



## Effect of Computer Animation on Students' Academic Achievement in Auto Braking System in NCE Awarding Institutions of North- Eastern, Nigeria

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### ABSTRACT

The study determined the effect of computer animation on students' academic achievement in auto braking system in NCE awarding institutions in north- eastern, Nigeria. For achieving the purpose of this study, three objectives, three research questions and three hypotheses were formulated. Related literature was extensively reviewed based on relevant concepts and theory to guide the study. Quasi-experimental research design (pretest and posttest) was used for the study. All students offering TED214 (braking, steering and suspension system) at NCE II level made the population of the study. Existing intact classes were used but a simple random sampling of the Hat-picks technique was employed to select two colleges of education from North Eastern Nigeria as experimental group and control group. Auto Braking System Academic Achievement Test (ABSAAT) was used as the instrument for data collection. The instrument was validated by three experts in the area of automobile technology. A pilot test of the instrument was carried out in a college of education having similar characteristics with sampled colleges but located in North Western, Nigeria. The reliability of the instrument was established by KR-21 and 0.81 co-efficient was obtained. The data were analysed using mean, standard deviation and t-test. After the analysis, the study revealed that the students had higher academic achievement in auto braking system in the experimental group than that of the control group. Based on this finding, it was concluded that the students taught using computer animation had higher academic achievement in auto braking system than those taught with the conventional method of teaching. Also, the research study recommended that computer animation should be adopted in teaching automotive courses in tertiary institution of north-eastern Nigeria. In addition, this study has an implication to students, teachers and curriculum planners on practice. Lastly, the researcher suggested the replication of this study in the other field of studies.

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### INTRODUCTION

Technical Vocational Education and Training (TVET) is a type of education designed to equip individuals with competencies in an occupational trade for the technological and economic development of Nigeria. TVET is the

sub-sector of the education system widely recognized as the bedrock to sustainable technology development programmes in entrepreneurship, occupational professionalism, self-reliance, poverty alleviation and wealth creation (Okoye & Okwelle, 2013). TVET as



defined by UNESCO (2001) and adopted by the Federal Republic of Nigeria in her National Policy on Education (2013:16) is:

*“a comprehensive term referring to those aspects of the educational process involving in addition, to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. (FRN, 2013, p.36)*

TVET is further understood to be an integral part of general education or means of preparing for occupational fields for effective participation in the world of work. It is also an aspect of continuing or lifelong learning and a preparation for responsible citizenship. It is similarly considered as an instrument for promoting environmentally sound sustainable development. In this broad definition, David (2010) posited that the Vocational skill training aspect of TVET focuses on specific trades such as automobile repairs or mechanic, welding, plumbing, electrical craftsmanship, hair dressing, tailoring and barbing that can equip an individual to be self-reliant.

The curriculum of the Department of Vocational and Technology Education (DVTE), Faculty of Technology Education (FTE), Abubakar Tafawa Balewa University (ATBU) Bauchi, DVTE (2011) defined Automobile Technology Education (ATE) as a teacher education Programme for producing teachers of Basic Technology; Technical drawing, Applied Mechanics, and their respective technical trade components in the areas of Automobile. It further aimed at producing a dedicated individual student capable of becoming technology teachers for Nigerian Secondary Schools and Colleges who will be equipped with deeper knowledge that can contribute in building the economy of the country. In other word Inti, Latib and Audu (2014) defined ATE as one of the TVET Programme that deals with the acquisition of scientific and technological knowledge in production, selection of resources, operations and diagnosis and repair of automobiles.

According to Nevkar (2008) teaching in Nigeria has generally characterized by the use of

lecture and demonstration method and Ahmad et., al. (2015) explained that methods of teaching used in automobile and other technology education courses include: lecture methods, discussion methods, case studies, programmed instructions, role play, demonstration, experiments and educational field trips among others. They also argued that most of these methods are teacher centered and do not develop skills such as communication, creativity, persuasion and problem-solving skills as it ignores the two of the main important domains of learning that is cognitive and psychomotor domain which left the learners behind rather than active during instruction. However, Ogbuanya and Peter (2014) said the used of non-traditional teaching methods like inquiry, guided discovery, and video instruction engage the learner to actively participate in learning. Again, Tyav (2016) emphasized that video instruction is a cognitive method of learning that combine various forms of media to ease teaching and learning processes. This may imply that the use of animation can be very effective in teaching Technical and Vocational Education courses particularly Automobile Technology Education.

According to Pekdag, (2010), Computer animations are the process of animating graphics in a certain scenario and they should be regarded as alternative teaching ways to visualize knowledge. However, Akor (2011) noted that the use of Computer animation in the classroom is to engage the interest of the students, motivating them to learn and increasing independent and personal responsibility for education, higher thinking skills and creativity in problem solving. Moreover, well-designed Computer animations may help students learn faster and easier. They are also excellent aid to teachers when it comes to explaining difficult subjects. The difficulty of subjects may arise due to the involvement of mathematics or imagination. For instance, the electric current is invisible. The operation of electric circuits is difficult for students to understand at the beginning. With the aid of computer animations, learning and teaching might become easier, faster and amusing.

The abstract and dynamic nature of auto braking has therefore, made computer



animation an important instructional media to help in teaching the topic. Kylie (2012) noted that computer animations could be seen as a basic form of class entertainment that could pick the interest of all age groups, whether adult, teenager or a kid. Furthermore, Iravani and Delfechresh (2011) stressed that the flexibility of learning through computer animation allows a wider range of stimuli thus increases the students' engagement in learning which consequently translate into increase in level of students' academic achievement which is the priority of any educational system.

Academic achievement represents performance outcomes that indicate the extent to which a person has accomplished specific goals that were the focus of activities in instructional environments, specifically in school, college, and university. Consequently, Tyav (2016) viewed Academic achievement as the intellectual ability of an individual in a particular course of the study measured in a test. However, there have been great concerns on the academic achievements of Automobile Technology Education students in Nigeria tertiary institutions because Udofia, Ekpo and Akpan (2012) lamented that one of the challenges facing TVET is that most technical education students including automobile are incompetent to perform effectively in the world of work after graduation. Oyenuga (2016) added that the traditional method of teaching has its own advantages in teaching but poor academic achievement in an automotive course is connected with the use of conventional methods of teaching which do not touch all the five human senses.

Many type of researches on computer assisted instruction and effect of multimedia technologies in the area of automobile technology education had been conducted such as the study by Tyav (2016) and Cyril (2016) but the researcher however, is unable to see any research work on the effect of computer animation on students' achievement and retention in auto braking system in NCE (technical) awarding institution in north-eastern Nigeria, it is against this background that this study was carried out.

It is discouraging to note that many automotive technology education students

perform poorly in relating the theory acquired in the classroom with the real-life situation when it comes to practical activity. It is in that respect Abiadiak and Godwin (2017) lamented that automobile technology education graduate's display a low level of skills in automotive components repair and maintenance, which indicate they have inadequate theoretical and practical skills. For them to be proficient in the field, their academic achievement needs to be improved in both theoretical and practical aspect. This situation may be connected with the use of the conventional method of teaching, lack of effort to incorporate the appropriate instructional methods that can supplements the irregularities associated with it and also go by the emerging technologies in automobile. In addition, (Ogundola (2012); Oyenuga (2016) contended that the use of the conventional method in teaching automotive courses contributes to the low academic achievement of students in the Programme.

In addition, the conventional method of teaching is teacher centered which therefore not encouraged students to be active rather than passive in teaching and learning processes (Ahmad *et al.*, 2015). However, the research conducted by Nwanekezi and Kalu (2012) revealed that students taught with instructional media perform better than those taught with conventional teaching methods during academic achievement test. Oyenuga (2016) added that the traditional method of teaching has its advantages in teaching but poor academic achievement in automotive course is connected with the use of conventional methods of teaching which do not touch all the five human senses.

Many types of researches on computer assisted instruction and the effect of multimedia technologies in the area of automobile technology education had been conducted such as the study by Tyav (2016) and Cyril (2016) but the researcher however, is unable to see any research work on the effect of computer animation on students' academic achievement in auto braking system in NCE awarding institution in north-eastern Nigeria, it is against this background that this study was carried out.



### **Objective of the study**

The purpose of this study was to determine the effect of computer animation on students' academic achievement in auto braking system in NCE awarding institution in north-eastern Nigeria Specifically; the objectives of this study are to:

1. Determine the effect of computer animation on students' academic achievements in auto braking system.
2. Determine the difference in the pre-test achievement scores of experimental and control group in auto braking system.
3. Determine the difference between pre-test and post-test mean achievement of students taught auto braking system using computer animation.

### **Research Questions**

The following research questions were formed to guide the study:

1. What is the effect of computer animation on students' academic achievements in auto braking system?
2. What is the difference in the pre-test achievement scores of experimental and control group in auto braking system?
3. What is the difference between pre-test and post-test mean achievement of students taught auto braking system using computer animation?

### **Research Hypotheses**

The following hypotheses were formed to guide the study:

**HO<sub>1</sub>:** There is no significant difference in the effect of computer animation on students' academic achievements in auto braking system

**HO<sub>2</sub>:** There is no significant difference in the pre-test achievement scores of experimental and control group in auto braking system.

**HO<sub>3</sub>:** There is no significant difference between pre-test and post-test mean achievement of students taught auto braking system using computer animation.

### **METHODOLOGY**

Quasi-experimental research design (pretest and posttest design) was employed for this study as this design does not disrupt the original class setting organize by schools there by having the opportunity to use intact class. This is a type of experimental design that does not include random assignment of individuals to groups (Creswell, 2014). The area of this study was North eastern Nigeria. All the 661 students offering automotive auto braking system at NCE II technical in tertiary institutions of north-eastern Nigeria formed the population of the study. The automotive braking system is an NCE II topic in a course TED 214 title: Auto braking, suspension and steering system that is offered in tertiary institutions of Nigeria awarding NCE Technical (NCCE, 2012). Simple random sampling was used to select two tertiary institutions in north eastern Nigeria. However, all the students in each of the two groups selected as the experimental and control group were used as sample because of the research design. Based on the design intact classes were used so as not to disrupt the existing class setting. The instruments for data collection were a structured questionnaire titled "Auto Braking System Academic Achievement Test (ABSAAT). The ABSAAT is a four option (A-D) multiple-choice objective test item developed by the researcher that is categories into two (part 1 and 2). In order to establish the reliability of the instrument, a pilot test was carried out outside the area of this study after seeking permission from the institution. This was because the institution uses same curriculum as those in the area of this study. Both the students share same characteristics. The reliability of ABSAAT was established using Kuder-Richardson method and 0.81 reliability of coefficient was obtained. Kuder-Richardson is a method of determining the internal consistency of a test whose items are scored dichotomously (Enemali, 2010). This was done by applying KR-21 formula.

The experimental group was taught using computer animation instruction while the control group on the other hand was taught using conventional method of teaching. In the course of applying the treatment, both the experimental and the control groups had met once a week for



2 hours for 3 weeks and this process took place according to normal class period as schedule in the course time table. The statistical tools used for data analysis were mean, standard deviation and t-test. All research questions were answered using mean and standard deviation. While the research hypotheses were tested using paired sample t-test and analyzed using statistical package for social sciences (SPSS). Likewise, to determine the decision rule for all the hypotheses any value that is found to be less than or equal to 0.05 the null hypotheses were rejected and the

alternate hypotheses was accepted which indicate a significant difference. Similarly, any value that will found to be greater than 0.05, the null hypotheses were accepted which indicates that there is no significant difference. (Creswell, 2014).

## RESULTS

**Research question 1:** What is the effect of computer animation on students' academic achievements in auto braking system?

**Table 1:** The effect of computer animation on students' academic achievements in auto braking system

Test type	N	Mean	Std. Deviation	Std. Error Mean
Experimental	161	15.73	4.321	.205
Post-test Control	161	14.18	4.791	.280

Table 1 shows the descriptive statistics of the post test scores for both experimental and control groups. The experimental group, N=161 had a mean score of 15.73 and a standard deviation of 4.321. While the control group, N=161 had a mean score of 14.18, and a standard deviation of 4.791. From the findings, the experimental group's mean score is higher

than the control group's mean score implying that the computer animation had a positive effect on students' performance in auto braking system.

**Research question 2:** What is the difference in the pre-test achievement scores of experimental and control group in auto braking system?

**Table 2:** Pre-test scores of students of both Experimental and the Control Groups

Test type	N	Mean	Std. Deviation	Std. Error Mean
Experimental	161	13.39	5.960	.283
Pretest Control	161	13.45	5.047	.295

Table 2 shows the descriptive statistics for both experimental and control group. In the experimental group, the mean is 13.39 while the control group the mean is 13.45. From these findings, the groups mean score are almost equal (a difference of 0.06) implying that the two groups of students were

similar in auto braking system in the pre-test.

**Research question 3:** What is the difference between pre-test and post-test mean achievement of students taught auto braking system using computer animation?

**Table 3:** Pre-test and Post-test scores of students in the Experimental Group

Test type	N	Mean	Std. Deviation	Std. Error Mean
Pretest	161	8.94	.177	1.480
Experimental Post Test	161	23.67	.163	2.067



Table 3 shows the pre-test and post-test of students' academic achievement in the experimental group; where the pre-test mean score of students was 8.94 and standard deviation of .177 while the post-test mean score

of the group was 23.67 and standard deviation of 1.63 this indicates that the experimental group had higher academic achievement during post-test than the pre-test.

### Research Hypothesis 1

**HO<sub>1</sub>:** There is no significant difference in the effect of computer animation on students' academic achievements in auto braking system

The result in Table 4 showed that there is statistically significant difference between the students' academic achievements in experimental and control groups in auto braking system in the post-test ( $t = 59.936$ ,  $p > 0.05$ ). Therefore the hypothesis is accepted.

Table 4: T-test result of students in both the Experimental and the Control Group in Post-test

Group	Test	N	Mean	SD	DF	T	P	Decision
Exp Group	Post-test	161	23.67	2.067	160	59.936	.000	Accepted
Con Group	Post-test	161	12.06	1.233				

### Research Hypothesis 2

**HO<sub>2</sub>:** There is no significant difference in the pre-test achievement scores of experimental and control group in auto braking system.

The result in Table 5 showed that there is statistically significant difference between the students' academic achievements in experimental and control groups in auto braking system in the pre-test ( $t = 25.033$ ,  $p > 0.05$ ) therefore the hypothesis is accepted.

Table 5: T-test result of students in both the Experimental and the Control Group in Pre-test

Group	Test	N	Mean	SD	DF	T	P	Decision
Exp Group	Pre-test	161	8.94	1.480	160	25.033	.000	Accepted
Con Group	Pre-test	161	5.78	1.188				

### Research Hypothesis 3

**HO<sub>3</sub>:** There is no significant difference between pre-test and post-test mean achievement of

students taught auto braking system using computer animation.

Table 6: T-test result on pre-test and post-test mean achievement of students taught auto braking system using computer animation

Group	Test	N	Mean	SD	DF	T	P	Decision
Exp Group	Pre-test	161	8.94	1.480	160	-100.24	.000	Rejected
	Post-test	161	23.67	2.067				

Table 6 shows the pre-test and post-test of students' academic achievement in the experimental group; where the pre-test mean score of students was 8.94 and standard deviation of .1480 while the post-test mean score of the group was 23.67 and standard deviation of 2.067 this indicates that the

experimental group had higher academic achievement during post-test than the pre-test. Therefore the hypothesis is rejected

## DISCUSSION

The findings in relation to research question one was intended to determine the



effect of computer animation on students' academic achievements in auto braking Table 1 shows the descriptive statistics of the post test scores for both experimental and control groups. The experimental group, N=161 had a mean score of 15.73 and a standard deviation of 4.321. While the control group, N=161 had a mean score of 14.18, and a standard deviation of 4.791. From the findings, the experimental group's mean score is higher than the control group's mean score implying that the computer animation had a positive effect on students' performance in auto braking system. This was confirmed by the research hypothesis 1 as shown in table 4. This indicates that there was a significance difference between students' academic achievement in experimental group and that of the control group in auto braking system in the post-test. This is associated with the findings of Cyril (2016b) who conducted a study on the effect of multimedia instruction on students' performance and reported that there was a significant difference in the post-test score of students between the experimental and the control groups. However, this finding contradicted the findings of the study conducted by Shehu, Muhammad, Enemali, and Nordin (2012) which revealed that there was no significant difference between the mean academic achievements of students taught in the experimental group than that taught in the control group. Based on this finding, it was established that students taught with computer animation had better academic achievement than students taught with conventional method of teaching.

The finding in relation to research question two was intended to determine the difference in the pre-test achievement scores of experimental and control group in auto braking system the descriptive statistics for both experimental and control group. In the experimental group, the mean is 13.39 while the control group the mean is 13.45. From these findings, the groups mean score are almost equal (a difference of 0.06) implying that the two groups of students were similar in auto braking system in the pre-test. This finding was confirmed by the research hypotheses tested in table 5. These findings correspond to a finding of Tyav (2016) who conducted a study on the

effect of multimedia technique on technical college students' academic achievement in auto-mechanics in Benue state and reported that there was no significant difference in achievement scores of both experimental and control groups in the pre-test.

The finding in relation to research question three revealed that the students' academic achievement in auto braking system in the experimental group was higher during post-test than in the pre-test. Table 3 shows the pre-test and post-test of students' academic achievement in the experimental group; where the pre-test mean score of students was 8.94 and standard deviation of .177 while the post-test mean score of the group was 23.67 and standard deviation of 1.63 this indicates that the experimental group had higher academic achievement during post-test than the pre-test. This was proved by the research hypothesis tested in table 6. Therefore, there was a significant difference between students' academic achievement in the experimental group in auto braking system during pre-test and post-test. This was as a result of the treatment administered after the pre-test. This was in line with the findings of Ikwuka (2017) who carried out a study on Effect of Computer Animation on Chemistry Academic Achievement of Secondary School Students in Anambra State, and reported that there was a significant difference between pre-test and post-test of students taught with computer animation in the experimental group.

## CONCLUSION

After the findings gathered on this study, it was concluded that the students, academic achievement in auto braking system in the experimental group was higher than that of the control group. This revealed that there was a significant difference in academic achievement between the students taught with computer animation and those taught with conventional method of teaching, therefore, computer animation is more credible to use in teaching automotive courses or any abstract concepts.

## RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made:



1. The use of computer animation should be adopted in teaching auto braking system and other automotive courses in tertiary institutions of north-eastern Nigeria so as to improve academic achievement of students.
2. In addition to the use of conventional teaching method, automobile teachers should be encouraged to be using computer animation related instruction in order to suppress the inappropriateness of conventional method of teaching.
3. Researchers in TVET and other field of studies whose curriculum is practical base should replicate this study to promote understanding of instructional objectives and improve students' academic achievements.
4. Nigerian government should provide more instructional gadgets on computer animation to support TVET teachers in teaching and learning delivery.

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