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Effect of Computer Animation on Students Achievement and Interest on Technical Drawing in Technical Colleges in Niger State

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Abstract

The study investigated the effect of computer animation and achievement on technical drawing students in technical colleges in Niger State. A quasi-experimental, design was used in carrying out the research; Thepopulation for the study was 102 Technical College II Students. Fifty-four students, from two schools (male 27 and female 27) were sample for the study. Intact classes were assigned by balloting to either experimental or control group; and separately taught by their regular Technical Drawing teachers who had earlier been trained for the purpose. All the groups were pre and post tested. Sectional View Achievement Test (SVAT) containing twenty multiple choice test and Sectional View Interest Inventory containing twenty items were used as instruments for both the control and the experimental groups. Three research questions and two hypotheses guided the study. The mean and standard deviation were used in answering the research questions while Analysis of Covariance (ANCOVA) was used in testing the hypotheses at $p<0.05$ level of significance. The results showed that the use of computer animation approach in teaching affects students' achievement and interest in sectioning. Also there was no significant interaction effect between the teaching method and gender on students' achievement. The study recommended among other things the incorporation of computer animation approach in Technical Drawing text books, organization of workshop and seminars for teachers on the use of computer

animation approach in the teaching and learning of Technical Drawing especially in Sectioning.

Introduction

Technical Drawing is a universal language which uses graphic prepared in special ways and a few words as notes to accompany it. It is not normally done y the spoken word, it is more easily understood than any form of languages. It is an important tool for communicating ideas between peoples, especially those in industry. Technical Drawing is a very useful subject because it is applied in all fields of human endeavour. It is one of the most important subjects in education; hence it is a core subject in technical colleges in Nigeria (Usman, 2010). A common goal of teachers of technical education is to make lesson preservation vita, interesting, alive and lasting. Every teacher seek to convey to the students certain basic information, ideas, knowledge and skills in the shortest possible time and in accordance with the principles of learning. For this reason, new methods and approaches are continuously being sought to overcome the limitations of exhaustively verbal communication. Current development in both psychological research and technology has given rise to adoption of improved methods of teaching and learning.

Technical drawing is that aspect of education which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. Technical drawing play a crucial role in the social and economic development of a nation. Technical drawing a multifaceted, multi-disciplinary and pragmatic field of study, is aimed at equipping the individuals with requisite vocational and technical education literacy skills, which will enhance their relevance and functionality in the society. As a result, it plays a vital and indispensable role in the development of the society.

Computer animation is essentially a digital successor to the stop motion techniques used in traditional animation with 3D models and frame-by frame animation of 2D illustrations. Computer generated animations are more controllable than other more physically based processes, such as constructing miniatures fore effects shots or hiring extras for crowds scene. And because it allows the Creation of images that would not be feasible using any other technology. It can also allow a single graphic artist to produce such content without the use of actors, expensive set pieces, or props. To create the illusion of movement, an image is displayed on the computer monitor and repeatedly replaced by a new image that is similar to it, but advanced slightly in time (usually as a rate of 24 or 30 frames/seconds). Computer animation is identical to how the illusion of movement is achieved with television and motion pictures.

Animations have a number of advantages over other instructional methodologies. Students often find active participation in animations to be more interesting, intrinsically motivating and closer to real world experiences than other learning modalities (Alessi&Trollip, 2011). To provide transfer of learning with the result that what is learned facilitates improved performance in real-world settings (Leemkuil, De Jong, De Hoog&Christoph, 2008). Further, there is evidence to suggest that animations may be more efficient modalities for learning in some content areas (Alessi&Trollip, 2011). Animations can be very flexible in that both student and instructor can have a high degree of control over animation variables (Duffy & Cunningham, 2010; Hung & Chen, 2012). Animations can accommodate a wide range of instructional strategies, including microworlds, scientific discovery learning, virtual reality, laboratory animations, role playing, case-based scenarios, and animation gaming (Alessi&Trollip, 2011). Through animations the learner is given the opportunity to practice on his or her own with a variety of situations which resemble "real-life" problems which they might face in the future. And it is this type of practice,

which they indicate that enhances the learner's problem solving skills (Akpan, 2011). Animations are creative; students are organized into small groups, goals are set for individuals, as well as for the groups with which they work. The goal setting in conjunction with the competition with the other groups keep the students very involved in the learning (ITC, 2007).

Interest is an important variable in learning because when one becomes interested in an activity, one is likely to be more deeply involved in that activity. Interest is a subjective feeling of concentration or curiosity over something (Harbor-Peters, 2012). The influence of gender on student level of achievement and interest has been a matter of concern to technical education.

Similarly, Adeleke (2008), observed that the rate of students' poor achievement is alarming and equally disturbing and it is most likely that most students have some Technical Drawing knowledge but they may have almost no understanding of the basic structure of Technical Drawing, thereby making them to resort to memorization of Technical Drawing facts and concepts. Adeleke further stressed that one particular area which students' problems have been documented is sectional view. Perhaps, this is so because historically, sectional views have represented students' first sustained exposure to the abstraction and symbolism that makes Technical Drawing powerful (Kieran, 2012). It then becomes the duty of the teacher to teach Technical Drawing in a way to encourage the understanding of the required basic structure of Technical Drawing. One way of achieving this is through a careful and thoughtful selection of appropriate teaching strategy that will help students in understanding Technical Drawing concepts, especially in sectional view rather than passive reception of ideas.

Research questions

The research questions were raised and answered.

1. What is the mean achievement scores of students taught with computer animation and those taught with conventional approach in the Sectional Views Achievement Test (SVAT)?
2. What are the mean achievement scores of male and female students taught using computer animation in the Sectional View Achievement Test (SVAT)?
3. What is the mean interest scores of students taught with computer animation and those taught with Traditional lecture methodin the Sectional Views Interest Inventory (SVII)?

Hypotheses

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

1. There is no significant difference between the mean achievement scores of students taught with computer animation and those taught with traditional method, as measured by the Sectional Views Achievement Test (SVAT).
2. There is no significant difference between the mean achievement scores of male and female students taught with computer animation in sectional views, as measured by the Sectional View Achievement Test (SVAT).

Methodology

The Design of the study is quasi-experimental design. The study was carried out in all the seven (7) Educational Zones of Niger state. There are seven (7) technical colleges in Niger State. The population of the study is comprised of 102 TCII technical college students. The sample for the study was 54 (27 male and 27 female) number in the intact classes of the TC II students of 2014//2015 academic session. Purposive sampling technique was employed to sample two schools. The reason for purposively selecting two schools is because only the two schools have computer facilities and electricity.

The two schools selected had up to two streams of TC II students and from each school, one class was chosen through simple random sampling.

Two instruments were used for the study; they are the Teacher Made Sectioning Achievement Test (TMSAT) and Sectional View Interest Inventory (SVII). Teacher Made Sectioning Achievement Test (TMSAT)was developed by the researchers following the table of specification.

The Pre-Sectional view Interest Inventory was administered to the students immediately after the Pre-Teacher Made Sectioning Achievement Test while the Post-Sectional view Interest Inventory was administered to the students immediately after the Post-Teacher Made Sectional view Achievement Test.

The internal consistency of the Sectional View Achievement Test was determined using Kuder Richardson Formula 20 (K-R 20) method. Kuder Richardson was used because the test items involved multiple-choice items. The internal consistency coefficient r = 0.98.

Again Cronbach's Alpha method, which is a modified version of K-R 20 formula was used to establish the reliability of the Sectional View Interest Inventory. The internal consistency of the AII was computed as 0.76 with the use of Special Package for Social Sciences (SPSS). The experimental groups were taught using computer animation approach while the control groups were taught the same topics using the traditional lecture method. The research questions were answered using means (x) and standard deviation (S.D). Hypotheses were tested at 0.05 level of significance using Analysis of covariance (ANCOVA).

RESULTS

Research question 1

What is the mean achievement scores of students taught with computer animation and those taught with conventional approach in the Sectional Views Achievement Test (SVAT)?

From the data table 1, the experimental group which represents those taught with computer

Table 1: The mean achievement scores of students taught Technical Drawing using computer animation and traditional lecture method approach

Group	Subject No. of Students (N)	Pre test Mean ($\bar{X}$)	Pre test Standard Deviation (SD)	Post test Mean ($\bar{X}$)	Post test Standard Deviation (SD)
Experimental	27	46.67	23.12	73.33	18.03
Control	27	38.52	23.97	47.59	18.42
TOTAL	54				

animation approach, obtained a higher mean achievement score of 46.6667and a standard deviation of 23.12175 in pre test (PRESVAT) and a mean score of 73.3333 and a standard deviation of 18.02776 in the post test (POSTSVAT). While the control group representing those taught with the conventional approach, it was observed that they had a mean score of 38.5185 and a standard deviation of 23.97173 in the pre test while in the post test, they had a mean achievement score of 47.5926 and a standard deviation of 18.41667. The better performance of the experimental group over that of the control group showed that students taught Technical Drawing using computer animation learnt Technical Drawing concept better than those taught Technical Drawing by the conventional method.

Research question 2

What are the mean achievement scores of male and female students taught using the computer animation in the Sectional View Achievement Test (SVAT)?

Table 2: The mean achievement scores of male and female students taught Technical Drawing using computer animation and the conventional approach

Group	Subject No. of Students (N)	Pre test Mean ($\bar{X}$)	Pre test Standard Deviation (SD)	Post test Mean ($\bar{X}$)	Post test Standard Deviation (SD)
Male	12	52.50	19.48	30.42	16.30
Female	15	42.00	25.34	67.67	17.82
TOTAL	27				

Table 2 revealed that the male students had a mean score of 52.5000 and a standard deviation score of 19.48193 in the pre-test and a mean score of 30.4167 and a standard deviation of 16.30091 in the post test. While their female counterparts had a mean score of 42.0000 and a standard deviation score of 25.34054 in the pre-test and a mean score of 67.6667 and a standard deviation score of 17.81519 in the post test. The result showed that the mean achievement scores of males in both the pre-test and post test scores were significantly higher than their female counterpart.

Research question 3

What is the mean interest scores of students taught with computer animation and those taught with traditional lecture method in the Sectional View Interest Inventory (SVII)?

Table 3: The mean interest scores of students taught Technical Drawing using computer animation and the conventional approach

Group	Subject No. of Students (N)	Pre test Mean ($\bar{X}$)	Pre test Standard Deviation (SD)	Post test Mean ($\bar{X}$)	Post test Standard Deviation (SD)
Experimental	27	2.74	1.06	3.59	0.50
Control	27	2.40	0.93	2.67	0.96
TOTAL	54				

From Table 3, it is observed that the interest score of the experimental group had a mean score of 2.7407 and a standard deviation of 1.05948 for the pre-test (PRESVII) and a mean score of 3.5926 and standard deviation of 0.50071 for the post test (POSTSVII). For the students taught with the conventional method (control group), it was observed that they had a mean interest score of 2.4074 and a standard deviation of 0.93064 for the pre-test while a mean interest score of 2.6667 and a standard deviation of 0.96077 for the post test. The higher mean interest score for the experimental group over the control group showed that the experimental group showed more interest in sectioning than the control group as indicated in their interest mean scores in AII.

Hypothesis Testing

Hypothesis 1

There is no significant difference between the

mean achievement scores of students taught with computer animation and those taught with conventional method, as measured by the Sectional View Achievement Test (SVAT).

Table 4: Summary of ANCOVA Result for SVAT

Source of variation	Type III Sum of squares	DF	Mean sum of square	F	Sign
Intercept	17129.17	1	17129.17	117.69	.000
Pre test	7996.72	1	7996.72	54.94	.000
Groups	5808.55	1	5808.55	39.90	.000
Sex	946.31	1	946.31	6.50	.014
Group* Sex	26.41	1	26.41	.181	.672
Error	7132.44	49	145.56		
Total	223625.00	54			

The result of the analysis in Table 5 showed that there is a significant difference in the mean achievement scores of students taught sectioning with computer animation and those taught the same topics using conventional approach. In other words, the null hypothesis of no significant difference was rejected.

Hypothesis 2

There is no significant difference between the mean achievement scores of male and female students taught with computer animation in sectioning, as measured by the Sectioning Achievement Test (SVAT)

Table 5: Summary of ANCOVA Result for SVAT for male and female students taught with computer animation.

Source of variation	Type III Sum of squares	DF	Mean sum of square	F	Sign
Intercept	13851.26	2	13851.26	67.96	.000
Pre test	2474.41	1	2474.41	12.14	.002
Sex	424.34	1	424.34	2.08	.162
Error	4891.84	24	203.83		
Total	153650.00	27			

The result on Table 6 shows that gender was not significant. Thus, the null hypothesis of no significant difference for gender was not rejected since sex was not significant.

Discussion of the findings

The data presented in table 1 provided answer to research question one, finding revealed that students taught technical drawing with computer animation had a higher mean achievement score that those student taught using the conventional teaching method in the achievement test. In the same vein, analysis covariance was used to test the first hypothesis, table 4 at the calculated f-value (117.687), significant of F (.000) and significance level of .05. there was a statistically significant difference between the mean score of the group taught with computer animation and those student taught using the conventional teaching methods in the achievement test. The implication of this findings therefore is that computer animation is more effective than convent6ional teaching methods in enhancing students achievement in technical drawing. The finding is similar to the finding of odogwu (2002) who found that there was a significant difference in the ICT achievement of experimental group with conventional teaching methods in favour of the experimental group.

The findings is also in line with the assertion of cotton (2001) who pointed out that the use of computer based learning produces achievement effects superior to those obtained with traditional instruction.

This finding appears to support the view of Ezugwu (2009) that teacher's method can greatly affect students achievement and skills acquisition.

The result of this study in table 3 revealed that computer animation enhanced students interest in technical drawings. This result is similar to the findings Rotgan and Schmidt (2007) who found that situation interest increased significantly after the problem was presented.

Conclusion

The results of this study provide evidence that the use of computer animation enhanced students achievement and interest in technical drawing. Therefore, the use of computer animation could be a means of improving students' performance in technical drawing.

Recommendations

The following recommendations were made based on the findings of this study.

- Since the use of computer animation enhance achievement of students in technical drawing, the technical drawing teachers should use it as one of the strategies to be employed in classroom teaching and learning
- Workshop/seminars should be organised by the Government for technical drawing teachers to enable them learn how to use computer animation in teaching technical drawing.
- Technical Drawing experts should be funded by government for the production of computers and computer animation programmes in various Technical Drawing topics for schools.
- The state and federal ministries of education should invest on massive acquisition and distribution of Technical Drawing software to technical colleges.
- Technical Drawing textbook authors and publishers should incorporate the use of computer animation approach in their text books. This will avail the teachers and students the opportunity in developing interest on the need of computer animation in their lessons.

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