

Assessment of Availability of ICT Facilities for Basic Science and Technology Teachers in Nasarawa State

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Abstract

This study investigated the assessment of information and communication technology facilities of basic science and technology teachers in Nasarawa state. Three research questions and three null hypotheses guided the study. The study employed a descriptive survey research design. The population of this study consists of 1700 basic science and technology teachers from 93 government owned secondary schools and 63 private owned secondary schools in Nasarawa state. A sample of 170 basic science and technology teachers was randomly selected and used. Two instruments were used for data collection: ICT facilities availability check list (ICTFACL) and basic science and technology ICT literacy questionnaire (BSATICTLQ) which was validated by experts. The average validity index was 0.72 and the reliability coefficient found was 0.82. Descriptive statistics of mean and standard deviation were used to answer the research questions while independence t-test was used to test the null hypotheses at 0.05 level of significance. The findings among others reveal that: information communication technology facilities were more available in private secondary school than public secondary school in Nasarawa state; information communication technology facilities were more available in urban secondary school than rural secondary school in Nasarawa state; there was significant difference in the mean response of basic science and technology teachers in public and private secondary schools on the availability of ICT facilities in teaching in Nasarawa state. It was therefore recommended among others that government, multinational cooperation proprietors and individual should guarantee the provision and use of functional ICT facilities in both private and public schools. The study concluded that private schools have more information communication technology facilities than government schools.

Keywords: Assessment, Information, Communication, Technology, ICT Facilities, Teachers.

Introduction

Basic Science is a science subject taught at upper basic school level. According to Amewuda (2018), Basic science is the fundamental of science mainly made up of Chemistry, Physics, Biology and Mathematics. Basic Science being the foundation for further studies of all sciences and science related fields, the foundation must therefore be laid solidly well at basic level because any inadequacy at this level would consequently create serious negative educational consequences for the learners. Consequently, the overall learning outcomes in terms of student's scientific skills and attitude to academic performance in basic science

and technology have not been really encouraging; a comprehensive look at students' performance in basic science and technology has revealed that students' performance in the subject area has been quite discouraging in terms of skills and attitudes. Studies have shown that the performance in basic science and technology among students at basic education certificate examination in Nigeria in terms of knowledge had been low (Umoke & Nnwafor, 2014).

The federal government of Nigeria, in the national policy on education (FRN 2014), recognizes the prominent role of ICTs in the modern world, and has integrated ICTs into education in Nigeria. Whilst majority of school heads and teachers recognize the importance of the use of ICTs for developing 21st century skills, ICTs use in classrooms are still limited. Indeed, most students and teachers in schools across Nigeria rarely use ICT during lessons with the majority of teachers using ICTs primarily for lesson preparation. The appropriate use of ICT in teaching transforms the learning environments from teacher-centered to learner-centered. They stress that this shifting of emphasis from teaching learning creates a more interactive and engaging learning environment for teachers and learners thus changing the role of the teacher from knowledge transmitter to that of a facilitator, knowledge navigators and a co-learner in Basic Science and Technology Education. However, the subject, Basic Science and Technology formally known as Integrated Science is taught at the junior secondary schools which general importance is to enable students observe and explore the environment using their senses and their hands. The objective specifically aims at enabling the learners to develop interest in science and technology, acquire basic knowledge and skills in science and technology, apply their scientific and technological knowledge and skills to meet their societal needs and take advantage of the numerous career opportunities offered by science. (NERDC, 2009).

ICT facilities: these are valuable based-tools used to enhance the teaching and learning experience and accessing resources in basic science across schools. Such valuable tools include computers, projectors, mobile phone, and internet services, printers, digital cameras, hardware and software, compact disk, radio, television sets, scanners, electronic media, photocopiers and amongst others Kamble (2017). The availability of ICT facilities at rural and urban schools is still debatable. Onwuagboke (2014) in his research found that the extent of availability of ICT resources in secondary schools is very low, in other words they were grossly inadequate in the schools where they were found. More so, the ICT skills are a thing of concern across rural and urban schools. Mabayoje, Isah, Bajeh and Oyekunle (2015) found that there was low level of ICT skills among secondary school students in the rural areas and that there was lack of ICT facilities for hands-on training which is the main reason for low ICT skills for teaching and learning.

Assessment is a process which includes identifying objectives to access, carrying out measurement, and documenting the results of the measurement usually in measurable terms. Behavior usually assessed includes knowledge, skills, attitude and beliefs. To a layman, assessment could mean to quantify and report the quality of characteristics and behavior of an individual. However, Palomba and Banta (2015) defined assessment as the

systematic collection, review and use of information about education programs undertaken for the purpose of improving learning and teaching. Assessment can focus on the individual learner, the learning community (class, workshop, or other organized group of learners) and the institution or the educational system

Gender is considered as a variable that has so much effect on both teachers and student in the teaching and learning processes. Gender according to Oyibe (2016) is a psychological experience of been a male or female. It has to do with personality and central components of self-concept. Unlike sex, which is concerned with only the distinction between male and female based on biological characteristic, gender encompasses other personality attributes as roles, orientation and identity based on individual's conceptualization of self.

According to Yakubu (2018) public schools are schools which are maintained at the expense of federal and state government for the education of the children of a given district and that constitute a part of a system of free education. Private schools, also known as independent schools, non-governmental or non-state schools, are not administered by local, state or national government, thus, they retain the right to select their students and are funded in whole or in part by asking their students to pay high amount of money as tuition rather than relying on mandatory taxation through public (government) funding. Private school is a school under the financial and managerial control of a private body or charitable trust, accepting mostly fee-paying students, it is also an independent school supported wholly by the payment of fees. A school supported by a private organization or private individuals rather than by the state school location refers to the particular place, in relation to other areas in the physical environment (rural or urban), where the school is sited. In Nigeria rural life is uniform, homogenous and less complex than that of urban centers, with cultural diversity, which often is suspected to affect students' literacy level in ICT (Ntibi & Edoho, 2017). This is because urban centers are better favored with respect to distribution of social amenities such as pipe borne water, electricity, health care facilities while the rural areas are less favored. This is also true in the distribution of educational facilities and teachers. These prevailing conditions imply that learning opportunities in Nigeria schools differ from school to school. It would appear therefore that students in Nigeria urban schools have more educational opportunities than their counterparts in rural schools.

The inappropriate allocation and provision of ICTs resources for classroom such as fixing up computers or providing laptop in classroom may create fuss for teaching and learning process. Technology is changing rapidly, therefore, meeting up with the challenges and innovation is costly and may not be feasible for institution to accommodate themselves with these resources. The Availability of Information and Communication Technology Facilities. Thus, the problem of this study put in question form is, what are the availability of ICT facilities with respect to location of the school, school types as well as the gender differences in ICTs literacy level in upper basic ii schools in Nasarawa State?

Statement of the Problem

Concern has been expressed by relevant stakeholder in education especially science teachers over ICT literacy which forms part of a generic skills set, with implications for teaching and learning in the schools. Since ICT has found its way into the classroom as a tool for enhancing teaching and learning, it is expected that there should be adequacy in its availability; teachers and students should also be competent in its application in order to fit in the society. It might be that availability of ICT facilities cannot be assured and literacy level is not adequate. There is no doubt that ICT in the classroom could have a large number of benefits however, it is not free of drawbacks. The drawbacks of ICT could lead to lack of the training of teachers, students and other staff, lack of access to the gadgets, and lack of time required by school to implement its proper use.

The inappropriate allocation and provision of ICT resources for classroom such as fixing up computers or providing laptop in classroom may create fuss for teaching and learning process. Technology is changing rapidly, therefore, meeting up with the challenges and innovation is costly and may not be feasible for institution to accommodate themselves with these resources. The availability of Information and Communication Technology facilities and Literacy levels in Upper Basic School seems to be questionable. Thus, the problem of this study put in question form is, what is are the availability of ICT facilities and literacy levels of Basic Science and Technology teachers with respect to location of the school, school types as well as the gender differences in ICT literacy level in Upper Basic II Schools in Nasarawa North, Nasarawa State?

Theoretical Framework

This study is anchored on the cognitive theory of Multimedia Learning (1999). The cognitive theory of multimedia learning was popularized by the work of Richard E. Mayer and other cognitive researchers in (1999) who argue that Multimedia supports the way that the human brain learns. The cognitive theory of Multimedia learning stated that deeper learning can occur when information is presented in both words and pictures than by word or picture alone. The words can be spoken or written, and the picture can be any form of graphical imagery including cognitive theory of multimedia learning. The theory of multimedia learning hinges on the presumptions that there are two channels for learning: auditory and visual.

The cognitive theory of Multimedia Learning (CTML) centers on the idea that learners attempt to build meaningful connections between words and pictures and that they learn more deeply than they could have with words or pictures alone (Mayer, 2009).

The implications of the theory are that the use of multimedia instructional resources in teaching and learning facilitates both teachers and students to effectively transact learning experiences. This can be done by using multimedia instructional resources for the learner to see, hear, feel or touch where necessary.

Research Questions

The following research questions were raised to guide the study:

1. What are the mean responses of public and private basic science and technology teachers on availability of ICT facilities in secondary schools in Nasarawa state?
2. What are the mean responses of urban and rural basic science and technology teachers on availability of facilities ICT in secondary schools in Nasarawa state?
3. What are the mean responses of male and female basic science and technology teachers on availability of ICT facilities in secondary schools in Nasarawa state?

Objectives of the Study

The purpose of this study was to assess ICT facilities of basic science and technology teachers in upper basic schools in Nasarawa state.

Specifically, the study sought to:

1. To assess the availability of ICT facilities for teaching basic science and technology in public and private secondary schools in Nasarawa state.
2. To assess the availability of ICT facilities for teaching and learning basic science and technology in urban and rural secondary schools in Nasarawa state.
3. To find out the response of male and female basic science and technology teachers on the availability of ICT facilities in secondary schools in Nasarawa state.

Statement of the Hypotheses

The following null hypotheses formulated were tested at 0.05 level of significance:

Ho₁: There is no significance difference in the mean response of basic science and technology teachers in public and private secondary schools on the availability of ICT facilities in teaching in Nasarawa state.

ho₂: There is no significant difference in the mean response of basic science and technology teachers in urban and rural on the availability of ICT facilities in teaching secondary schools in Nasarawa state.

ho₃: There is no significant difference in the mean response of male and female basic science and technology on the availability of ICT facilities in teaching secondary schools in Nasarawa state.

Methodology

This study used descriptive survey research design. A descriptive survey research design was used for the purpose of gathering information about variables from a representative sample of the population. This design is appropriate in this study because the researcher has no control over teachers and students and it also enables the researcher to collect data from the respondents through the use of questionnaire. The reason for choice of this type of research design for this study is that the independent variable such as gender, location (urban and rural) and school ownership (public and private) have already existed. The population of this study consists of all basic science and technology teachers from 93

government owned secondary schools and 63 private owned secondary schools in Nasarawa state. A sample of 170 basic science and technology teachers was randomly selected and used. One instrument was used for data collection: ICT facilities availability check list (ICTFACL) which was validated by experts with the average validity index as 0.72 and the reliability coefficient of 0.82. Descriptive statistics of mean and standard deviation were used to answer the research questions while independence t-test was used to test the null hypotheses at 0.05 level of significance. This study is anchored on the cognitive theory of Multimedia Learning (1999).

Data Analysis and Results

Research Question One

What is the mean response of public and private Basic Science and Technology Teachers on Availability of ICT facilities in secondary schools in Nasarawa State?

Table 4.1: Mean and Standard Deviation of Public and Private Basic Science and Technology Teachers on Availability of ICT Facilities in Secondary Schools in Nasarawa State

	School ownership	N	Mean	Std. Deviation	Std. Error Mean
ICTFAC Avail	Public	104	28.89	10.253	1.005
	Private	66	72.00	14.123	1.738

Table 4.1 Reveals the Mean and Standard Deviation of Public and Private Basic Science and Technology teachers on availability of ICT facilities in secondary schools. The mean response for the public schools' BST teachers on the availability of ICT facilities is 28.89 and for the Private schools is 72.00. Private Basic Science Teachers Scored higher ($x=72.00$, $SD=14.123$) than Public Basic Science Teacher ($x=28.89$, $SD=10.253$). The mean difference of 43.11 was in favour of Private School Basic Science and Technology Teachers. This implies that private schoolteachers had higher mean on the availability of ICT facilities in teaching in Nasarawa state, as compared to public school basic science and technology teachers.

Hypothesis One

Ho₁: There is no significance difference in the mean response of Basic Science and Technology Teachers in Public and Private Secondary Schools on the Availability of ICT Facilities in Teaching in Nasarawa state.

Table 4.2: t-test result of Public and Private Basic Science and Technology Teachers on Availability of ICT facilities in secondary schools in Nasarawa state

	School ownership	N	Mean	Std. Deviation	T-Test For Equality Of Means		
					T	Df	Sig. (2-Tailed)
ICTFAC Avail	Public	104	28.89	10.253	-23.017	168	.000
	Private	66	72.00	14.123			

Table 4.2 shows the t-test Result of Public and Private Basic Science and Technology Teachers on Availability of ICT Facilities in Secondary Schools. $t = -23.017$; $Df = 168$; $P = 0.000 < \alpha = 0.05$. Therefore, The Null Hypothesis was rejected. This implies That There Is Significance Difference in the mean response of Basic Science and Technology Teachers in Public and Private Secondary Schools on the Availability of ICT facilities in teaching in Nasarawa State.

Research Question Two

What is the mean response of Urban and Rural Basic Science and Technology Teachers on Availability of ICT Facilities in Secondary Schools in Nasarawa state?

Table 4.3: mean and standard deviation of urban and rural basic science and technology teachers on availability of ICT facilities in secondary schools in Nasarawa State

	Location	N	Mean	Std. Deviation	Std. Error Mean
ICTFAC Avail	Urban	79	59.35	23.328	2.625
	Rural	91	32.95	17.235	1.807

Table 4.3 reveals the mean and standard deviation of urban and rural basic science and Technology Teachers on Availability of ICT facilities in secondary schools. The mean response for the urban schools' BST Teachers on the Availability of ICT facilities is 59.35 and for the rural schools are 32.95. Urban Basic Science and Technology Teachers scored higher ($x=59.35$, $SD=23.328$) than Rural Basic Science and Technology Teacher ($x=32.95$, $SD=17.235$). The mean difference of 26.4 was in favour of urban school basic science and technology teachers. This implies that urban school teachers had higher mean on the availability of ICT facilities in secondary school in Nasarawa state as compared to rural school basic science and technology teachers.

Hypothesis two

Ho₂: There is no significant difference in the mean response of Basic Science and Technology Teachers in Urban and Rural on the Availability of ICT Facilities in Teaching Secondary Schools in Nasarawa State.

Table 4.4: t-test Result of Urban and Rural Basic Science and Technology teachers on availability of ICT Facilities in Secondary Schools in Nasarawa State

	Location	N	Mean	Std. Deviation	T-Test For Equality Of Means		
					T	Df	Sig. (2-Tailed)
ICTFAC Avail	Urban	79	59.35	23.328	8.463	168	.000
	Rural	91	32.95	17.235			

Table 4.4 shows the t-test result of Urban and Rural Basic Science and Technology Teachers on Availability of ICT facilities in Secondary Schools. $t = 8.463$; $df = 168$; $P = 0.000 < \alpha = 0.05$. Therefore, the null hypothesis was rejected. This implies That There is Significance Difference in the Mean response of Basic Science and Technology Teachers in Urban and Rural Secondary Schools on the Availability of ICT Facilities in Teaching in Nasarawa State.

Research Question Three

What is the mean response of male and female Basic science and technology teachers on availability of ICT facilities in secondary schools in Nasarawa state?

Table 4.5: mean and standard deviation of public and private basic science and technology teachers on availability of ICT facilities in secondary schools in Nasarawa North Nasarawa state

	Gender	N	Mean	Std. Deviation	Std. Error Mean
ICTFAC Avail	Male	112	45.05	23.994	2.267
	Female	58	44.66	24.674	3.240

Table 4.5 Reveals the Mean and Standard Deviation of Public and Private Basic Science and Technology Teachers on Availability of ICT Facilities in Secondary Schools. The Mean Response for the Male Schools' BST Teachers on the Availability of ICT Facilities is 45.05 and for the female schools are 44.66. Male Basic Science and Technology Teachers Scored higher ($X=45.05$, $SD=23.994$) than female Basic Science and Technology Teacher ($X=44.66$, $SD=24.674$). The mean difference of 0.39 was in favour of Male School Basic Science and Technology Teachers. This implies that Male School Teachers had higher mean on the

Availability of ICT Facilities in Secondary School in Nasarawa State as compared to female School Basic Science and Technology Teachers.

Hypothesis Three

Ho₃: There is significant difference in the mean response of male and female of Basic Science and Technology on the Availability of ICT Facilities in Teaching Secondary Schools in Nasarawa State.

Table 4. 6: t-test Result of Male and Female Basic Science and Technology Teacher son Availability of ICT Facilities in Secondary Schools in Nasarawa State

	Gender	N	Mean	Std. Deviation	T-Test For Equality Of Means		
					T	Df	Sig. (2-Tailed)
ICTFAC Avail	Male	112	45.05	23.994	.102	168	.919
	Female	58	44.66	24.674			

Table 4.6 shows the t-test result of Public and Private Basic Science and Technology Teachers on availability of ict facilities in secondary schools. $t = 0.102$; $df = 168$; $p = 0.919 < \alpha = 0.05$.

Therefore, the null hypothesis was not rejected. This implies that there is no significance difference in the mean response of Basic Science and Technology Teachers in Male and Female Secondary Schools on the Availability of ICT Facilities in Teaching in Nasarawa North, Nasarawa State.

The findings of this study revealed that:

- Information Communication Technology facilities were more Available in private Secondary School than Public Secondary School in Nasarawa State.
- In information communication technology facilities were More Available in Urban Secondary School than rural secondary school in Nasarawa State.
- There was no significant difference in the mean response of Basic Science And technology teachers in Male and Female Secondary Schools on the Availability of ICT Facilities in Teaching in Nasarawa State.

Discussion of Findings

This study investigated the Assessment of Information Communication Technology Facilities of Basic Science and Technology Teachers in Nasarawa State Nigeria. The discussion of findings is strictly based on the variables facilities of The Study Which Are Guided by research questions and hypotheses:

Availability of ICT Facilities in Public and Private Secondary Schools in Nasarawa State. From The result, the require ICT facilities were more Available in Private School than Public School. The mean difference of 43.11 was in favour of Private School Basic Science and

Technology Teachers. This implies that Private School Teachers had higher mean on the Availability of ICT Facilities in teaching in Nasarawa State, as compared to Public School Basic Science and Technology Teachers.

Availability of ICT Facilities in Urban and rural Secondary Schools in Nasarawa North, Nasarawa State. From the result, the Availabilities of ICT facilities were more in Urban School than Rural School. The mean difference of 26.4 was in favour of Urban School Basic Science and Technology Teachers. This implies that Urban School Teachers had higher mean on the Availability of ICT facilities in Secondary School in Nasarawa State as compared to rural School Basic Science and Technology Teachers. This is in Agreement with the findings of on Wuagboke (2014) whose finding revealed that the extent of Availability of ICT resources in Rural Secondary Schools was very low. The reason could be that there is no Basic amenities like electricity that would support the functionality of these facilities in rural Areas in addition to in security and poor funding. In the same vein, the finding is also in agreement with the findings of Mabayoje, Isah, Bajeh and Oyekunle (2015) who found that there was significance difference in Technology Availability between Rural and Urban Schools, including the number of interactive whiteboards, desktops in Laboratories, notebooks, Netbooks, and tablet computer in favour of Urban Schools.

From the result of the finding, the mean difference of 0.39 was in Favour of Male Basic Science and Technology Teachers. This implies that male Teachers had higher mean on the Availability of ICT Facilities in Secondary School in Nasarawa State as compared to female Basic Science and Technology Teachers.

Conclusion

Based on the findings of this study it was concluded that there is inadequacy of ICT facilities in public upper basic Schools in Nasarawa State. There is disparity in availability of ICT facilities between private and public, urban and rural upper Basic Schools in Nasarawa state and private schools tend to have higher availability of ICT facilities as compared to their public-school counterparts. Relatedly, urban schools have higher availability of ICT facilities as compared to their rural-schools' counterparts.

Recommendations

Based on the Findings of this study, the Following Recommendations Were Made:

1. Government, non-governmental organization, cooperative bodies, multinational cooperation proprietors and individual should guarantee the provision of functional ICT facilities in both private and public schools; this will improve quality teaching and learning. ICT facilities should be upgraded and well maintained. The ministry of education should appoint a committee that will guarantee the functional ICT facilities available are in good working condition.
2. Enlightenment Campaign, Seminar, Workshop and Conferences should be organized for teachers and students by Education Authorities - Federal and State Ministries of Education to create awareness of the functional ICT facilities strategies and techniques

that will advance increase motivation of students and instructors in teaching and learning.

3. Basic science and technology teachers should avail themselves irrespective of their gender the opportunities provided by ICT Integration strategies in improving the performance of their students.

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