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AUTOCAD APPLICATION ON STUDENTS PERFORMANCE IN TECHNICAL DRAWING FOR SUSTAINABLE DEVELOPMENT IN NIGERIA

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AutoCAD Application on Students Performance in Technical Drawing for Sustainable Development in Nigeria

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Effect of AutoCAD Application on Students in performance in Technical Drawing for sustainable development in Nigeria. Two research objectives, two research questions were raised and two null hypotheses were formulated and tested in the study. A quasi-experimental design was used for this study. The population of the study was 1,521 first-year senior secondary school students of the nine senior secondary schools that have computer laboratories and offering Technical Drawing. Ninety senior secondary students from three selected schools in the three senatorial zones in Niger State were used as the sample. Twenty multiple-choice questions and two practical questions in the Technical Drawing Achievement Test. The reliability coefficient of the instrument was found to be 0.91 using Kudar-Richardson formula 2(K-R 21) which shows that the test items are reliable. Mean, and the standard deviation was used to answer the research questions and Analysis of Covariance (ANCOVA) was used to test the two null hypotheses. Null hypotheses were tested at 0.05 level of significance. The findings of the study revealed among others that, there was a significant difference between the pre-test and post-test results in the objective test. Similarly, the study revealed that there was a significant difference between the pre-test and post-test results of the practical test for Technical Drawing students. Based on the findings it was recommended that Technical Drawing teachers should be trained in the use of AutoCAD Application in teaching Technical Drawing through workshops, seminars, and induction courses to be organized by the Ministry of Education.

Introduction

The status quo done in homes, workplaces and schools are continually changing everywhere throughout the world. The email, e-learning and different employments of computers are unquestionably affecting lives and can improve the learning procedure in the schools. The acknowledgement of the estimation of computers in the instructing learning process in the contemporary world brought computer training into the Nigerian school educational plan in 1989 (Achuonye, 2011). This in actuality implies that students can continue at their own time and pace, finishing away from the educational program appropriate for their advantage and ability.

Educational change usually occurs with the curriculum, which serves as the instrument through which the desired changes in the society envisaged by the educational policy are given concrete manifestation. One of the innovations and changes provided by the National Policy on Education (NPE) is that of the introduction of Computer-Aided Design (CAD) into the school system.

Computer-Aided Design (CAD) denotes the integrated use of computer in the conceptualization and design of products. Computer-Aided Design embraces the use of computer in the industry for design, simulation and graphics design such as technical drawing.

The computer-aided drafting program, AutoCAD, is the most broadly perceived such program. It has many, various advisers for drawing development plans and detail drawings. In the occasion that changes ICT has fundamentally affected Students-Skills in the use of computer program and that the educator acknowledges, preparing to build drawing with computer-aided instructional material. Considering the above disclosures, it is endorsed that building attracting teachers should be introduced to computer care courses. The computer machines in schools are not acceptable as against students enrolment empower courses in computer use in key advancement could be open for the teacher. Computer training courses for AutoCAD students should be told with the end goal that computer can be used for all structure drawing related courses; this will give them confidences on the usage of computer in teaching AutoCAD. AutoCAD labs should be developed where there are none with the objective that speakers can have genuine and hands-on planning on the usage of computers for demonstrating structuring Drawing. Bureaucratic and State government should help the association of learning by giving cash related relationship to procure the workplaces. (Oluwadare et al., 2015)

The computer gives quick input, for students to know whether their answer is right or not. It likewise offers various kinds of exercises and a difference in pace from teacher to amass guidelines. The capacity of ACA is caught and recorded by Osuwa (2002) as follows: Assessing students abilities with a pre-test, introducing instructive materials in a safe structure. giving dreary drills to improve the students' order of information, giving game-based drills to build exercises, surveying students' progress in a post-test, steering students through a progression obviously of the instructional program. Distributed computing is the component of moving the handling exertion from the nearby gadgets to the server farm offices. Virtualization innovation isolates the physical equipment from working framework, which on one hand can make computing and capacity limit of the current server into littler size and reintegration, to improve the use and adaptability of IT asset; then again can give a typical interface to huge scope distributed computing coordination that empowers the production of estimation along these lines to upgrade the academic performance of students.

Academic performance alludes to what students' accomplish in their investigations and how they adapt to or achieve distinctive learning encounters given to them by their teachers. Flegm (2005) reports that in instructive establishments, the achievement is estimated by academic performance or how well the students satisfy the guideline set out by the organization. Instructing technique is portrayed as a blend of a few training practices and how they are assembled to realize positive change in students (Nzewi, 1999). Meanwhile, teaching behaviour is deliberately and actively made by a teacher to help a pupil to learn. It involves the teacher initiating several activities such as writing, speaking and use of the number of non-verbal signals such as nodding of the head and use of hands to indicate directions and the use of nearly all visible aspects of the body to communicate the content, form, concepts, and principles of what is to be learned. On the other hand, Universal Basic Education Board (UBEB) (2008) sees the teaching method as the ability for a purpose of understanding. The further describes it as a supporting device which a teacher uses to emphasize ideas, point, beliefs etc through communication and manipulation of resources. Teaching method can also be described as the way a teacher organizes the teaching process. Teaching methods is also a process of imparting knowledge, ideas and beliefs on a person or group. This means generally a guideline for promoting teaching and learning which involves various ways of manipulating

instructional resources and communication to make the learner receive the teacher's message. Teaching method can, therefore, be said to be the most fundamental aspects of education and it is a central issue in teaching. There are many senior secondary schools in the study area that use conventional methods of teaching students but the use of ACA as a method of teaching is very scarce and other researches like Yusuf (2010) show that ACA affects the academic performance of students in senior secondary school. Therefore, it is important to use this method of teaching for better performance of the students.

The use of demonstration with drawing instrument on the chalkboard apparently, results into neglect in the development of students performance which invariability leads to sustainable development as a build, which imagines development as addressing the need of the current age without trading off the issues of things to come age. It infers that while training addresses the issue of the current it doesn't bargain the capacity of things to come ages to address possess issues. By the by, this capacity to address the issues is dictated by human capital (through instruction, innovation advance) and through physical capital (machine, apparatus and so forth). Kundan contends that proceeded with sustainable development is just conceivable or guaranteed when it concurs and in fact, solid advances are taken to raise the degree of proficiency and numeracy in any general public. Instructive organizations and their projects are in this manner, the devices with which to accomplish development and its manageability

Statement of the Problem

The declining performance of students in Technical Drawing at external examinations has been a matter of great concern to many educators. Some teachers in teaching the subjects attribute this to the abstract nature of the subject and the teaching method(s) adopted (Hassan et al., 2016). This study, therefore, attempts to determine the effect of using AutoCAD Application in Technical Drawing instruction on student's performance for sustainable educational development.

The objective of the Study
The study

1. Determined the effect of using AUTOCAD on the practical skills of senior secondary school students in Niger State.
2. Determined the effect of AUTOCAD on the performance of senior secondary school students in Niger State.

Research Questions

1. What are the effects of AUTOCAD on the practical skills of senior secondary school students in Niger State?
2. What is the effect of AUTOCAD on the performance of senior secondary school students in Niger State?

Research Hypotheses

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

1. There is no significant difference in the practical skills of senior secondary school students taught Technical Drawing with AutoCAD and conventional method.
2. There is no significant difference in the performance of students taught Technical Drawing using AutoCAD and those taught using the conventional method in senior secondary schools in Niger State

Method

The study was a quasi-experimental pre-test/post-test control group design. The study was carried out in the secondary schools in three Educational zones of Niger State. The target population of the study was made up of 1,521 first-year Technical Drawing students in senior secondary schools that have computer laboratories in Niger State. A school was selected from each of the three senatorial zones in Niger State. This makes a total of three schools for the study. The sample of the study consisted of (90) first senior secondary school students of the three school randomly selected in the three senatorial zones. Simple random sampling technique (balloting) was used to assign three schools to the experimental and control group. Three intact classes of year one students were assigned to each of the group that is 15 for the experimental group and 15 as a control group.

The experimental group was taught Technical Drawing using a computer while the control groups were taught the same item using the conventional method. An achievement test instrument that consists of two sections A & B Section A comprised of 20 multiple-choice items, section B which is the practical part all from the aspect of Technical Drawing curriculum. The questions were drawn from the past WAEC and NECO Technical Drawing examination Paper II. In using the instrument practical aspect of teaching the concept was performed, while the visual multimedia facilities were used such as a computer, CD-Rom and projectors for the teaching and learning.

The instrument was adopted from WAEC and NECO standard examination and the use of multimedia in teaching the topic, the test instruments and their marking scheme were forwarded to the validators in the Department of Technical Drawing Niger State College of Education, Minna. Two research experts in the same Department at the Federal University of Technology, Minna to establish the face validity of the instrument. A pilot study was conducted in G.S.S Funtua, Katsina State, which is outside the study area. A total number of 60 students were selected from the school, 30 students were selected from the same year group to serve as an experimental group, while the other 30 students served as the control group. The pre-test was administered to the two groups on the same day. After two weeks, the post-test was administered. Data were analyzed using Analysis of Covariance (ANCOVA) was employed to determine the significant difference between two mean scores of the groups. All observed corrections and suggestions were duly incorporated.

The test-retest method was utilized on 60 SSI students randomly chose in G.S.S Funtua, Katsina state. The unwavering quality coefficient was performed and examined utilizing split-half gauge Spearman-Brown prescience equation method. The connection coefficient acquired was 0.89. The test was planned by the analyst. It was utilized as both a pre-test and a post-test to discover the impact of AutoCAD Application on students performance.

The test included 20 numerous decision things and 2 reasonable test questions. Toward the start of the test paper, the guidelines of the test were presented. The students were approached to pick the right answer. The time allotted for the test was 40 minutes. Concerning the checking plan, there was one imprint for everything. So the absolute scores were 40 denotes (that is) 20 imprints for the various decision things and 20 imprints for the reasonable test. The students‟ past information, the equivalent pre-test was utilized toward the finish of the investigation as a post-test to survey the students‟ performance on the subject, the target of the post-test was to evaluate the impact of both instructional methods (exploratory and control) on students‟ performance. The factual apparatus that was utilized for data analysis got from the pre-test and

post-test was a mean and standard deviation to answer the exploration questions. Analysis of Covariance (ANCOVA was utilized to decide the distinctions among the mean of the test scores in the 3 schools. This method was likewise confirmed by Huck (2004), who supported that ANCOVA measurement can be utilized to increase knowledge into how a gathering of means vary. On the off chance that F-determined worth is more prominent than f-basic worth, the invalid hypothesis was dismissed, on the off chance that F-determined worth is not exactly the f-basic worth, at that point, the invalid hypothesis was acknowledged. The invalid speculations were tested at 0.05 degree of essentialness with the utilization of ANCOVA measurement. The analysis was completed by the utilization of the Statistical Package for Social Sciences (SPSS).

Results

Research Question One: What is the effect of using ACA and conventional methods for teaching Technical Drawing s on the performance in a practical test of Senior Secondary School Students in Niger State?

Table 1: Mean of the test scores on the effect of using ACA and conventional method on the performance of students in the practical test

Variables	N	Mean	Std. Deviation	Std. Error Mean
Pre-test practical control group	45	7.60	2.20	.32937
Pre-test practical experimental group	45	7.57	1.91	.28513
The post-test practical control group	45	7.60	1.55	.23225
The post-Test practical experimental group	45	13.11	3.17	.47271

In Table 1, there was little difference in the performance of pre-test Practical control and experimental group. A similar case was also observed between the standard deviation of the two groups. Meanwhile, in the post-test practical scores, the experimental group scored a higher mean of 13.11 than the control group with a mean score of 7.60. This signifying high performance in the post-test practical by the experimental group than post-test by the control group. It was concluded that the performance of students in practical test increased with the use of ACA for teaching Technical Drawing in a senior secondary school in Niger State.

Research Question Two: What is the performance of students who were taught Technical Drawing s using ACA and those taught using conventional teaching method in the three senatorial zones in Niger State?

Table 2: Mean scores of the performance of students on the experimental and control group within the three zones in Niger State.

Zones		Pre-test control group	Pre-test experimental group	Post-test Control group	Post-test experimental group
Zone I	Mean	15.40	14.80	14.80	28.67
	Std.D	2.67	2.04	2.98	3.41
Zone II	Mean	14.13	15.13	13.93	26.53
	Std.D	2.85	1.81	3.33	3.39

Zone	Mean	13.81	13.40	14.47	24.60
III	Std.D	4.18	3.77	3.36	3.09

Table 2, showed little difference in the performance of pre-test control and pre-test experimental group in all the three zones. The same was observed between the standard deviation of the two groups. In the post-test control group of the zone, I post-test experimental group scored higher mean of 28.67 than the control group with a mean score of 14.8. This signified high performance in the post-test experimental group than the control group in zone I. Similarly the same trend occurred in Zone II and Zone III. Meanwhile, the difference is more prevalent in Zone I, followed by zone II and lastly in zone III. It can be concluded that the performance of students who were taught Technical Drawing s using ACA was better than those who were taught using the conventional teaching method in the three senatorial zones in Niger State.

Hypothesis One: There is no significant difference between the performance of Senior Secondary School Students in the practical test when taught with ACA and conventional method of teaching in Niger State.

Table 3. ANOVA Test of significant difference of performance in a practical test of Senior Secondary School Students in Niger State using ACA and conventional method

Variable	Groups	Sum of Squares	df	Mean Square	F Sig.
Pre-test practical control group	Between Groups	8.40	2	4.20	.85 .433
	Within Groups	206.40	42	4.91	
	Total	214.80	44		
Pre-test practical experimental group	Between Groups	8.58	2	4.29	1.18 .317
	Within Groups	152.40	42	3.63	
	Total	160.98	44		
The post-test practical control group	Between Groups	.533	2	.27	.11 .900
	Within Groups	106.27	42	2.53	
	Total	106.80	44		
The post-test practical experimental group	Between Groups	128.04	2	64.02	8.55 .001
	Within Groups	314.40	42	7.487	
	Total	442.44	44		

*Significant at 0.05 level

Hypothesis Two: There is no significant difference between the performance of senior secondary school students taught Technical Drawing with ACA and those taught without it in senatorial zones conventional method of teaching in Niger State.

Table 4.ANOVA Test of differences in performance between students taught using ACA and those without it in senatorial zones

Variables	Groups	SS	df	MS	F Sig
pretest control group	Between Groups	21.39	2	10.69	0.981
	Within Groups	457.73	42	10.90	0.383
	Total	479.11	44		
pre-test experimental group	Between Groups	25.37	2	12.69	1.755
	Within Groups	303.73	42	7.23	0.185
	Total	329.11	44		
Posttest Control group	Between Groups	5.73	2	2.87	.275
	Within Groups	437.07	42	10.41	0.761
	Total	442.80	44		
Posttest experimental group	Between Groups	124.13	2	62.07	5.683
	Within Groups	458.67	42	10.92	
	Total	582.80	44		0.007

*Significant at 0.05 level

Result in Table 4. Revealed that the f-value on the post-test experimental group was greater than the post-test control group which showed a significant difference between the groups.

Discussion

The study uncovered that students educated with ACA (trial method) performed better than those instructed with regular teaching method (control gathering) in Technical Drawing. This finding concurs with the previous finding of Owusu (2010) who found that students who utilized ACA scored fundamentally higher in numerical ideas and calculation than students who experienced the traditional methodology. This uncovered the students that were told through ACA performed better on the numerical ideas as contrasted and those students who were told through teaching methodologies, for example, address teaching method. The findings of Harrison (1993) on ACA in essential mathematics idea additionally verified with the findings of this study. The outcome uncovers that students who got ACA demonstrated more noteworthy increment in their performance scores in duplication and subtraction than students who got traditional scientific instructions.

The study also revealed that ACA is fit for improving students‟ performance. The findings of this study similarly affirmed the findings of Kausar, Choudhry and Gujjar (2008) who revealed that ACA winds up being through and through better than study corridor teaching concerning performance in data, analysis and amalgamation of the Bloom's logical classification when they guided a close to study to evaluate the reasonability of computer-helped instruction versus study lobby address for Technical Drawing students. Data of Table 2 showed that the performances of students between the test and control bundles inside the three zones were one of a kind. This finding reinforced the constructivist perspective which focused on the dynamic employment of the students in securing cognizance and grasping data acquainted with them

(Roblyer and Edwards 2000; Hsu Chen and Hung, 2000; Good and Brophy, 1990). This is so considering the way that the students trained by the ACA, through data revelation and relationship with the ACA exhibited a tremendous differentiation in their performance. Furthermore, past studies done by Kuchler (1998) examined the ampleness of ACA in teaching science and math. The study found that students who got instructions through ACA achieved more than the people who moved in a standard circumstance. It can along these lines be construed that student's in target test performance in Technical Drawing s and other subjects on a very basic level improved due to the use of the ACA. In like way while others with hypotheses were excused. The findings of Al-Qomoul (2005) showed that there were verifiably basic differentiations in the achievement mean scores of the subjects of the preliminary pack who thought about the effect of ACA on English Language Function on the Basic Stage Students‟ Achievement. The figures in the like manner speculated that any expansion in the academic performance in the field of the Technical Drawing could be credited to the method used. The hard and fast mean scores of the preliminary bundles in the post-test were mean 13.11, while it was 7.6 for the benchmark gatherings.

This infers the achievement in the post-test for both the preliminary and control bundles was credited to the treatment. It will, in general, be easily observed that the extra increment in the test social event's mean scores is higher than the benchmark gathering's mean scores. Another possible explanation is the peculiarity of the experience which may have added to students energy to learn and in this manner to perform better. Besides, the independently directed nature of the computerized practices and the unmatched visual depiction of the material in the item convinced the students in the test social event to perform generally better in the post-test. Additionally, the computerized method, as opposed to the traditional method, enables the student to get analysis adequately, which makes certainty aptitudes. Using the computer permits the student to use various resources during the learning strategy. The usage of the computer screen which is joined by development, video pictures, shades, music and sounds attract students‟ thought and empower assets of upkeep to them. The authority acknowledges that students can get familiar with even more capably and enough isolated with additional advantages which development makes available. Besides, using programming programs applies the "Learning by Doing" method, since students use the support and the mouse to click or to print their answers. Computer instructional undertakings are keen. Students can without a lot of a stretch proceed or in opposite as demonstrated by their necessities and essentials.

Conclusion

Based on the findings of this study it was concluded that:

1. ACA significantly enhanced the performance of students in Technical Drawing because those students taught using ACA performed significantly better than those taught using conventional teaching method in Technical Drawing.
2. ACA is more effective in teaching Technical Drawing in senior secondary schools.

Recommendations

Based on the findings, it was recommended that:

1. AutoCAD Application should be used to teach Technical Drawing students in the senior secondary schools in Niger State for better performance of students.
2. Emphasis should be given in the use of ACA in the objective test for teaching Technical Drawing student in the senior secondary schools in Niger State. The government should provide computers in the laboratories and projector to facilitate active learning in the

practical test for teaching Technical Drawing in the senior secondary schools in the study area.

3. Student's wrong perception of Technical Drawing as a difficult subject should be discouraged by teachers, guidance counsellors and parents. This is because; the study revealed that ACA was better than the conventional method of teaching in performance within the three senatorial zones. The result revealed that ACA has a significant effect on the performance of students.

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