



Impact of Information and Communication Technologies (ICTs) on Academic Performance of Students in Agricultural Science in Secondary Schools in Bauchi State

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ABSTRACT

This study assessed the impact of Information and Communication Technology (ICT) on the academic performance of students in agricultural science in secondary schools in Bauchi State, Nigeria. Two objectives, two research questions, and two null hypotheses were stated and tested at 0.05 level of significance. Ex-post-factor research design was adopted for the study. The population of the study was 920 agricultural science students in secondary schools in Bauchi State. A sample size of four hundred and sixty (460) students was used. The instruments used for data collection were a checklist and structured questionnaire named "Availability and Accessibility of Information and Communication Technology Equipment Questionnaire (AA – ICTEQ). Mean and standard deviations were used to answer the stated research questions. Simple Regression Analysis was used to test the two null hypotheses. The summary of the findings showed that the availability and accessibility of ICT equipment affected the academic performance of students in agricultural science in secondary schools in Bauchi state. It is hence concluded that provision of ICT equipment in schools can be one way by which teachers' efficiency, school learning situation and students' learning outcome can be improved. One of the recommendations were given, among which was that, to make teaching and learning of agricultural science better and to improve students' academic performance, Bauchi State governments should provide available ICT equipment in all secondary schools in the State and should be made accessible to the teachers for optimal utilization.

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INTRODUCTION

The rapid growth in Information and Communication Technology (ICT) has brought remarkable changes in the 21st century. ICT is becoming increasingly important affecting the daily lives of the

people and the educational system. Therefore, this makes a growing demand on educational institutions to use ICT in teaching skills and knowledge, because of realizing the effect of ICT on the workplace and everyday life, the educational



institutions have to restructure their educational curricular and classroom facilities to bridge the existing technology gap in teaching and learning. This restructuring process requires effective adoption of technologies into the existing environment to provide learners with knowledge of specific subject areas, to promote meaningful learning and to enhance professional productivity (Charles, 2012).

ICT has brought into the system new and emerging technologies that have come to replace or challenge the traditional methods involved in the teaching and learning process. There is need therefore for proper integration of ICT in instructional delivery for purposeful and experimental learning to take place. This involves being able to seek out and use information stored in computers and other electronic-materials to be up-to-date. They have been proved to be very useful support materials in teaching and learning, that is why different governments globally made investment in ICT to improve teaching and learning in schools. For example in United Kingdom (UK), the government spending on ICT in the educational sector in 2008 – 2009 was \$ 2.5 billion, in the United States the expenditure on K – 12 schools and higher education institutions was \$ 6 billion and 4.7 billion respectively and in New Zealand, the government spent over \$ 410 million every year on schools ICT infrastructure (Charles, 2012). The Nigerian government on her effort towards the development of Information Technology (IT), the National Policy for Information Technology (NPIT) was formulated in 2001 with a vision 'to make Nigeria IT capable country in Africa and a key player in the information, using IT as the engine for sustainable development, and global competitiveness' (Federal Ministry of Science & Technology, (FMST) 2001). The mission statement recognized

the need to use IT for education. Also, the general objectives 3 out of 31 focused on integrating ICT into the mainstream education and training, with a strategy to restructure educational systems at all levels to respond effectively to the challenges and imagined impact of the information. Also, the Nigerian Government has been in the lead in the integration of ICT tools with the number of initiatives through collaborations with development partners to initiate a programme like SchoolNet Nigeria, computers-in-schools projects, One-laptop-per-Child etc. Despite all these investments in ICT infrastructure and professional development to improve education, there is still little evidence of ICT adoption and utilization in teaching and learning in Nigeria. Evidence suggests that the education sector is investing heavily on ICT but ICT adoption in the education sector lagged behind the business sector in Nigeria.

ICT has been seen by Adeosun (2010) as the emergence of tools of microelectronic and telecommunications that are used in the automatic acquisition, analysis, storage, retrieval, manipulation, management, control, movement, display, transmission, reception and interchange of quantitative and qualitative data. Ogunsola (2005) opines that ICT is an electronic-based system of information transmission, reception, processing and retrieval, which has drastically changed the way we think, the way we live and the environment in which we live". It can be used to access global knowledge and communication with other people. Students who use ICTs gain a deeper understanding of complex topics and concepts and are more likely to recall information and use it to solve problems outside the classroom (Apple Computer, 2002).

ICT Equipment, on one hand, is all digital tools and machines used in teaching and learning which includes computer



hardware and software, television, radio, data projector, overhead projector, digital camera and internet facilities, smart board, video slides, film strips, fax machine, scanning machine and telephone etc. In this study, availability means the condition with which teachers have access and make use of functional ICT Equipment for effective teaching of agricultural science to students in senior secondary schools. It refers to the quality, quantity and functionality of such ICT equipment to teachers at every point in time for effective utilization.

Accessibility, going by this study, refers to ICTs equipment per number or population of teachers that uses an ICT at a disposable time. Accessibility of ICT equipment in teaching agricultural science is important because at times the equipment may be available but not accessed by teachers. All the described variables constitute the background in which this study was conducted to assess the availability, and accessibility of ICT equipment on academic performance of students in agricultural science in secondary schools in Bauchi State, Nigeria.

With a population of over 160 million, Nigeria has set for herself a wide array of ambitious goals of several global and national frameworks that seek to promote the fundamental right of her citizens to quality education. However, the E9 meeting held in Indonesia in April 2008, it was revealed that Nigeria is one of the only few countries that were at the risk of not meeting the targets of education for all (EFA) because the quality of teaching and learning due to improper adoption of ICT resources in our schools remained a significant challenge (Adeosun, 2010).

The 21st century currently coiled everything into ICT in which education is inclusive for which the use of ICT has made teaching and learning process very impressive.

Moreso, the researcher went on interaction with people in the state and observed that there is an argument among stakeholders in education on the availability of ICT equipment in the state. Some argued that the government furnished the schools with available ICT equipment others stressed that, there was no available ICT equipment in the schools. On this note, the available ICT equipment was either not accessible or not properly utilized by teachers. In the same vein, some previously conducted research works on the use of ICT equipment in Nigerian secondary schools affirmed this statement (Muhammad, Hamza and Suleiman 2014). It is based on these therefore, the researcher conducted this research to assess the availability, and accessibility of ICT equipment on academic performance of students in agricultural science in secondary schools in Bauchi State, Nigeria.

Objectives of the Study

The main objective of this study is to examine the availability, accessibility and utilization of ICT equipment on academic performance of agricultural science students in secondary schools in Bauchi State, the specific objectives of the study are to:

1. determine the effect of availability of ICT equipment on the academic performance of students in agricultural science in secondary schools in Bauchi State;
2. determine the effect of accessibility of ICT equipment on the academic performance of students in agricultural science in secondary schools in Bauchi State;

Research Questions

Based on the specific objectives of the study, answers to the following questions were provided:



1. What is the effect of availability of ICT equipment on the academic performance of students in agricultural science in secondary schools in Bauchi State?
2. What is the effect of accessibility of ICT equipment on the academic performance of students in agricultural science in secondary schools in Bauchi State?

Research Hypotheses

The following null hypotheses were postulated to guide this study:

- H0₁: availability of ICT equipment has no significant effect on the academic performance of students in agricultural science in secondary schools in Bauchi State.
- H0₂: accessibility of ICT equipment has no significant effect on the academic performance of students in agricultural science in secondary schools in Bauchi State.

METHODOLOGY

This study adopted an ex-post factor research design. The design was chosen to allow the researcher to have the previous records of student's Mock examination for the transition to SSS III, get an insight about feelings, opinions, perception, awareness and appreciation of agricultural science students in the use of ICT equipment in teaching and learning in secondary schools in Bauchi State.

The population of this study comprised of nine hundred and twenty (920) students offering Agricultural science as a subject at senior secondary school three (SSS III) in the three education zones in Bauchi State. The Education zones are Bauchi zonal education office, Bauchi; Central zonal education office, Darazo and Katagum zonal education office, Azare, with a total population of three hundred and seventy-

one (371); two hundred and fifty-three (253) and two hundred and ninety-six (296) respectively.

A sample size of four hundred and sixty (460) students was used in this study. Out of this number, one hundred and eighty-five (185) students were selected from Bauchi zonal education area, one hundred and twenty-seven (127) from Central education zone and one hundred and forty-eight (148) from Katagum education Zone. The sampled sizes in the three education zones were drawn using a proportionate sampling procedure since each zone was considered as a stratum.

The instrument for data collection was a checklist adapted from Stephen (2013), a structured questionnaire titled "availability and Accessibility of Information and Communication Technology Equipment Questionnaire (AA-ICTEQ)" developed by the researcher and a Record of students' performance in Mock examination. The checklist had fourteen (14) items to determine the availability of ICT equipment. The checklist structured as Readily Available (RA), Fairly Available (FA) and Not Available (NA).

The questionnaire was vetted by experts in ICT and experts in educational research and pilot tested in secondary schools in Kiyawa Local Government Area (LGA) of Jigawa state and Fika LGA in Yobe state because of their common characteristics with the respondents in the study area. Standardized Cronbach alpha reliability coefficient of 0.87 was obtained and used. Data collected were coded and analyzed using the Statistical Package for Social Sciences (SPSS, version 23). The two (2) research questions were answered using mean and standard deviation, while all the null hypotheses were tested using simple regression analysis at 0.05 level of significance.



RESULTS

Research Question One: What is the effect of availability of ICT equipment on the

academic performance of students in agricultural science in secondary schools in Bauchi State?

Table 1: Mean and standard deviations on the effects of availability of ICT equipment on the academic performance of students in Agricultural Science in secondary schools in Bauchi State

S/N	Checklist items	N	Mean	Std.	Decision
1.	There are available computer hardware in my school	460	1.35	0.49	Available
2.	There are available computer software in my school	460	2.00	0.41	Readily Available
3.	There are available data projector in my school	460	1.55	0.63	Available
4.	There are available digital camera in my school	460	1.10	0.14	Not Available
5.	There are available internet for browsing in my school	460	1.40	0.56	Not Available
6.	There are available smart board in my school	460	1.37	0.29	Not Available
7.	There are available TV/Radio in my school	460	1.55	0.63	Available
8.	There are available fax machine in my school	460	1.20	0.16	Not Available
9.	There are available scanning machine in my school	460	1.55	0.49	Available
10.	There are available telephone in my school	460	1.70	0.42	Readily Available
11.	There are available E-mail services in my school	460	1.90	0.27	Readily Available
12.	There are available Satellite service in my school	460	1.05	0.15	Not Available
13.	There are available LAN services in my school	460	1.14	0.04	Not Available
14.	There are available Video Conferencing facilities in my school	460	1.46	0.66	Not Available
Cumulative Mean			1.45		

Table 1 showed the means and standard deviations of the assessment of the effects of availability of ICT equipment on the academic performance of students in agricultural science in Secondary Schools in Bauchi State. The analysis showed that questionnaire item 2 (*computer hardware and software*) had the highest mean score of 2.00 with a relatively closer standard deviation of 1.41, while questionnaire item 12 (*available satellite*) which did not meet the prior expectation of this research had a mean score of 1.05. However, it was observed that the results revealed that most

of the ICT equipment was not available with an aggregate mean of 1.45 which is less than the benchmark of 2.00. This implies that the availability of ICT equipment did not affect the performance of students in agricultural science in senior secondary schools in Bauchi State.

Research Question Two: What is the effect of accessibility of ICT equipment on the academic performance of agricultural science students in secondary schools in Bauchi State?

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Table 2: Mean and standard deviations on the accessibility of ICT equipment for teaching agricultural science in secondary schools in Bauchi State

S/N	Questionnaire items	N	Mean	Std.	Decision
1.	I use to access computer hardware available in my school	460	1.50	1.70	Moderately Accessible
2.	I use to access computer software available in my school	460	2.00	1.41	Highly Accessible
3.	I use to access data projector available in my school	460	2.00	1.41	Highly Accessible
4.	I use to access digital camera available in my school	460	1.00	0.08	Not Accessible
5.	I use to access the internet for browsing available in my school	460	1.15	0.05	Not Accessible
6.	I use to access smart board available in my school	460	1.11	0.19	Not Accessible
7.	I use to access TV/Radio available in my school	460	1.55	0.66	Accessible
8.	I use to access the fax machine available in my school	460	1.00	0.08	Not Accessible
9.	I use to access scanning machine available in my school	460	1.60	0.56	Moderately Accessible
10.	I use to access the telephone available in my school	460	1.80	0.28	Highly Accessible
11.	There are available E-mail services in my school	460	1.90	1.27	Highly Accessible
12.	There are available Satellite service in my school	460	1.19	1.34	Not Accessible
13.	There are available LAN services in my school	460	1.49	0.63	Not Accessible
14.	There are available Video Conferencing facilities in my school	460	1.10	0.21	Not Accessible
Cumulative Mean			1.46		

Source: Field Study, 2017

Table 2 showed the means and standard deviations of the assessment of the effects of accessibility of ICT equipment on the academic performance of students in agricultural science in Secondary Schools in Bauchi State. The analysis showed that questionnaire item 2 and 3 (*I use to access computer software available in my school and I use to access data projector available in my school*) had the highest mean score of 2.00 with a relatively closer standard deviation of 1.41 respectively, while

questionnaire item 4 (*I use to access the Digital Camera available in my school*) which did not meet the prior expectation of this research had a mean score of 1.00. However, it was observed that the results revealed that the ICT equipment was not accessible with an aggregate mean of 1.46 which is less than the benchmark of 2.00. This implies that accessibility of ICT equipment did not affect the performance of students in agricultural science in senior secondary schools in Bauchi State.



Null Hypothesis One: Availability of ICT equipment has no significant effect on the academic performance of agricultural

science students in secondary schools in Bauchi State.

Table 3: Regression Analysis on the effects of availability of ICT equipment on the academic performance of students in agricultural science in a secondary school in Bauchi State

Variables	β	SE	T	R ²	Adj. R	Sig.
Constant	3.783	0.465	8.135	0.797	0.792	0.000
Availability of ICT equipment	0.530	0.086	6.123	0.512	0.497	0.001

P < 0.05

The regression analysis in table 3 presents the effects of the availability of ICT equipment on the academic performance of agricultural science students in secondary school students in Bauchi State. The results revealed that the coefficient of determination (R²) which shows the total contribution of the independent variable to the dependent was 0.797 or 79%. The coefficient of the independent variable (available ICT equipment) was 0.530 indicating that one unit increase in the availability of ICT equipment will increase students' performance in agricultural

science by 53%. The result further indicated that the calculated p-value of 0.001 was less than the *a priori* alpha-value (α) of 0.05 level of significance ($P = 0.001 < \alpha = 0.05$). Hence, the null hypothesis that says the availability of ICT equipment has no significant effects on academic performance of students in agricultural science was, therefore, rejected.

Null Hypothesis Two: Accessibility of ICT equipment has no significant effect on the academic performance of agricultural science students in secondary schools in Bauchi State.

Table 4: Regression Analysis on the effects of accessibility of ICT equipment on the academic performance of students in agricultural science in a secondary school in Bauchi State

Variables	β	SE	T	R ²	Adj. R	Sig.
Constant	1.652	0.687	2.405	0.653	0.650	0.000
Accessibility of ICT equipment	0.374	0.199	1.918	0.493	0.490	0.001

P < 0.05

The regression analysis in table 4 presents the effects of accessibility of ICT equipment on the academic performance of agricultural science students in secondary school students in Bauchi State. The results revealed that the coefficient of determination (R²) which shows the total contribution of the independent variable to the dependent was 0.493 or 49%. The coefficient of the independent variable (accessibility of ICT equipment) was 0.374

indicating that one unit increase in the accessibility of ICT equipment will increase students' performance in agricultural science by 37%. The result further indicated that the calculated p-value of 0.001 was less than the *a priori* alpha-value (α) of 0.05 level of significance ($P = 0.001 < \alpha = 0.05$). Hence, the null hypothesis that says the accessibility of ICT equipment has no significant effects on the academic performance of students in agricultural science was, therefore, rejected.

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DISCUSSION OF FINDINGS

The findings from null hypothesis one revealed that availability of ICT equipment had significant effects on academic performance of students in agricultural science in secondary schools in Bauchi State ($p = 0.001$). This finding is in contrast with that of Idoko and Ademu (2010) found that ICT facilities were not available in secondary schools in Kwara State. Similarly, Fekeye (2010) also investigated the English language teachers' knowledge and use of ICT in Ibadan Southwest LGA of Oyo State and found that availability of computers and their connections to the internet was non-existent in virtually all the schools studied. Also, Wisdom and Terumber (2012) revealed that ICT resources were not available in COE Katsina-Ala for teacher educators' instructional development. Cirfat, Zumyil and Ezema, (2003) who found that the status of ICT in colleges of education in Plateau State was below average. Very few ICT facilities were available. Ezeoba (2007) revealed that the media availability average was less than 20% over 50%. Adeyeye, Oke and Tijina (2003) who find out that, very low availability of ICT resources in his sampled schools although 80% of the respondents both teachers and students indicated their willingness to be trained for ICT usage. Also, Atsumbe, Raymond, Enoch and Duhu (2012) revealed that e-learning infrastructure was not available for teaching and learning and ICT tools available in the university were mainly used for administrative purposes. Also, the same with that of Zubairu (2014) who revealed that ICT resources are not available in Federal Colleges of Education in Nigeria. Also, Mohammed, Hamza and Sulaiman (2014) revealed that the public schools did not have enough computers and respondents agreed that ICT has an effect on school operations among others.

In line with this finding, Akingbade, (2013) found that computers were available in most schools. The findings also showed that there is no significant difference in the availability of ICT facilities in public and private secondary schools and that students in private schools are more exposed to ICT than their counterparts in public schools. Also, Akindele (2013) who found that about 90%, 92%, 96% of ICT facilities were found readily available in public secondary schools in the south-west, Nigeria, but personal observation revealed that these facilities were scanty and not maximally utilised. The same with the findings of Ugwoke, Onu, Agangan and Ugwuanyi (2015) who found that there was availability of ICT facilities such as laboratories and others in secondary schools in Nsukka education zone.

The findings from null hypothesis two revealed that accessibility of ICT equipment had significant effects on the academic performance of students in agricultural science in secondary schools in Bauchi State ($p = 0.001$). The findings of Wisdom and Terumber (2012) found that teacher educators in COE Katsina-Ala could not access ICT resources for instructional development purposes. This finding is the same as that Madu and Laura (2011) found that the e-learning facilities were for teaching agriculture at Minna University was inadequate and students' accesses was negligible.

Agreeing with the finding of this study, Yildirim (2007) revealed that, teachers agreed that, access to ICT infrastructure is one of the effective means to integrate ICT in classrooms. In the same vein, Toure (2008) found that majority of the teachers had access to a computer and the internet at their schools. He further stressed that 98% of the teachers had access to the internet at the schools. The findings are also in line with that of CCK (2010) who mentioned that 78.6% of the teachers had access to cyber



cafes and 36.7% through ICT training centres that offered short term courses during the school recess. The similar findings of TNS Research International (2010) mentioned that majority of the teachers, about 40% had more than 10 hours in a week of access to the school computers. However, Kenya SCHOOLNET (2003) found that the level of access to locally relevant content by the teachers was high as 82.4% said they had access to local web-based training programmes.

From the findings, the availability and accessibility of ICT affected the academic performance of students in agricultural science in secondary schools in Bauchi state. Provision of ICT equipment in schools can be one way by which teachers' efficiency, school learning situation and students' learning outcome can be improved.

RECOMMENDATIONS

Based on the outcome of the study, the following recommendations were made.

1. To make teaching and learning of agricultural science effective and improved students' academic performance, the Bauchi state government should provide available ICT equipment through the ministry of education in all the state-owned secondary schools in Bauchi state.
2. The researchers recommend that the ICT equipment if provided should be made accessible to teachers to generate more effective teaching and learning of agricultural science in secondary schools in Bauchi State.

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