diagrams, charts and graphs for teaching.	2(10%)	8(40%)	2(10%)	8(40%)
6.	Teaching students how to use ICT.	6(30%)	4(20%)	0(0%)	10(50%)
7.	Using spreadsheet to analyze geographic data collected during field lesson.	5(25%)	5(25%)	2(10%)	8(40%)
8.	Use of CD-ROM and USB to store and retrieve document.	4(20%)	6(30%)	0(0%)	10(50%)
9.	Use GIS software to input, retrieve and analyze geographical data collected in the field with students.	4(20%)	6(30%)	1(5%)	9(45%)
10.	Use a variety of spreadsheet to code and analyze data.	3(15%)	7(35%)	1(5%)	9(45%)
11.	Teaching students the various application of geographical information system (GIS).	6(30%)	4(20%)	2(10%)	8(40%)
12.	Teaching students the sub-system of GIS data input, output, manipulation and reporting.	4(20%)	6(30%)	0(0%)	10(50%)
13.	Integrating ICT into the teaching and learning of geography.	7(35%)	3(15%)	7(35%)	3(15%)
14.	ICT implementation in teaching and learning of geography in schools.	4(20%)	6(30%)	2(10%)	8(40%)

Additionally, the negative response rate of public school teachers was generally higher than their private counterparts (see table 2). There was therefore sufficient ground to conclude that teachers in private and government schools varied in their application of ICT in teaching and learning of geography. The data in the table two show clearly that even though the private schools were better off, yet did not meet the criteria set by NEEDS 2005 ensuring that 50 percent of the teachers at all levels are trained in computer literacy in the curriculum at all levels of learning, planning and development of curriculum for teaching computer education at all levels of learning and providing schools with ICT equipment and facilities

Research Question Two: The question explores the challenges confronting geography teachers in their drive towards adapting the application of ICT in geography teaching and learning at the secondary school level.

Table two reveals that geography teachers responded negatively on all the seven items of the instrument. The negative responses range from 55% to 95% while the positives responses range from 5% to 40%. There is therefore sufficient ground to conclude that the application of ICT in the teaching and learning of geography is hampered by the non-availability of ICT resources, funds and human resources as indicated in Table two.

Table 2: Distribution of teachers' response on the challenges of applying ICT in geography teaching and learning

Items	Challenges	Responses	
		Yes	No
1.	Availability of electric supply to facilitate application of ICT.	7(35%)	13(65%)
2.	Availability of Internet connectivity to enhance the teaching of geography.	7(35%)	13(65%)
3.	Sufficiency of funds to purchase ICT resources for teaching geography.	1(5%)	19(95%)
4.	Availability of GIS software resources for teaching geography.	3(15%)	17(85%)
5.	Availability of ICT infrastructure for teaching and learning of geography.	6(30%)	14(70%)
6.	Availability of ICT hardware resources for teaching and learning.	7(35%)	11(55%)
7.	Sufficiency of competent ICT personnel.	8(40%)	12(60%)

The negative responses of teachers in this research is also in line with the findings of Mangal [18] and Ololube [19] respectively.

Hypothesis One: The hypothesis examined the extent to which private and public geography teachers' application of ICT in teaching of geography.

Table 3. Testing the influence of qualification on geography teachers' application of ICT.

N	α	X^2_{cal}	X^2_{tab}	Decision
20	0.05	2.50	40.11	Accepted

As indicated in table 3 above, the calculated chi-square value (2.50) is less than the critical value (40.11) at the significant level of 0.05. The hypothesis was therefore accepted, leading to the conclusion that the extent of teachers' application of ICT was not significantly influenced by their school status. This result is contrary to the expectation of the criteria set by [8] ensuring that 50 percent of the teachers at all levels are trained in computer literacy to cope with the competency of using computer to teach their students.

Hypothesis Two: The hypothesis investigated the contingency between the status of school and geography teachers' challenges in the application of ICT.

Table 4. Testing the influence of school status on teachers' application of ICT.

N	α	X^2_{cal}	X^2_{tab}	Decision
20	0.05	19.16	32.67	Accepted

The data in the table 4 above shows vividly that the calculated chi-square value (19.16) is less than the critical value (32.67) obtained at the 0.05 level of significance. It was therefore accepted, resulting in the conclusion that the challenges faced by geography teachers in applying ICT in teaching and learning was not significantly a function of status of the school. It is therefore imperative for teachers and students of both public and private schools to embrace the use of ICT in line with Ali et al. [14] and [4] so as to promote global competition in geography.

CONCLUSION AND RECOMMENDATION

Considering the confirmed importance of ICT to facilitating learning at all levels of education worldwide, Nigeria cannot afford to play an exception if it must be a partner in the global transformation in

science and technology most especially that it is dreaming to become one of the 20th best economies of the world in the year 2020. The results of the study as shown in tables one and three represent serious deficit in fundamental areas of ICT application in terms of funds, software and hardware resources and human competencies. The study recommends that government should provide the enabling environment for the application of ICT in schools and teachers should avail themselves of training opportunities in the area of workshops, conferences and seminars in ICT. This would enable geography teachers at the senior secondary schools level acquire ICT skills and knowledge relevant for its application in teaching and learning in this 21st century.

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