



**INFORMATION AND COMMUNICATION TECHNOLOGY AND STUDENTS'
ACADEMIC ACHIEVEMENT IN SECONDARY SCHOOLS OF NORTHERN
SENATORIAL DISTRICT, PLATEAU STATE, NIGERIA**

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Abstract

The study focused on the assessment of ICT and Students' Academic Achievement in Secondary Schools of Northern Senatorial District, Plateau State, Nigeria. The study was guided by two research questions with corresponding objectives and hypotheses. The study reviewed ten empirical studies. The research design used for this study was a correlational survey research design. The population of the study consisted of 2328 principals and teachers. The sample size of the study constituted 474 respondents. The instrument used for data collection was duly validated and it yielded 0.81 as the logical validity index while 0.76 was obtained as the reliability index. Descriptive statistics of mean and standard deviation were used to answer the research questions while Pearson's product moment correlation was employed to test the hypotheses. The findings of the study indicated that there is a significant relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District and there is a significant relationship between the availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District. The study recommended that the Plateau State Teaching Service Commission should mandate all teachers of secondary schools to periodically present evidence of the areas in which they have incorporated ICT facilities such as computers, email, internet and World-Wide Web (WWW), computer database, data processing mechanism, CD-Rom, DVD among others into their teaching

activities as such measure would help teachers to develop an interest in the use of ITC during teaching to enhance the academic achievement of students.

Keywords: Information and Communication Technology, E-Teaching and Students' Academic Achievement

Introduction

The success of secondary education in the 21st century cannot only be determined based on the number of employees, adequate funds, school facilities, equipment, research activities and instructional materials available at the disposal of the school managers but paramount among the factors that may facilitate effective teaching and learning is the nature of information management. The complex nature of the school system as a result of the government's desire to provide adequate secondary education to the citizens has brought about the increment in high level of enrolment. As such, the operations of the school system become complex and necessitates the application of Information and Communication Technology (ICT) to enhance effective teaching needed to enhance high academic achievement among students (Osaat, 2012).

Information and Communication Technology (ICT) is the application of computers and other modern equipment to process, store, retrieve and transmit information from one person or organization to another speedily. Olujemisi (2015) viewed information and communication technology as any product that would store, retrieve, manipulate, transmit, or receive information electronically in a digital form. This means that information and communication technology consists of hardware, software, networks and media for the collection, storage, processing, transmission and presentation of information (voice, data, texts and images). ICT is an integral part of all communication auxiliaries such as computer systems, fabric cables, storage devices, video monitors, printers, audio amplifiers, speakers, scanners, and satellite components among others that provide easy communication to all school community consumers and its environs in sending, receiving, processing, securing and manipulation of data or information (Uwaleke & Iyala, 2020).

ICT helps to produce, manipulate, store, communicate or disseminate information within the school system. Teaching through ICT could produce positive results by the way of improving the academic achievement of students in different subject areas. ICT could be employed to improve the quality of teaching and learning at all levels of education. Its facilities have become part of

man's daily life; as a result, their usage in education by teachers and students is a thing of necessity (Olowonefa & Iyala, 2017). Information and Communication Technology (ICT) covers all forms of computer and communications equipment and software that are used to create, store, transmit, interpret and manipulate information in its various formats. The advancement in ICT ranging from chips, and mini computers to large-scale devices has a greater impact on academic activities in the school system. The computer and the internet have integrated a lot of information and communication technology, leading to e-commerce, e-banking, e-government, e-learning and e-library (Ajayi, 2015).

Before the advent of technology in Nigeria, people communicated using various instruments and codes such as talking drums, flutes, gongs, town criers and village square meetings (Olokoba, Abdullahi & Omosidi, 2014). The use of writing and the invention of printing materials transformed the type and context of recorded history communication on a universal scale became possible through the use of Books, Newspapers, Magazines and Radio. The advancement in technology has created so many ICT tools that are useful in teaching and learning processes. These new technologies are central to contemporary societies, especially, the 21st Century tagged "the information technology age driven by a knowledge-based generation where teachers and students engage in the use of technology in classroom instruction delivery through the use of e-learning, c-teaching, e-library, e-laboratory and e-instructional materials among others. These ease access to qualitative knowledge and provide a good platform for interaction between teachers and students with the prospect of improving the academic achievement of students (Iyala, Oyekan & Udam, 2019).

Academic achievement is the overall student performance in different school disciplines as exhibited by every student. It is the general ability in the intellectual, social and physical well-being of students. The academic achievement of students could be used to grade students based on above average, average and below average. Academic achievement is identified by a range of statistical indices. Academic achievement is the level of attainment of a person in an examination, that is, how a student could demonstrate his or her abilities in an examination and other areas of continuous assessment. Academic achievement is the measurement of educational output obtained by students. Academic achievement indicates an individual's ability to attain the academic goals and objectives which are reflected in the school curriculum. Academic achievement is one of the notable indicators of success in students' academic life. Olokoba, Abdullahi and Omosidi (2014) conducted a study and submitted that many schools do not use ICT tools in their instructional activities which reduces the academic achievement of students in Kwara State, Nigeria.

The academic achievement could be defined as the student's ability to display the knowledge, skills, values and competencies which they acquire in school from different subjects through designated tests and examinations scores or marks assigned by the subjects' teachers. Some factors that influence students' academic achievements are individual inherent potentials in terms of intelligence combined with other sociological and psychological factors. Ige (2016) identified personality factors such as anxiety, achievement, motivation and level of interest as factors that influence academic achievement among students. Students with high self-efficacy received higher grades than those with low self-efficacy which brings about a negative self-concept that leads to poor academic achievement. Teachers' related factors such as academic qualifications, teaching skills, knowledge of the subject area, and good physical appearance also influence the level of students' academic achievements.

E-teaching is one of the means of integrating ICT into teaching and learning to improve the academic achievement of students. The use of ICT in teaching involves the application of interactive computers, the internet, and all ICT materials that could be employed to facilitate effective teaching and learning. In an educational setting, the use of ICT has gained strong backing as teachers could now use multimedia projectors, computers, PowerPoint and CD-ROM among others to enhance effective teaching and learning. The use of ICT in teaching is something that should be considered as paramount because of its great benefits. The benefits of using ICT in teaching include better classroom management which makes classroom activities more interesting to students (Aduwa-Ogiegbaen, & Iyamu, 2015).

E-teaching involves computational systems that communicate and cooperate with learners at many levels. Its focus is on digital learning environments in which students proceed at their own pace and are not assumed to be accessing the same material at the same time not under the supervision of classroom teachers. In a study conducted by Nwosu, Shaffe and Nurzatul (2018), it was found that the level of teachers' ICT acceptance and use in Aba North District secondary schools was low and teachers' perceived usefulness, perceived ease of use, attitude towards ICT and behavioural intention were also low. This, therefore, means e-teaching does not seem to be common among teachers in the school system.

It seems the integration of ICT into the public secondary school system is still a nagging problem considering the fact face-to-face teaching is one of the commonest means of instructional delivery in the state. It is unfortunate as the

academic achievement of students in the state in external examinations continues to be discouraging yearly. This prompted the researchers to embark on this study which investigated the relationship between the use of ICT and students' academic achievement in secondary schools of Plateau Senatorial District, Plateau State, Nigeria.

Statement of the Problem

Secondary schools in Plateau State seem to be deficient in terms of having adequate information and technology facilities to effectively manage academic activities as most lessons are delivered through the traditional method of face-to-face teaching and learning against the application of modern information communication gadgets. The researchers observed that there are inadequate computer-aided interactions and other specialized software to support adequate teaching and learning activities in secondary schools in Plateau North Senatorial District as teachers are yet to have access to adequate ICT facility required to enhance effective teaching and learning. Teaching and learning through ICT is sometimes disrupted due to a poor network which prevent students to have easy access to their e-learning and interact with their teachers effectively online.

The preference of teachers to deliver their lessons through the traditional means of face-to-face teaching as against the application of ICT facilities such as audio sets, TV, PCs, projectors, Optical fibre cables, Telephones, Mobile devices, Handhold devices, Fax machines, Internet, CD-ROM, PPT slides, electronic board, digital multi-media, video/VCD, DVD, machines etc. to promote effective e-teaching and learning suggests ICT has not been integrated into teaching and learning in secondary schools in Plateau North Senatorial District. As a result, this study assessed the relationship between Information and Communication Technology and students' academic performance in public secondary schools in Plateau North Senatorial District of Plateau State, Nigeria.

Purpose of the Study

The purpose of this study was to assess the relationship of ICT on students' academic achievement in secondary schools of Plateau senatorial District, Plateau State, Nigeria. The specific objectives of the study include:

1. To examine the relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District.

2. To ascertain the relationship between the availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District.

Research Questions

The study answered the following research questions:

1. What is the relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District?
2. What is the relationship between the availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District?

Statement of Hypotheses

The following hypotheses were tested at 0.05 level of significance:

- HO₁:** Significant relationship does not exist between e-teaching and students' academic achievement in secondary schools in Plateau North Senatorial District.
- HO₂:** There is no significant relationship between availability of ICT facilities and students' academic achievement in secondary schools in Plateau North Senatorial District.

Research Methodology

The study adopted the correlational survey research design. The total population of this study consisted of 2328 (42 principals and 2286 teachers) obtained from 42 public senior secondary schools in Plateau North Senatorial District. The sample size of the study was 474 (17 principals and 457 teachers). The instrument for data collection was the 'Questionnaire on the Relationship between Information and Communication Technology on Students' Academic Achievement (QRICTSAA). The questionnaire contained 14 items designed based on the modified Likert's 4-point rating scale given as follows: SA=strongly Agree (4), Agree (3), D=Disagree (2) and SD- Strongly Disagree (1). Descriptive statistics of mean and standard deviations were used to answer the research questions while Pearson Product Moment Correlation (PPMC) was employed to test the hypotheses at 0.05 level of significance.

Presentation of Results

Research Question One: What is the level of relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District?

Table 1: Mean and Standard Deviation showing the Relationship between E-teaching and Students' Academic achievement

S/N	ITEMS	SA	A	D	SD	\bar{X}	Std. Dev	Decision
1.	There is low academic achievement among students because teachers prefer face-to-face teaching to e-teaching.	174	106	95	80	2.55	0.18	Agree
2..	Teachers are effective in using Instant Messengers and Skype to deliver their lessons for better retention and improvement of academic achievement by students.	95	93	150	117	2.20	0.14	Disagree
3..	Teachers deliver their lessons using PowerPoint to ease the understanding of difficult concepts by students and help them to obtain high academic achievement.	76	99	120	160	2.35	0.13	Disagree
4.	Tape recorders are used by teachers during teaching and learning to improve students' listening skills needed for better academic achievement.	95	90	130	140	2.25	0.10	Agree
5.	Teachers employ the services of ICT facilities during teaching to broaden students' knowledge and help them to explore different information worldwide for improving their academic achievement.	84	90	111	170	2.30	0.12	Disagree

6.	Digital videos are used by teachers during lesson delivery to monitor students' behaviour to avoid distractions that could prevent students from succeeding academically.	86	74	125	180	2.38	0.15	Disagree
7.	Teachers train students to learn independently and improve their academic achievement through the application of ICT facilities.	80	75	100	200	2.40	0.11	Disagree
Cluster Mean						2.34	0.13	Disagree

Table 1 showed the mean and standard deviation of the relationship between e-teaching and students' academic achievement in secondary schools in Plateau North Senatorial District. The table revealed that item 1 has the mean score of 2.55 and standard deviation of 0.18, item 2 has the mean score of 2.20 and standard deviation of 0.14, item 3 has the mean score of 2.40 and standard deviation of 0.13, item 4 has the mean score of 2.25 and standard deviation of 0.10, item 5 has the mean score of 2.35 and standard deviation of 0.09, item 6 has the mean score of 2.38 and standard deviation of 0.15, while item 7 has the mean score of 2.40 and standard deviation of 0.11. The cluster mean of 2.34 is below the scale mean of 2.50, this means that there is a low relationship between e-teaching and students' academic achievement in secondary schools in Plateau North Senatorial District.

Research Question Two: What is the relationship of the availability of ICT facilities on students' academic achievement in secondary schools of Plateau North Senatorial District?

Table 3: Mean and Standard Deviation showing the Relationship between Availability of ICT Facilities and Students' Academic achievement

S/N	ITEMS	SA	A	D	SD	\bar{X}	Std. Dev.	Decision
9.	Free Local Area Network (LAN) internet services are provided by the school for teachers to enable them to deliver effective lessons required to ease	80	75	180	120	2.28	0.17	Disagree

	students' understanding of lessons and to pass their examinations successfully.							
10.	Projectors are made available for teachers to demonstrate their lessons and enhance students' participation in better academic achievement.	150	110	97	98	2.30	0.15	Disagree
11.	Word processors are designed for teachers to enhance their instructional activities that will enable students to learn successfully and obtain high academic achievement.	80	99	110	166	2.40	0.13	Disagree
12.	There is low academic achievement among students because of limited available ICT tools to be used by teachers during instructional delivery.	70	80	150	160	2.15	0.11	Disagree
13.	The academic achievement of students is not encouraging because computers are insufficient to be allocated to all students during teaching and learning.	111	170	90	84	2.38	0.16	Disagree
14.	Students' academic achievement is high because there are sufficient ICT facilities that teachers employ to disseminate information easily to students on their academic activities.	90	70	120	185	2.23	0.10	Disagree
21.	School provides Computer Aided Instructional Software for teachers to ease their teaching exercises and help students to perform better academically.	95	60	180	120	2.40	0.14	Disagree
Cluster Mean						2.30	0.15	Disagree

Table 2 showed the mean and standard deviation of the relationship between the availability of ICT facilities and students' academic achievement in secondary schools in Plateau North Senatorial District. The table indicated that item 9 has the mean score of 2.28 and standard deviation of 0.17, item 10 has the mean score of 2.30 and standard deviation of 0.15, item 11 has the mean score of 2.40 and standard deviation of 0.13, item 12 has the mean score of 2.15 and standard deviation of 0.11, item 13 has the mean score of 2.38 and standard deviation of 0.16, item 20 has the mean score of 2.23 and standard deviation of 0.10, while

item 14 has the mean score of 2.40 and standard deviation of 0.14. The cluster mean of 2.30 is below the scale mean of 2.50, this implies that there is inadequate availability of ICT facilities with low students' academic achievement in secondary schools in Plateau North Senatorial District.

Testing of Hypotheses

The study tested all the null hypotheses at 0.05 level significance using Pearson's product-moment correlation: The details of the results are presented in Table 6-8 below:

Hypothesis One: Significant relationship does not exist between e-teaching and students' academic achievement in secondary schools in Plateau North Senatorial District.

Table 3: Correlation Coefficient Analysis Showing the Relationship between E-teaching and Students' Academic achievement in Public Schools of Plateau North Senatorial District

S/N	Variable	\bar{X}	Df	r-cal	r-tab	Level of Sig.	Decision
1.	E-teaching	2.25					
2.	Student Academic achievement		2.30	553	0.85	0.194	0.05 Rejected

Table 3 showed the correlation coefficient of the significant relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District. The analysis of the results demonstrated that the r-calculated value is 0.85 while the r-table value is 0.194 at the significant level of 0.05 and 453 as a degree of freedom. Since the value r-calculated value of 0.85 is above the table value of 0.194, the null hypothesis is therefore rejected which means that there is a significant relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District.

Hypothesis Two: There is no significant relationship between the availability of ICT facilities and students' academic achievement in secondary schools in Plateau North Senatorial District.

Table 4: Correlation Coefficient Analysis Showing the Relationship between Availability of ICT Facilities and Students' Academic achievement in Public Schools of Plateau North Senatorial District

S/N	Variable	\bar{X}	Df	r-cal	r-tab	Level of Sig.	Decision
1.	Availability of ICT Facilities	2.20					
2.	Student Academic achievement		2.25	553	0.80	0.194	0.05 Rejected

Table 4 showed the correlation coefficient of the significant relationship between the availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District. The analysis of the results indicated that the r-calculated value is 0.80 while the r-table value is 0.194 at the significant level of 0.05 and 453 as a degree of freedom. Since the value r-calculated value of 0.80 is above the table value of 0.194, the null hypothesis is therefore rejected which signifies that there is a significant relationship between the availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District.

Summary of Findings

The following are the findings of the study:

1. The findings of the study revealed that there is a significant relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District.
2. The findings of the study also showed that there is a significant relationship between availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District

Discussion of Findings

The findings of hypothesis one showed that there is a significant relationship between e-teaching and students' academic achievement in secondary schools of Plateau North Senatorial District. The findings of the study concurred with Nwosu, Shaffe and Nurzatul (2018) who found that the level of teachers' ICT acceptance and use in Aba North District secondary schools was low and teachers' perceived usefulness, perceived ease of use, attitude towards ICT and behavioural intention were also low. ICT is used to perform both academic and non-academic activities in the school system. The use of ICT in teaching involves the application of interactive computers, the internet, and all ICT materials that could be employed to facilitate effective teaching and learning. The use of ICT encourages cooperative learning, enhances the teaching and learning process and encourages communication through websites, blogs and social networks. Unavailability and insufficiency of instructional materials are the main causes of the non-productive nature of the Nigerian school system and poor academic achievement among students. The attempts made towards implementing the use of ICT in the secondary school system in Plateau North Senatorial District have not yielded positive results. ICT is capable of promoting effective classroom

management, collaborative learning self-study, subject organization, enhance effective communication between peers as well as teacher-student. Students in the modern world are expected to participate actively and vigorously in teaching and learning processes unlike before where a teacher will stand in front of a class and teaches students without them contributing to a given topic.

The findings of hypothesis two indicated that there is a significant relationship between availability of ICT facilities and students' academic achievement in secondary schools of Plateau North Senatorial District. The findings of the study agreed with Olokoba, Abdullahi and Omosidi (2014) who submitted that many schools do not use ICT tools in their instructional activities which reduces the academic achievement of students in Kwara State, Nigeria. The different ICT gadgets that are used during instruction delivery and learning in schools include audio sets, TV, PCs projectors Optical fibre cables, Telephones, Mobile devices, Handhold devices, Fax machines, Internet, CD-ROM, PPT slides, electronic board, digital multi-media, video/VCD, DVD, machines among others. The use of the above gadgets during teaching and learning helps to improve the academic achievement of students. Effective integration of ICT into the educational system depends to a great extent on the availability, accessibility and utilization of ICT gadgets to enhance innovative teaching and learning. Secondary schools in Plateau North Senatorial District with PCs do not have the instructive programming required by their students in general cases because the PC accessible in these schools cannot cater to the needs of a large number of students.

Conclusion

The study concluded that there is low academic achievement among students because teachers in public secondary schools of Plateau North Senatorial District do not have access to ICT facilities to enable them to teach students electronically to improve their academic achievement.

Recommendations

The following recommendations were made based on the findings of the study:

1. The Plateau State Teaching Service Commission should mandate all teachers of secondary schools to periodically present evidence of the areas in which they have incorporated ICT facilities such as computers, email, internet and World-Wide Web (WWW), computer database, data processing mechanism, CD-Rom, DVD among others into their teaching

activities as such measure would help teachers to develop an interest in the use of ITC during teaching to enhance the academic achievement of students.

2. The principals of public secondary schools of Plateau North Senatorial District need to solicit special intervention funds from donor agencies like United Nations Educational Scientific and Cultural Organization (UNESCO), European Union (EU), African Union (AU) and advanced countries like USA, UK, Germany, France, China among others to purchase sufficient ICT equipment to be used for teaching students to improve their academic achievement.

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