EFFECT OF DIGITAL LEARNING TECHNOLOGY ON ACADEMIC ACHIEVEMENT OF COLLEGE OF EDUCATION STUDENTS IN SOUTH-SOUTH NIGERIA

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ABSTRACT

The study was carried out to examine the effect of Digital learning technology on academic achievement of college of education students in South-south Nigeria. In order to achieve this purpose, two research questions were raised and two hypotheses formulated to guide the study. The quasi-experimental design was used for this study. This design was considered suitable for the study because it's enabled the researcher to establish two groups under experimentation. The population of this study was 420 students who offered Computer Science in state colleges of education 200 level classes in 2019/2020 Academic Session. The sample size of this study was College of education, Afaha Nsit and College of Education, Akamkpa 300 level students, selected from South-south. Simple random sampling technique was used to select the respondents from each school. Two instruments were used for data collection titled "Computer Studies Achievement Test on Database application packages (CSATDAP) and Computer Studies Achievement Test on Desktop publishing application packages (CSATDPAP). Face validation was used for validating these instruments. The internal consistency of CSATDAP and CSATDPAP were determined using Kuder-Richardson formula 20 in Statistical Package for Social Sciences (SPSS). This method was used because it determines reliability of a test. The reliability coefficient of CSATDAP and CSATDPAP were .81 and .78 respectively. The experimental groups were taught using digital technology for two (2) weeks, 60 minutes per period while the control group was taught the same topics without digital technology for the same number of days. The sampled students were pretested using all the instruments CSATDAP and CSATDPAP) before the appropriate actual treatments. The actual treatments were done in the first and second week while the posttest were administered immediately after complete treatments. The scores from the posttest were recorded and used to provide information on students' academic achievement across treatment groups. The research questions were answered using adjusted mean ($\bar{x}$) and standard deviation (S.D). The formulated null Hypotheses were tested at 0.05 level of significance using Analysis of covariance (ANCOVA). Based on the findings of the study, it was concluded that there is a significance effect of digital technology on academic achievement of Computer Science students in Database application and Desktop Publishing packages in Colleges of Education in South-south Nigeria.

KEYWORDS: Digital Learning Technology, Academic Achievement, College of Education, Students and South-South Nigeria.

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Introduction

The society today puts a lot of importance on students' academic achievement. Academic achievement refers to the learners' ability to show and apply knowledge, skills, abilities and attitudes leant towards a specific objective (Kiruhi, Githua and Mboroki, 2019). Both formative and summative evaluation may be used to measure achievement. In Akwa Ibom State in Nigeria, examination results are used as summative evaluation to measure students' achievement. Outcome in national examinations is used as criteria for admission from junior secondary school to senior secondary school. For this reason, Digital Technology (DT) is increasingly becoming a more and more powerful tool for education and economic development world over. Teachers must understand the context within which students' achievement improvement takes place (Wango, 2019). DT can be a catalyst by providing tools which teachers use to improve teaching and by giving learners access to electronic media that make concepts clearer and more accessible.

Teaching is imparting knowledge, attitudes and values (Lefrancise, 2021). Hough and Wenglinsky (2019) described teaching as a unique professional, rational and humane activity in which one creatively and imaginatively uses himself and his knowledge to promote the learning and welfare of the learner. Guilbert (2021) summarized teaching as 'interactions between teacher and learner under the teachers' responsibility in order to bring about expected changes in the learners' behaviour'. He further explains the purpose of teaching as to help learners to acquire, retain and use knowledge; understand, analyze, synthesize and evaluate; achieve skills and establish habits and develop attitudes.

It is imperative to utilize DT resources in teaching software application packages in Colleges of Education because students easily remember faster when more sense organs is used in teaching.

- Eyes: They can see the DT resources used in teaching and watch how it's being used.
- Skin: they can touch and used the hardware components under the supervision of a teacher.
- Ear: they can hear sounds from the resources. (Watching a tutorial using a computer)

Software is the means by which a general purpose computer system is made to perform specific tasks. It contains a complete and clear description of each task in terms of available operations of the computer. In other words, software may be conceived as a set of programs for a computer. Each program is a complete specification of the processing to be performed on the data supplied to the computer. Software may conveniently be divided into: systems software (that is, programs designed to control the execution of other programs and to utilize hardware effectively) and applications software (that is, programs to solve users' problems).

The importance of software cannot be over emphasized because it is the software which supplies power of the computer to the user's problems. It has been stated that the rapid increase in the capabilities of computer systems has not been matched by corresponding increases in availability and quality of software. Software Application Packages are types of software that can perform many different related tasks. They include word processor, spreadsheets, databases, desktop publishing graphics and presentation software. The use of Digital Technology (DT) in teaching Software applications can improve student's academic achievement. Computer utilization in teaching software application packages brings widened possibilities for the learning processes that are independent from place and space. Utilization of DT also allows more flexible (asynchronous) and more personalized learning. It offers new methods of delivering subject at Colleges of Education level. Taking advantage of these opportunities needs a profound change in the organization of the College

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of Education system. This research will focus on utilization of Digital Technology (DT) in teaching software applications packages which include:

Database packages: Databases make it possible to store, organize and retrieve information in ways that otherwise would not be possible. Databases come in all sizes and shapes from mainframe applications that run multinational corporations to appointment calendars in PDAs. Just about any collection of information can be turned into a database. Databases make it easy to store large quantities of information. The larger the mass of information, the bigger the benefit of using a database. Databases make it easy to retrieve information quickly and flexibly. Databases make it easy to organize and reorganize information. You can quickly switch between schemes. Databases make it easy to print and distribute information in a variety of ways. Examples of database packages are Ms Access, Lotus Approach, Paradox etc.

Desktop Publishing means (DTP): Desktop Publishing is a process in which we can make use of computer and application software to design a good quality document which will include text and picture. Desktop publishing software can be used to make newsletter, booklets, visiting cards, banners, logos, poster, reports, calendar, pamphlets etc. With the help of DTP good quality pamphlets, books and so on, can be designed and printed and also can design page layouts in which Pictures and Fonts of different language can be written in different ways and can be printed. This research studies how the utilization of Digital technology in teaching software application (Database and Desktop publishing) in Colleges of Education can influence student academic achievement. Digital technology (DT) facilities are instructional materials which teachers use as alternative means of communication to transmit curriculum content to the learner. DT combines two or more different types of instructional materials at the same time in a presentation. With the supply of DT facilities in Colleges of Education in South-south Nigeria, everybody expect to see the effects of these facilities in teaching and learning. It is based on this background that a study on the utilization of Digital technology and academic achievement of computer science students in software application packages in Colleges of Education in South-south Nigeria.

Statement of the Problem

The direct link between computer use and students' achievement has been the focus of extensive literature during the last two decades. Several studies have tried to explain the role and the added value of the computer technologies in classrooms and on student's achievement. The first body of literature explored the impact of computer uses. Since the Internet revolution, there has been a shift in the literature that focuses more on the impact of online activities: use of Internet, use of educative online platforms, digital devices, use of blogs and wikis, etc. Looking at the link between computer usage and student achievement seems nowadays a misunderstanding of the role and nature of these technologies The researcher observed that the students offering computer oriented courses always complain of learning software application packages without the necessary Digital technology facilities. They argued that lack of DT facilities affects their interest and motivation in teaching and learning computer application as a course. Akale (2016) posited that students' academic achievement can only improve if all the facilities required in teaching and learning the course are available and properly been used in teaching the students in this DT era. Also, assessment of students' academic achievement in software application packages from 2002 to 2007 was mainly on theories taught rather than the theoretical and practical aspect of computer application course. Hence, the researcher has to carry out a study on the utilization of Digital technology and academic achievement of computer studies student in Colleges of Education in South-south Nigeria using software application packages as a case study.

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Purpose of the Study

- The main purpose of the study was to determine the effect of Digital Technology utilization on academic achievement of Computer science students in software application packages in Colleges of Education in South-south Nigeria. Specifically, the study was designed to determine;

- The effect of Digital technology utilization on academic achievement of Computer studies students in Database Application Packages in Colleges of Education in South-south Nigeria.

- The effect of Digital technology utilization on academic achievement of Computer studies students in Desktop Publishing Packages in Colleges of Education in South-south Nigeria.

Research Questions

The following research questions were raised to guide the study;

- What is the effect of Digital technology utilization on academic achievement of Computer science students in Database Application Packages in Colleges of Education in South-south Nigeria?

- What extent is the effect of the effect of Digital technology utilization on academic achievement of Computer science students in Desktop Publishing Application Packages in College of Education Student in South-South Nigeria?

Research Hypothesis

In order to guide the study, the following null hypothesis were postulated and tested at 0.05 level of significance.

$H0_1$: There is no significance effect of Digital technology utilization on academic achievement of Computer studies students in Database Application Packages in College of Education Student in South-South Nigeria

$H0_2$: There is no significance effect of Digital technology utilization on academic achievement of Computer studies students in Desktop Publishing Application Packages in College of Education Student in South-South Nigeria.

Design of the study

The quasi-experimental design was adopted for the study. Specifically, the pre-test post-test non-equivalent control group design was employed for the study. This design was adopted because it is possible to have complete randomization of the subjects to avoid the disruption of school organization (streaming of classes). This design allows the use of intact class. Consequently, intact classes will be randomly assigned to experimental groups (E) and control group (C) respectively.

Groups

Experimental (E) O_1 X_1 O_2
Control group C O_1 X_2 O_2
Where E=   Experimental Group (Digital technology utilization)
C=   Control group (without Digital technology utilization)

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O_1=   Pretest for all groups

X_1=   Treatment given to E

O_2=   Post-test for all groups.

Area of the Study

The area of the study is South-South geo-political zone of Nigeria. This zone is popularly known as the oil rich zone of Nigeria. It is made up of six States in the Federal Republic of Nigeria namely: Akwa Ibom, Bayelsa, Cross River, Delta, Edo and Rivers. The South-South zone of Nigeria is of great interest to the country, because of their natural resources, which include crude oil, Nigeria's highest foreign exchange earner. The zone is bounded on the south by Atlantic Ocean, on the north by North-Central zone, on the East by South-Eastern zone and on the West by South-Western zone. The South-South zone is located between Latitude 4^0 and $6^0 2^1$ North and Longitude 4^0 and $8^0 3^1$ East. It has a population of approximately 25.8 million people being the sum of the population of the six component states (National Population Census, 2007). The zone occupies a total landmass of 84,547 sq km being the sum landmass of the six states. The South-South zone has 140 local government areas, thus taking 18.09 percent of the 774 local government areas in Nigeria.

It is a sensitive area in many ways including infrastructural and education perspective. It has three (3) Federal Colleges of Education namely: Federal College of Education (T), Omoku, Rivers State; Federal College of Education, Obudu, Cross River State; Federal College of Education and Asaba, Delta State. The choice of South-South, Nigeria for this study is based on similarity in educational, political and social development having been part of the former South Eastern Nigeria. The Colleges of Education also share similar problems in terms of poor social amenities and underdeveloped infrastructures. Federal Colleges of Education operate the same academic minimum standard including accreditation requirements for programmes approval under the supervision of National Commission for Colleges of Education (NCCE).

Population of the Study

The target population of this study consisted 125 Computer Science students in two Colleges of Education in South-South geopolitical zone of Nigeria, (NCCE report, 2017) that was used in determining the effect of Digital technology on academic achievement of students in Colleges of Education of final year students in their respective Colleges of Education for the period of three (3) years.

Sample and Sampling Technique

The sample size for the study consisted of 95 Computer Science students each in the Department of Computer Science Education in two selected Colleges of Education for the study. They were all final year students for 2021/2022 academic session.

Instrumentations

A researcher made four instruments titled: Computer Studies Achievement Test on Database application packages (CSATDAP), Computer Studies Achievement Test on Desktop publishing application packages (CSATDPAP) were used for this study. All the instruments consisted two sections (A & B). Section A contained demographic details about the students while section B contained 20 multiple choice (A-D) test items each. These test items were drawn mostly from National Commission for Colleges of Education (NCCE) minimum standard for Colleges of Education (Database application packages and Desktop publishing application packages). The test was used to gather the pretest and posttest scores when taught

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using Digital technology and without Digital technology. The researcher also prepared lessons note that was used in teaching the students the concepts.

Validation of the Instruments

All the instruments were subjected to both content and face validation. Both face and content were done by three groups of experts consisting of one Computer studies teacher, one Computer Education lecturer and one Test and measurement lecturer. Face validation of the instruments helped to ensure whether the instrument appears appropriately in terms of vocabulary, time allocation and suitability for the level of the test. The content validation of the instruments was ensured through strict adherence to the contents of the Software application packages as stated in the NCCE minimum standard curriculum. The lesson notes were also be validated by experts in Computer Education and Measurement and Evaluation in School of Education from the two Federal Colleges of Education respectively.

Reliability of the instruments

The researcher conducted a trial test of the Computer Studies Achievement Test on Database application packages (CSATDAP) and Computer Studies Achievement Test on Desktop publishing application packages (CSATDPAP) to estimate the internal consistency of the instruments. The instruments were administered to a class of final year computer science students from the College in the population but not used for the study. One intact class of 95 students was used for the trial testing.

The internal consistency of CSATDAP and CSATDPAP were determined using Kuder-Richardson formula 20 in Statistical Package for Social Sciences (SPSS). This method was used because it determines reliability of a test in which the items are dichotomously scored (Orluwene, 2012). The reliability coefficient of CSATDAP and CSATDPAP were .81 and .78. These coefficients revealed that all instruments were reliable.

Experimental procedure

The experimental groups were taught using Digital technology for two (2) weeks, 60minutes per period while the control group was taught the same topics without Digital technology for the same number of weeks.

The sampled students were pretested using all the instruments CSATDAP and CSATDPAP) before the appropriate actual treatments. The actual treatments were done in the first and second week while the posttest was administered immediately after complete treatments. The scores from the posttest were recorded and used to provide information on students' academic achievement across treatment groups.

Method of Data Collection

After appropriate permission have been granted by the Provost of sampled Colleges, the two instruments for data collection for this study were administered to the students before experimental treatment. Scores obtained at this stage served as pre-test scores. After treatment, a post-test was administered using the instruments to obtain the post-test scores. This exercise was carried out by two research assistants of the two schools trained by the researcher.

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Method of Data Analysis

The research questions were answered using adjusted mean $(\bar{x})$ and standard deviation (S.D). The formulated null Hypotheses were tested at 0.05 level of significance using Analysis of covariance (ANCOVA).

Decision Rule

For hypothesis to be rejected, the sig. (2-tailed) value must be less than or equal to .05 alpha level of significance. Then to be retained, the sig. (2-tailed) value must be greater than .05 alpha level of significance. The researcher formulated a scale and used to answer the research questions. The scale is shown as below:

Mean score			Remark
0	-	49	Low extent
50	-	100	High extent

Results of Data Analysis

Research Question Three: To what extent is the effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria?

Table 1: Pretest and Posttest Mean of students' Academic Achievement in database application packages

Group	N	Pretest X_1	Posttest X_2	Mean Gain
Digital Technology Utilization (experimental group)	150	27.87	64.37	36.5
Without Digital Technology Utilization (control group)	150	27.67	29.10	1.43

From the result in table 1, it is revealed that the posttest mean and standard deviation for students taught database through Digital technology utilization is 64.37 and 7.20 while that of students taught without Digital technology utilization is 29.10 and 5.05. Therefore, the extent of effect Digital technology utilization on academic achievement of Computer studies students in database processing application packages is high. The pretest mean scores for students taught through Digital technology utilization and without are 27.87 and 27.67 respectively.

Research Question 2: To what extent is the effect of Digital technology utilization on academic achievement of Computer studies students in desktop publishing application packages in Colleges of Education in South-south Nigeria.?

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Table 2:   Pretest and Posttest Mean of students' Academic Achievement in desktop publishing application packages

Group	N	Pretest X_1	Posttest X_2	Mean Gain
Digital Technology Utilization	150	27.17	64.30	37.13
(experimental group) Without Digital Technology Utilization (control group)	150	27.67	28.47	0.8

From the result in table 2, it is revealed that the posttest mean and standard deviation for students taught desktop publishing through Digital technology utilization is 64.40 and 7.26 while that of students taught without Digital technology utilization is 28.47 and 5.91. Therefore, the extent of effect Digital technology utilization on academic achievement of Computer studies students in desktop publishing application packages is high. The pretest mean scores for students taught desktop publishing through Digital technology utilization and without are 27.17 and 27.67 respectively. This shows equivalent of the group before treatments.

Null Hypothesis One: There is no significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria.

Table 3: Summary Analysis of Covariance (ANCOVA) of Pretest and Posttest Scores of students' Academic Achievement in database application packages

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	93293.25	2	46646.63	1204.13	.00	.89
Intercept	22291.91	1	22291.93	575.44	.00	.66
PRETESTDATABASE	12.92	1	12.92	.33	.56	.00
ICT	93206.52	1	93206.52	2406.03	.00	.89
Error	11505.42	297	38.74			
Total	760000.00	300				
Corrected Total	104798.67	299				

From the result in table 3, the sig or p-value of .00 is less than the .05 alpha level of significance. This implied the formulated null hypothesis which stated that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria is rejected. Therefore, there is a significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria.

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Null Hypothesis Two: There is no significance effect of Digital technology utilization on academic achievement of Computer studies students in desktop publishing application packages in Colleges of Education in South-south Nigeria.

Table 4: Summary Analysis of Covariance (ANCOVA) of Pretest and Posttest Scores of students' Academic Achievement in desktop publishing application packages

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	96458.87	2	48229.44	1111.08	.00	.88
Intercept	26511.48	1	26511.48	610.76	.00	.62
PRETESTDESK TOPBUL	156.79	1	156.79	3.61	.06	.01
ICT	95712.17	1	95712.17	2204.10	.00	.88
Error	12892.04	297	343.42			
Total	754775.00	300				
Corrected Total	109350.92	299				

From the result in table 8, the sig or p-value of .00 is less than the .05 alpha level of significance. This implied the formulated null hypothesis which stated that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria is rejected. Therefore, there is a significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria.

Discussion of the Findings

The findings of this study were discussed based on the hypotheses formulated for this study as follows:

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The results of the analysis in table 3 revealed that students who were taught database through utilization of Digital technology had mean score of 64.37 while those taught databases without Digital technology had mean score of 28.93. Though the post-test mean were higher than the pre-test mean score, those taught databases through utilization of Digital technology performed better than those taught without utilization of Digital technology. From this finding, it was concluded from the result that since Digital technology utilization in teaching yielded a higher mean score, this depicted that Digital technology was more effective in improving students' academic achievement in database. Furthermore, the finding shows the rejection of hypothesis which state that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages Colleges of Education in South-south Nigeria.

The rejection was because the sig-value (.00) on Table 7 was below .05 which showed that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in database application packages in Colleges of Education in South-south Nigeria. This result was expected because students tend to understand and retained new knowledge when they see and hear what they are learning than when they only hear. Beside, to learn and understand how to use database application packages, one's need see spreadsheet

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environment and how executions are done in the environment. This result is agreed with Stephen, Mbugual and Edward (2005) that reported that integration of Digital technology in teaching influence students' academic

Digital technology Utilization and Academic Achievement of Computer Studies Students in Desktop publishing application packages

The results of the analysis in table 4 revealed that students who were taught database through utilization of Digital technology had mean score of 64.30 while those taught desktops without Digital technology had mean score of 28.47. Though the post-test mean were higher than the pre-test mean score, those taught desktop publishing through utilization of Digital technology performed better than those taught without utilization of Digital technology. From this finding, it was concluded from the result that since Digital technology utilization in teaching yielded a higher mean score, this depicted that Digital technology was more effective in improving students' academic achievement in desktop publishing. Furthermore, the finding shows the rejection of hypothesis 4 which state that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in desktop publishing application packages in Colleges of Education in South-south Nigeria.

The rejection was because the sig-value (.00) on Table 8 was below .05 which showed that there is no significance effect of Digital technology utilization on academic achievement of Computer studies students in desktop publishing application packages in junior secondary schools in Uyo Local Government Area of Akwa Ibom State. This results were expected because students tend to understand and retained new knowledge when they see and hear what they are learning than when they only hear. Beside, to learn and understand how to use desktop application packages, one's need see spreadsheet environment and how executions are done in the environment. This result is agreed with Stephen, Mbugual and Edward (2005) that reported that integration of Digital technology in teaching influence students' academic achievement positively.

Furthermore, the result of this study is also in line with the findings by Rahman (2019) that reported there is significant effect of Digital technology on students' academic achievement at private universities in Nigeria. Finally, the findings of this study also agreed with the study done by Ekula (2019) on the effects of using Digital technology facilities on the academic achievement of students in software application packages in Federal Colleges of Education. The findings revealed a positive significant effect of using Digital technology facilities on the academic achievement of students in software application packages. Furthermore, the result of this study is also in line with the findings by Rahman (2019) that reported there is significant effect of Digital technology on students' academic achievement at private universities in Nigeria. Finally, the findings of this study also agreed with the study done by Ekula (2019) on the effects of using Digital technology facilities on the academic achievement of students in software application packages in Federal Colleges of Education. The findings revealed a positive significant effect of using Digital technology facilities on the academic achievement of students in software application packages.

Conclusion

On the basis of the findings from this study, it was concluded that Digital technology utilization in teaching promote learning and improve academic achievement of students in computer studies. Also, there was a higher mean score of the experimental groups (Digital technology utilization) over the control groups (without Digital technology utilization). This means that utilizing Digital technology by teachers in teaching concepts make teaching effective

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and thus, enhance students' academic achievement. Therefore, computer studies teachers should key into this development if they want their students to eradicate poor academic achievement of students in computer studies.

Recommendations

Based on the study findings, it is recommended that:

1.   Computer studies teachers should forfeit the conventional strategy in teaching and adopt Digital technology utilization.

2.   Government should make computer facilities to be available in all schools.

3.   Government should always have routine inspection to make sure that the computer facilities are always used for teachings.

4.   The school administrators and educational institutions should periodically organize workshops and seminars to enlighten teachers in training, potential and serving teacher to rub minds together so as to update their teaching skills and methodology.

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