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Original Research Article

Influence of Information and Communication Technology (ICT) on Teaching and Learning Geography in Selected Tertiary Institutions in Adamawa State

Dr. Fareo Dorcas Oluremi*

Educational Foundations Department, Adamawa State University, Mubi Nigeria

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***Corresponding author:** Dr. Fareo Dorcas Oluremi

Abstract

This study investigated the influence of Information Communication Technology (ICT) in teaching and learning Geography in selected tertiary institutions in Adamawa State, Nigeria. The study specifically sought to determine if Geography teachers in tertiary institutions are exposed to new technologies, establish whether new technologies are available for teaching Geography, investigate the extent of integration of these new technologies into teaching Geography and examine the factors that inhibit teachers from using new technologies in teaching Geography in selected tertiary institutions in Adamawa State. The study adopted a descriptive survey design and the population consisted of students of three tertiary institutions in Adamawa State. Three hundred respondents were selected using stratified random sampling technique. The instrument titled: 'Information and Communication Technology in Teaching and Learning Geography Questionnaire' was validated by an expert in Guidance and Counselling from the Department of Science Education. The reliability value was calculated using Kudden Richardson formular (KR-21) which yielded reliability co-efficient of 0.87. Data collected were analyzed using frequency counts, simple percentage and t-test analysis. The study established that the teachers are exposed to internet/ web services, e-mail, multimedia, geographic positioning system, computers, printers and photocopiers and electronic cameras. he study also revealed that the factors inhibiting the integration of new technologies include inadequate training, poor funding, irregular power supply, prohibitive cost of ICT equipment, lack of interest in teachers and lack of pedagogical models on how to use ICT in teaching and learning in Geography. Tere is no significant difference in the male and female teachers' perception on the integration of new technologies for teaching Geography; There is no significant difference between the availability of new technologies and its utilisation for teaching Geography in tertiary institutions. It was recommended that Government should concentrate the ICT policies in the secondary schools in the State and there should be continuous training and ICT skills upgrading for teachers.

Keywords: Information and Communication Technology (ICT); teaching and learning; social and economic transformation; policy and integration.

INTRODUCTION

Education is vital for the development of a nation. An educated population leads to a productive workforce. Information and Communications Technologies (ICT) have become an integral part of education the world over. ICT is an umbrella term used to describe communication devices or applications that are used for the gathering, processing and dissemination of information. Most Nigerian tertiary institutions are already having computer study as part of their academic programmes, yet most of them are still theoretical in nature that hardly make impact meaningfully on the society. The Nigeria University Commission recently established a virtual learning website but its impact is yet to be seen and it is too early to be assessed [1].

In fact, ICT has had more impact on administrative services such as admissions, registration, fee payment and purchasing than on the fundamentals of classroom teaching and learning. However, even if ICT has not revolutionized the classroom yet, it is changing the learning experience of students by relaxing time and space constraints as well as providing easier access to information online journals and e-books; students' portals; etc., an achievement that should not be downplayed [2]. A significant milestone in the development of the ICT industry in Nigeria is the

formulation of a National Information Technology Policy (NITP), which was approved in March, 2001 by the Federal Executive Council.

The enactment of this policy came with the establishment of an implementing agency-the National Information Technology Development Agency (NITDA) in April 2001. This agency is charged with the responsibility of implementing Nigeria's Information Technology policy "as well as promotes the healthy growth and development of the Information Technology industry in Nigeria [3]. This has led to various schools to be investing in various and different ICTs and at different paces in order to be consistent with the government calls. Some schools that have huge financial muscle are moving with the ever changing technology and their students and teachers are not only computer literate, but keep in touch with the latest hardware, software and communication technologies.

The use of ICT in teaching and learning is a relevant and functional way of providing education to learners in order to assist them in imbibing the required capacity for the world of work [4]. Ajayi [5] posited that with the aid of ICT, teachers can take students beyond traditional limits, ensure their adequate participation in teaching and learning process and create vital environments to experiment and explore. However, the application of ICT needs expensive hardware and software which becomes the big obligations for schools and parents. It is also necessary that both teachers and learners should have basic technology knowledge before they apply ICT. This new development is a strong indication that the era of teachers without ICT skills are gone. Unfortunately, most teachers today do not have technological training to guide their students in the use of computers to enhance their learning achievement.

The pervasive influence of ICT has brought about a rapid technological, social, political and economic transformation, which has paved way to network society, organised around ICT. The field of education has not been unaffected by the penetrating influence of information and communication technology. However, ICT has immensely contributed to the quality and quantity of teaching and learning and research in traditional and distance education institutions. ICT enhances teaching and learning through its dynamic interactive and engaging content and provides real opportunities for individualization of instruction. The use of ICT in Geography helps students learn by providing access to large quantities of information on people, places and environment.

Italso provides the framework for analyzing data on patterns and relationships in a Geographicalcontext.There is no doubt that ICT is the medium of communication of young people and it already plays a pivotal role in almost every aspect of their lives. This study will therefore investigate the effect of ICT on teaching and learning Geography in selected tertiary institutions in Adamawa State, Nigeria.

Statement of the Problem

As Nigeria is striving hard to play a leadership role in Africa, particularly in the period of pragmatic and competitive science and technology, there is an urgent need to pay more prominent attention to the improvement of teaching and learning particularly in Nigerian tertiary institutions. This entails the adoption of Information and Communication Technology (ICT) in tertiary institutions. ICT has become an invaluable intervention of this modern time. Its inherent attributes such as accuracy, high speed performance, reliability and capability to store very large amount of data have made it possible for its applicability to all human endeavours including teaching, learning and research in educational institutions. The teaching and learning of Geography in tertiary institutions is plagued, due to non-integration of new technologies for the teaching and learning.Could this be due to unavailability of these technologies, teachers non-acceptability of ICT, or students' non chalant attitude towards effective learning using ICT? This study will therefore investigate the effect of ICT on teaching and learning Geography in selected tertiary institutions in Adamawa State, Nigeria.

Research Questions

- What is the extent of Geography teacher exposure to new technologies for teaching Geography in selected tertary institutions of Adamawa State?
- What is the extent of the availabilityof new technologies for teaching Geography in selected tertiary institutions in Adamawa State?
- What is the extent of integration of these new technologies into teaching Geography in selected tertiary institutions of Adamawa State?
- What are the factors that inhibits teachers from using the new technologies?

Research Hypotheses

The following research hypothses will be tested at 0.05 level of significance:

HO_1: There is no significant difference between male and female teachers' perception on the integration of new technologies for teaching Geography.

HO_2: There is no significant relationship between the availability of new teachnologies and its utilisation for the teaching and learning of Geography in tertiary institutions.

HO_3: There is no significant relationship among the factors that determine the inhibition of new technologies for the teaching and learning of Geography in tertiary institutions

Research Design

Descriptive research design was used for this study. This design was founded to be appropriate

because Jen [6] defined survey as a process of documenting the nature, scope, relationship, dimensions and directions of events, behaviour, attitudes and interests about a person or things.

Population and Sample

The target population for the study comprised of students of three tertiary institutions in Adamawa State. Five faculties/schools were chosen by simple random sampling while 20 students were chosen from each of the faculties/schools. The sample size of 300 was chosen from the three tertiary institutions by stratified sampling technique using age, sex and level as strata.

Research Instrument

The instrument for data collection was a questionnaire titled "Information and Communication Technology in Teaching and Learning Geography Questionnaire" (ICTTTLGQ). The instrument was adapted from Adelabu and Abu [3], and structured after a four point modified Likert rating scale. The instrument comprised of 45 items divided into 5 sections. Section A contained the demographic characteristics of the respondents which constituted age, gender, educational level, name of institution and years of experience. Section B contained 10 items relating to the extent of exposure of Geography teachers to new technologies for teaching Geography in tertiary institutions. Section C contained 10 items relating to availability of new technologies for teaching Geography in tertiary institutions. Section D contained 10 items relating to the extent of integration of new technologies in the teaching of Geography while Section E contained 10 items relating to the factors that inhibit teachers from using new technologies in the teaching of Geography.

Validity and Reliability of Instrument

The face and content validity of the instrument was established by the expert in Counselling Psychology in the Department of Science Education, Adamawa State University, Mubi. The reliability of the instrument was carried out in Adamawa State Polytechnic using test-retest reliability method. First test was administered on 30 teachers, while the second test was administered on the same set of students after two weeks. The reliability coefficient of 0.87 was obtained.

Data Collection and Analysis

The researcher and two research assistants administered the questionnaires and collected them on the spot. The collected data were analyzed using frequency count and simple percentage to answer research questions, while t-test and Analysis of Variance (ANOVA) was used to test all the hypotheses formulated at 0.05 level of significance.

RESULTS

Research Question 1: What is the extent of Geography teachers' exposure to new technologies for teaching Geography in tertiary institutions of Adamawa State?

Table-1: Geography teachers'exposure to new technologies for teaching Geography in tertiary institutions

ITEMS	SA	A	D	SD	Total
Internet/Web services	148 (49.33%)	94 (31.33%)	32 (10.67%)	26 (8.67%)	300 (100%)
E-mail	102 (34%)	88 (29.33%)	62 (20.67%)	48 (16%)	300 (100%)
Multimedia projector	153 (51%)	76 (25.33%)	33 (11)	38 (12.67)	300 (100%)
Interactive radio	25 (8.33)	34 (11.33)	78 (26)	163 (54.33)	300 (100%)
Video conferencing	20 (6.67%)	12 (4%)	125 (41.67%)	143 (47.67%)	300
Geographic Positioning Systems (GPS)	123 (41%)	96 (32%)	52 (17.33%)	29 (9.67%	300 (100%)
Weather forecast devices	32 (10.67%)	56 (18.67%)	78 (26%)	134 (44.67%)	300 (100%)
Computers	159 (53%)	111 (37%)	23 (7.67%)	7 (2.33%)	300 (100%)
Printers and photocopiers	115 (38.33%)	57 (19%)	78 (26%)	50 16.67)	300 (100%)
Electronic cameras	142 (47.33%)	89 (29.67%)	34 (11.33%)	35 (11.67%	300 (100%)

Table 1 shows responses from respondents concerning the exposure of Geography teachers to new technologies in teaching Geography in tertiary institutions. The responses shows that teachers are exposed to internet/ web services 242 (80.66%),E-mail 184 (61.33%), Multimedia 229 (76.33%), Geographic Positioning System (GPS) 219 (73%), Computers 270 (90%), Printers and Photocopiers 172 (57,33%) and Electronic cameras 231 (77%).

Research Question 2: What is the extent of availability of new technologies for teaching in selected tertiary institutions in Adamawa State?

Table-2: Availability of new technologies for teaching in Geography in selected tertiary institutions

ITEMS	SA	A	D	SD	TOTAL
Internet/Web services	34 (11.34%)	49 (16.33%)	89 (29.67)	128 (42.67%)	300 (100%)
E-mail	189 (63%)	75 (25%)	21 (7%)	15 (5%)	300 (100%)
Multimedia projector	162 (54%)	71 (23.67%)	42 (14%)	25 (8.33%)	300 (100%)
Interactive radio	12 (4%)	19 (6.33%)	91 (30.33	178 (59.33%)	300 (100%)
Video conferencing	34 (11.33)	57 (19%)	90 (30%)	119 (39.67%)	300 (100%)
Geographic Positioning Systems (GPS)	134 (44.67%)	84 (28%)	54 (18%)	28 (9.33%)	300 (100%)
Weather forecast devices	23 (7.67%)	41 (13.67%)	121 (40.33%)	115 (38.33%)	300 (100%)
Computers	143 (47.67%)	91 (30.33%)	34 (11.33%)	32 (10.67%)	300 (100%)
Electronic cameras	163 (54.33%)	73 (24.33%)	34 (11.33%)	30 (10%)	300 (100%)

Table 2 assessed the availability of new technologies in teaching Geographyin tertiary institutions. The results as revealed by respondents on the new technologies available include e-mail 264 (88%), Multimedia projector 233 (77.67%), Geographic Positioning System 218 (72.67%), Computers 234 (78%), Printers and photocopiers 263 (87.67%) and Electronic cameras 236 (78.66%).

Research Question 3: What is the extent of integration of these new technologies into teaching Geography in selected tertiary institutions of Adamawa State?

Table-3: Extent of Integration of these new technologies into teaching Geography

ITEMS	SA	A	D	SD	TOTAL
Internet/Web services	105 (35%)	99 (33%)	63 (21%)	33 (11%)	300 (100%)
e-mail	76 (25.33%)	89 (29.67%)	86 (28.67%)	49 (16.33%)	300 (100%)
Multimedia projector	135 (45%)	81 (27%)	55 (18.33%))	29 (9.67%)	300 (100%)
Interactive radio	81 (27%)	60 (20%)	66 (22%)	87 (29%)	300 (100%)
Video conferencing	27 (9%)	51 (17%)	109 (36.33%)	113 (37.67%)	300 (100%)
Geographic Positioning Systems (GPS)	87 (29%)	90 (30%)	72 (24%)	51 (17%)	300 (100%)
Weather forecast devices	27 (9%)	60 (20%)	99 (33%)	114 (38%)	300 (100%)
Computers	165 (55%)	75 (25%)	36 (12%)	24 (8%)	300 (100%)
Printers and photocopiers	126 (42%)	78 (26%)	54 (18%)	42 (14%)	300 (100%)
Electronic cameras	78 (26%)	81 (27%)	84 (28%)	57 (19%)	300 (100%)

Table 3 revealed the new technologies that have been integrated into teaching Geography. Those technologies include internet/web services 204 (68%), E-mail 165 (55%), multimedia 216 (72%), Geographic Positioning System 177 (59%), Computers 240 (80%), Printers and photocopiers 204 (68%) and Electronic cameras 159 (53%).

Research Question 4: What are the factors that inhibit teachers from using the new technologies?

Table-4: Factors inhibiting teachers from using new technologies

ITEMS	SA	A	D	SD	TOTAL
Inadequate computer trained and certificated teachers	130 (43.34%)	102 (34%)	38 (12.67%)	30 (10%)	300 (100%)
Poor funding	143 (47.67%)	126 (42%)	23 (7.67)	8 (2.67%)	300 (100%)
Irregular power supply	131 (43.67%)	97 (32.33%)	42 (14%)	30 (10%)	300 (100%)
Prohibitive cost of ICT equipment	94 (31.33%)	87 (29%)	52 (17.33%)	67 (22.33%)	300 (100%)
Lack of relevant software	53 (17.67%)	57 (19%)	94 (31.33%)	96 (32%)	300 (100%)
Low awareness of application of Information Communication Technology to teaching and learning	38 (12.67%)	59 (19.67%)	98 (32.67%)	105 (35%)	300 (100%)
Alienating of the child from his socio-cultural background	24 (8%)	32 (10.67%)	86 (28.67%)	158 (52.67%)	300 (100%)
Insufficient technical support for teachers	49 (16.33%)	55 (18.33%)	96 (32%)	100 (33.33%)	300 (100%)
Lack of interest in teachers	95 (31.67%)	82 (27.33%)	67 (22.33%)	56 (18.67%)	300 (100%)
Lack of pedagogical models on how to use ICT in teaching and learning in Geography	109 (36.33%)	88 (29.33%)	63 (21%)	40 (13.33%)	300 (100%)

Table 4 shows the factors inhibiting teachers from using new technologies in teaching Geography. Those factors according to respondents include inadequate training 232 (77.34%), poor funding 269 (89.67%), irregular power supply 228 (76%), prohibitive cost of ICT equipment 181 (60.33%), lack of interest in teachers 177 (59%) and lack of pedagogical models on how to use ICT in teaching and learning in Geography 197 (65.67%).

Hypothesis 1: There is no significant difference between male and female teachers' perception on the integration of new technologies for teaching Geography

Table-5: Male and female teachers' perception on the integration of new technologies for teaching Geography

Group	N	Mean	SD	Df	t-cal	t-crit	Decision
Male Geography teachers	241	4.57	1.76	299	1.742	1.906	Accepted
Female Geography teachers	59	2.50	1.82				

*Not Significant: (P>0.05)

Table 5 shows that the calculated t-test value of 1.742 is less than the criterion value of 1.906 at 0.05 level of significance. This implies that the perception of both male and female Geographyteachers on the integration of new technologies for teaching Geography did not differ. Therefore, the hypothesis is accepted.

Hyppothesis 2: There is no significant relationship between the availability of new technologies and its utilisation for teaching and learning of Geography in tertiary institutions.

Table-6: Availability of new technologies and its utilisation for teaching and learning of Geography

Group	N	Mean	SD	Df	t-cal	t-crit	Decision
Availability of new technologies	241	4.57	1.76	299	1.429	1.713	Accepted
Utilisation of new technologies	59	2.50	1.82				

*Not Significant: (P>0.05)

Table 6 shows that the calculated t-test value of 1.429 is less than the criterion value of 1.713 at 0.05 level of significance. This implies that there is no significant relationship between the availability and utilisation of new technologies for teaching Geography. Therefore, the hypothesis is accepted.

Hypothesis 3: There is no significant relationship among the factors that determine the inhibition of new technologies for the teaching and learning of Geography in tertiary institutions.

Table-7: Factors that determine the inhibition of new technologies for teaching and learning of Geography

Source of Variable	Sum of Squares	Df	Mean Square	F-cal	F-crit	Decision
Between Groups	43.006	1	43.006	34.135	4.47	Accepted
Within Groups	293.661	299	.985			
Total	336.667	300				

*Not Significant: (P>0.05)

The F-value of 34.135 obtained as shown in Table 7 is higher than the critical F-value of 4.47 at P > 0.05 level of significance. The null hypothesis is therefore accepted. It implies that there is no significant relationship among the factors that determine the inhibition of new technologies for the teaching and learning of Geography in tertiary institutions.

DISCUSSION

The finding of the study showed the extent of Geography teachers exposure to the new technologies in the field of teaching and learning Geography. The study revealed that teachers were moderately exposed to new technologies in teaching Geography. This is in agreement with Sofowora &Egbedokun [7] who pointed out that teachers rarely see or have access to new technologies for teaching. This they said could be attributed to a couple of reasons including lack of those new technologies and high cost of purchasing such equipments.

The study assessed the availability of new technologies in teaching and learning Geographyand it was revealed that there is poor availability of Information Communication Technology. This confirms the observation of Ezeoba [8] and Fakeye [9] who also found that ICT resources werenot available in primary and secondary schools.Ohakwe and Okwuanaso [10] contented that the knowledge of computer application software's such asspreadsheet, excel, computer aided design, and database are important skills in teaching and such skills should beimpacted. On the recipients of biological science, these would make them to compete confidently and acquire vastknowledge in their education pursuit. Nworgu [11] in his study emphasied that computer aided instruction is aprogramme of instruction or package presented in software for instructional purpose. They went further to state that ICTmade the teaching and learning process efficient, most effective easier and less cumbersome.Access to ICT infrastructure and resources in schools is a necessary condition to the integration of ICT ineducation. Effective adoption and integration of ICT into teaching inschools depends mainly on the availability and accessibility of ICT resources such as hardware, software [12]. According to him, access to computers, updated software and hardwareare key elements to successful adoption and integration of technology.

The study found out that there is poor integration of new technologies in teaching Geography by Geography teachers. This is in agreement with Mandoga, Matswetu and Mhishi [13] who found out in their study that computers were not utilized in all facets ofthe curriculum but were being utilized solely for computer studies lessons. According to Mandoga *et al*. [13], therespondents interviewed indicated that the use of the computers must spread across all subject areas, other than justbeing used as instructional tools in a single subject area. It should be noted that through utilizationof suitablesoftware, computers could be used to teach subjects like maths, science, Geography, art, physics, biology and othersubjects [13]. These findings are also in agreement with the study conducted by Bhukuvhani, Zezekwa, and Sunzuma [14] who discovered that computer usage by students for learning purposes and other uses wasvery low, as well as their relatively low computer expertise.

The study revealed that these factors include inadequate computer trained and certified teachers, poor funding, irregular power supply, lack of interest in teachers and lack of pedagogical models on how to use ICT in teaching and learning Geography. This is in consonance withYusuf, [15] that there have been a number of factors affecting the utilisation of ICT in education across the nations. They pointed out that such factors include inadequate funding to support the purchase of the ICT facilities, lack of training in the use of ICT facilities, teaching personnel's lack of motivation and the need among teachers to adopt ICT as teaching tools. They further stated that in Nigeria, the political conditions in the past thirty years give no room for continuity in ICT utilisation in schools.

The study revealed that there is no significant difference between male and female teachers' perception on the integration of new technologies for teaching Geography. This finding is in consonance with Adu, Adelabu and Anjorin [3] which stated that views of both the male and female teachers on the integration of ICT facilitiesin the teaching of biological science in secondary schools did not differ. The study also revealed that there is no significant relationship between the availability and utilisatioon of new technologies for teaching Geography. This finding is however contrary to the findings of Sibanda Mavellas, Wellington and Furusa [16] which is that most ICTs required for training are not available at all, and those that are available are inadequate. It also revealed that the available ICTs are being utilized to a very low extent.

The study also revealed that there is no significant relationship between among the factors that determine the inhibition of new technologies for teaching and learning of Geography in tertiary institutions. This finding is contraryto the study conducted by Sibanda, Mavellas, Wellington and Furusa [16] which showed that the factors affecting utilization of available resources in schools include lack of qualified teachers since the few they have are overwhelmed, lack of electricity, which is a common problem in most African countries, inadequate computers, breakdown of the computers, higher prices for the procurement of ICT resources, burglary, computer phobia by both administrators and teachers, obsolete computers and increased moral degradation, that is abuse of such facilities as internet by people who

watch inappropriate material, cyberbullying and other anti-social behaviors.

CONCLUSION

In conclusion, integration and proper utilization of ICT in the teaching of Geography intertiary institutions in the Adamawa state will go a long way in raising the fallen standard of education, making learning real andmore interesting, no longer abstract. This also will motivate Geographylearners, who deserve an improvedapproach to their daily educational pursuit via the use of modern educational technologies. The need to equip Geographyteachers with adequate ICT skills and infrastructure also becomes imperative.

RECOMMENDATIONS

The following are recommended based on the findings of this study;

- Geography teachers in tertiary institutions in the state should be exposed to ICT use in instructionaldevelopment through seminars and workshops sponsored by the state government.
- Parents Teachers' Association (PTA) should find a way of making internal arrangements to generate funds in order to pay the cost of these infrastructures.
- Alternate sources of power such as solar energy and generators be put in place to alleviate the problem of electrical power cuts.
- Government and stakeholders should provide funds for procurement and maintenance of ICTs in schools.
- Technical support should be provided in schools to ensure that help for those in need is always available and facilities are kept in their expected operational status.

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