



# EFFECTS OF ANIMATION ON STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION IN BASIC ELECTRICITY AT TECHNICAL COLLEGE LEVEL IN BENUE STATE, NIGERIA

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**ABSTRACT**– This study determined effects of animation on students' achievement and retention in Basic Electricity at Technical Colleges in Benue State, Nigeria. The study adopted quasi-experimental research design; specifically the pre-test post-test non-equivalent control group experimental design. Students' performance was obtained after being treated with animation instructional technique and conventional teaching method. There was no sampling as the population of the study comprised of all 82 Technical college one (TC 1) students offering Basic Electricity. The instrument used was Basic Electricity Achievement and Retention Test (BEART). Reliability testing of BEART was carried out with the use of test-retest technique and a reliability coefficient of 0.81 was obtained. Data collected were analyzed using mean and ANCOVA at .05 level of significance. The findings of the study revealed that students taught with animation have higher achievement and retention in Basic Electricity than with conventional method. The findings imply that animation had a positive effect on students' understanding of Basic Electricity. It is recommended that technical college teachers be equipped with necessary skills required to employ animation in teaching.

**Keywords:** Animation; Achievement; Retention; Basic Electricity; Technical College.

## 1. INTRODUCTION

Technical college is equivalent of the conventional secondary schools in the Nigeria educational structure whose curriculum, in addition to the skilled subjects referred to as trades, consists also of; "General Education, Theory and Related Courses, Workshop Practice, Industrial Training/Production Works, and Small Business Management and Entrepreneurial Training" (FRN, 2004). The Federal Republic of Nigeria (FRN, 2004) gave a range of trades in the Technical Colleges to include but not limited to: Mechanical, Computer Craft, Building, Wood Work, Hospitality, Textile, Printing, Beauty Culture, Business, and Electrical Engineering trade. Electrical engineering Trade in Technical College consists of Electrical Installation Work, Radio and Television Servicing and Appliances repairs. One of the Trade Related Course necessary for the study of this Trade is Basic Electricity.

Basic Electricity is a trade related module of the National Technical College Syllabus designed to provide the trainees with basic knowledge and practical skills of electricity/electronics. The objectives of Basic Electricity as outlined in the National Business and Technical Examination Board Syllabus (NABTEB, 2007) are that at its completion the students should be able to demonstrate an understanding of the: Structure of Matter and its Relevance to Electricity, Chemical Sources of Electromotive Force, Electric Circuit Analysis, Principles of A.C and D.C Generation, Principles of Magnetism, Series/Parallel Connection of Electrical Component, Operations and uses of Electrical/Electronic Measuring Instruments and Principles of Transformer Construction/operation.



Basic Electricity is a must offered subject by every student wishing to take a career and continue in the field of electrical/electronic technology or related field.

The objectives of any educational process determine the contents, methods and materials needed for achieving such objectives. In the delivery of Curricula Content at Technical College, studies have revealed that Technical teachers including Basic Electricity teachers rely on the traditional/use of the words to express method of teaching, to convey ideas or facts in the teaching-learning process. Raj (2012) observed that this method involves a teacher doing all the talking with little or no input from the students. Raj however noted that, this method allows the teacher to decide what material to teach and ensures that it is explained to students in the way the teacher desires within the allotted time, more material is therefore, covered within a short time. Consequently, this is problematic because it gives complete autonomy to the teacher while the student takes on a passive role which hinders learning (Raj, 2012). In this regard Iravani and Delfechresh (2011) affirmed that for effective learning the traditional teaching in the classroom using black board become supplemented with Computer Animation.

Animation as defined by Ukpebor and Ozobokeme (2007) is an art of making any objects into a motion with the aid of computer. Bradley (2004) observed that animation interactive features encourages individual class participation thereby, increasing students class autonomy and eases the teachers' work and level of talking in the classroom. The abstract and dynamic nature of Basic Electricity has therefore, made animation an important instructional media to help in teaching the subject. Kylie (2012) noted that animations could be seen as a basic form of class entertainment which could pick the interest of all age groups, whether adult, teenager or a kid. Akor (2011) noted that the use of 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 creative in problem solving. Furthermore Iravani and Delfechresh (2011) stressed that the flexibility of learning through 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 and retention which is the priority of any educational system.

Academic achievement refers to knowledge and skills attained by students in a school or institution subject or course designated by a score obtain in achievement test. Academic achievement describes students' success by what each student accomplishes and do occur during the implementation of the curricular strategies. On the other hand, retention is the ability to elicit performance and hold such performance after duration of time. Retention is a very vital component of the education process. It tells the worth of a student in subjects areas in terms of skills and knowledge acquired overtime.

However ,Kennedy (2009) observed that individuals who are expected to acquire the stipulated skill, attitude and knowledge necessary for economic growth as outlined in the National Policy on Technical Education are gradually disappearing more so in areas of electrical trades due to unsatisfactory performance. Ogbu (2011) observed that students' unsatisfactory performance in Basic Electricity subjects at national examinations has persisted over the last ten years, and consequently has resulted in unemployment, poverty among craftsmen plus scarcity in the skilled men and women needed for the growth of the nation's economy. For instance the 2007-2011 National Technical Certificate Examinations (NTC) taken in Basic Electricity revealed: 35.7 %, 63.0 %,



50.0 %, 71.95 % and 58.27 % failure rates respectively (Benue State Science and Technical Education Board , BSSTEB (2012). Raj (2012) further faulted the traditional teaching method because it gives complete autonomy to the teacher while the student takes on a passive role which hinders learning and denial students the opportunity to visualize learning content. Therefore, the purpose of this study was to determine the effect of animation on students' academic achievement and retention in Basic Electricity. Specifically, the study sought to determine the difference:

- i) Between the mean achievements scores of students taught with animation and those taught with conventional method.
- ii) Between the mean retention scores of students taught with animation and those taught with conventional method.

### **1.1. Research Questions**

The following research questions guided the study;

- i) What is the difference in the mean achievement scores of students taught with animation and those taught with conventional method?
- ii) What is the difference in the mean retention scores of students taught with animation and those taught with conventional method?

### **1.2. Hypotheses**

The following hypotheses were formulated based on the purpose of the study and tested at 0.05 level of significance:

H<sub>01</sub>: There is no significant difference between mean achievement scores of students taught with animation and those taught with conventional method

H<sub>02</sub>: There is no significant difference between the mean retention scores of students taught with animation and those taught with conventional method.

## **2. METHODOLOGY**

The study adopted quasi-experimental research design; specifically the pre-test post-test non-equivalent control group experimental design was used. This is because intact classes (non-randomized groups) were used for the study. The area of this study covered the seven technical colleges of Benue State in Nigeria offering Basic Electricity. There was no sampling as the population of the study comprised of all 82 Technical college one (TC 1) students offering Basic Electricity in the seven technical colleges. Students' performance was obtained after being taught with animation instructional method and conventional teaching method. The instrument used was Basic Electricity Achievement and Retention Test (BEART). BEART contained 30 items with response options A,B,C,D and E with 1 mark as the score allocated for each item and the total scores obtainable is 30. BEART covered the following topics: Electric circuit Analysis, Series circuit connection, Parallel circuit connection, Generators, and Transformer operation. BEART items was developed based on a table of specification covering the content area. The instrument (BEART) was validated by three senior lecturers from the Department of Industrial and Technology Education, Federal University of Technology, Minna, Nigeria who are experienced in educational test and measurement. Reliability testing of BEART was carried out with the use of test-retest technique and a reliability coefficient of 0.81 was obtained using Kuder-Richardson Formula 20. Data collected were analyzed using mean and ANCOVA at .05 level of significance.

### 3. RESULTS

**Research Question 1:** What is the difference in the achievement mean scores of students taught Basic Electricity with animation and those taught with conventional method?

**Table 1: Mean Score of pretest and post-test of Achievement Scores of Students taught with Animation and those taught with Conventional Method.**

GROUP	N	PRETEST SCORES	POSTTEST SCORES	MEAN GAIN
		$\bar{X}$	$\bar{X}$	
EXPERIMENTAL	27	8.26	24.85	16.59
CONTROL	55	8.35	18.42	10.07

As shown in Table 1, the experimental group had a mean score of 8.26 in the pretest while in the post-test a mean score of 24.85 was obtained. This gives a pretest, post-test mean gain of 16.59. On the other hand, the control group had a mean score of 8.35 in the pretest while in the post-test, a mean score of 18.42 was obtained which gives a pretest, post-test mean gain of 10.07. This result showed that there is a difference in the achievement means score of students taught with animation and those taught with conventional method as those taught with animation had a higher mean score than those taught with conventional method. This show that the difference between experimental and control group is 6.52.

**Research Question 2:** What is the difference in the retention mean scores of students taught with animation and those taught with conventional method?

**Table 2: Mean Score of post-test and Retention Mean Scores of Students taught with Animation and those taught with Conventional Method.**

GROUP	N	POSTTEST SCORES	RETENTION SCORES	MEAN GAIN
		$\bar{X}$	$\bar{X}$	
EXPERIMENTAL	27	24.85	17.70	7.15

CONTROL	55	18.42	12.85	5.57
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Table 2 shows the experimental and control group students' retention scores when taught with animation and when taught with traditional method respectively. As shown in Table 2, the experimental group had a mean score of 24.85 in the post-test while in the retention test, a mean score of 17.70 was obtained. This gives a post-test, retention test mean gain of 7.15. This result showed that there is a difference in the retention means score of those taught with animation and those taught with conventional method as those taught with animation had a higher mean score than those taught with conventional method. This show that the difference between experimental and control group is 1.58.

**Hypothesis One:** There is no significant difference in mean achievement scores of students taught with animation and those taught with conventional method.

**Table 3: ANCOVA of Achievement Scores of Students taught with Animation and those taught with Conventional Method.**

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	5.864 <sup>a</sup>	1	5.864	2.462		
Intercept	579.432	1	579.432	243.280	.000	H <sub>0</sub> 1 Rejected
CG	5.864	1	5.864	2.462		
Error	59.544	25	2.382			
Total	16741.000	27				
Corrected Total	65.407	26				

\*Significant at sig of  $F < .05$

The ANCOVA result on Table 3 showed that the calculated significant probability value at intercept (0.000) is less than 0.05 which showed that there is a significance difference between the mean achievement scores of students taught with animation and those taught with conventional method. Thus, the null hypothesis 1 is rejected.

**Hypothesis Two:** There is no significant difference in the mean retention scores of students taught with animation and those taught with conventional method.

**Table 4: ANCOVA of Retention Scores of Students taught with Animation and those taught with Conventional Method.**

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision
Corrected Model	6.380 <sup>a</sup>	1	6.380	.183		
Intercept	632.945	1	632.945	18.120	.000	H <sub>0</sub> 2 Rejected
CG	6.380	1	6.380	.183		
Error	873.250	25	34.930			

Total	9342.000	27
Corrected Total	879.630	26

\*Significant at sig of  $F < .05$

Table 4 showed that the calculated significant probability value at intercept (0.000) is less than 0.05 which showed that there is a significance difference between the mean retention scores of students taught with animation and those taught with conventional method. Thus, the null hypothesis 2 is rejected.

### 3.1. Findings of the Study

The following were the findings recorded:

- a) There was significance difference in the mean achievement scores of students taught with animation and those taught with conventional method with the animation group having higher mean achievement score than conventional group.
- b) There was difference in the mean retention scores of students taught with animation and those taught with conventional method as the experimental group had higher retention scores than conventional group.

### 4. Discussion of Findings

Table 1 showed that the achievement mean scores of students taught with animation was 24.85 and 18.42 for those taught by the traditional method. As evidenced also the experimental group had mean difference of 16.62 while that of the control group is 10.07. This difference in mean scores is an indication that the students who were taught with animation (experimental group) performed better than the students taught with the conventional method. On the hypothesis 1, the ANCOVA result on Table 3 showed that the calculated significant probability value at intercept (0.000) is less than 0.05 which showed that there is a significance difference between the mean achievement scores of students taught with animation and those taught with conventional method. Thus, the null hypothesis 1 is rejected. The result suggests that animation instructional strategy is more effective than the traditional instructional method in improving students' achievement in basic electricity as evidenced in the achievement mean scores.

This finding supports the finding of Mustafa, Aslihan and Turgay (2011). In their study on effect of computer assisted instruction with simulation technique on students' performance in physics where they find out that the experimental group on whom computer simulation was applied came out more successful in electric current than the control group on whom traditional method was applied. This finding indicates that unsatisfactory performance noted to have existed among students in recent times lamented by Kennedy (2009) and Ogbu (2011) is attributed to the traditional teaching method. However as revealed by this study, this menace can be curtail by employing animation teaching strategy.

The statistics on table 2 revealed that the difference in mean retention scores (17.70) of those taught with animation is higher than mean retention scores (12.85) of those taught with conventional method. The ANCOVA result of hypothesis 2 on table 4 showed that the calculated significant probability value at intercept (0.000) is less than 0.05 which showed that there is a significance difference between the mean retention scores of students taught with animation and those taught with conventional method. Thus, the null hypothesis 2 is rejected. The result suggests



that animation instructional strategy is more effective than the traditional instructional method in improving students' retention in basic electricity.

The findings is in line with the findings of Ukuma (2008) in his study on the effect of videotaped instructional strategy on auto mechanic students' academic achievement and retention, where he found out that the experimental group retention score was higher than the control group. This is an indication that animation had enhanced students' retention in basic electricity concepts better than the conventional method. This finding revealed that the stumbling block posed in traditional classroom lamented by Idoko (2007) that hinders students retention observed by Ukpebor and Ozobokeme (2007) can be eliminated by the use of animation instructional technique.

## **5. Conclusion**

Based on the results obtained from this research, it has been proven clearly that animation has effectively improved student's academic achievement in basic electricity at technical college level. Results of the statistical analysis showed that a significant difference exist in mean achievement and retention mean scores of students in Basic Electricity Achievement and Retention Test between the experimental group and control group. This implies that animation is a viable instructional method for improving students' achievement and retention of learning. It is therefore imperative to train Basic Electricity teachers to equip them with the pedagogical skills needed to effectively use animation to teach Basic Electricity in technical colleges.

## **Recommendations**

1. Technical teacher training institutions should adopt animation as an instructional technique so that technical teachers on graduation should acquired the necessary skills needed for classroom development and presentation of animation.
2. Training workshop, seminar or conferences should be periodically organize for technical teachers to encourage and equipped them with the necessary skills required to employ animation instructional method in the delivery of lessons.
3. Technical college administrators should channel their resources towards creation of animated classrooms especially for schools made of boys and girls. This will encourage the female students whose class performance is been hampered in traditional classroom to participate maximally as their male counterparts.
4. Animation simulation on various practical exercises should be provided in the Technical laboratory. As this will enable the students learn difficult task by imitation as they watch the animation.

## **REFERENCES**

- Akor S. T. (2011). The use of Computer Aided Instruction For the Teaching and Learning of Electronics Courses: A seminar paper presented to the Department of Vocational Teacher Education (Industrial Technical) University of Nigeria, Nsuka on 16<sup>th</sup> July.
- Benue State Science and Technical Education Board (BSSTEB) (2012). National Business and Technical Examination Board (NABTEB) internal examination records for 2007,2008,2009,2010 and 2011.Makurdi: BSSTEB.



- Bradley, J. S. (2004). Use of Animation in Teaching Cell Biology. *Journal of American Society for Cell Biology*, 3(3), 181-188.
- Federal Republic of Nigeria. (2004). *National Policy on Education* (4<sup>th</sup> edition). Lagos: Nigerian Educational Research and Development Council (NEDRC) press.
- Idoko, C.E. (2007). Guide for Effective Teaching/Learning of Genetics for Secondary School Students (Hands-on Minds-on Activity Instructional Strategy). *Multidisciplinary Journal of Research Development*, 9(1), 22-30.
- Iravani, M.R. and Delfechresh H. (2011) Effect of Computer Aided Instruction (CAI) on Science Achievement of Higher Primary Students. *International Journal of Business and Social Science (Special Issue)*, 2(19), 170-172.
- Kennedy, E.U. (2009). A Relational Study of Students' Academic Achievement of Television Technology in Technical Colleges in Delta State of Nigeria. *Journal of industrial teacher education*, 46(3), 113-135.
- Kylie, S. (2012). History of Animation. Retrieved from <http://answers> on 12<sup>th</sup> June ,2013.
- Mustafa B., Aslihan, K.T., and Turgay, A. (2011). The Effect of Computer Assisted Instruction with Simulation in Science and Physics Activities on the Success of Student in Electric Current. *Eurasian journal of physics and chemistry*, 5(2), 34-42.
- National Business and Technical Examination Board. (2007). *National Technical and Business Certificate Syllabus*. Reviewed Edition. Kaduna: NBTE.
- Ogbu, J.E. (2011). Effect of Integrative Application of Interaction Patterns on Students' Cognitive Achievement in Basic Electricity. Retrieved from <http://iis-db.stanford.edu> on 11<sup>th</sup> June ,2013.
- Raj, S. (2012). Advantages and disadvantages of the classroom conventional lectures. Retrieved 2012 from <http://www.ehow.com> on 11<sup>th</sup> June ,2013.
- Ukuma, S. (2008). Effect of Recorded Video Taped Instructional Strategy on Academic Achievement and Retention of Automechanics Students. Unpublished PhD Thesis submitted to the department of Vocational Teacher Education (Industrial Technical) University of Nigeria. Nsukka:
- Ukpebor, J.N., and Ozobokeme, J.K. ( 2007). The influence of gender and students' self-concept on their mathematics achievement. *Multidisciplinary journal of Research Development*, 9(1), 100-107.