Effects of Animated Media Instructional Strategies on Achievement and Retention of Secondary School Students in Computer Studies

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Abstract— This study examined the effects of animated media instructional strategies on the achievement and retention of senior secondary school students in computer studies. Two research questions guided the study and two hypotheses were tested. The quasi-experimental design was used, specifically the pretest posttest non-equivalent control group design. The population of the study is 4,873 SS2 students in Nnewi Education Zone of Anambra state. A sample of 133 SS2 computer studies students was involved in the study. The instrument for data collection was Computer Studies Achievement Test (CSAT) validated by two lecturers one from Science Education, and one from Education Foundation (Measurement and Evaluation) Departments of Nnamdi Azikiwe University, Awka and one experienced computer studies teacher in Nnewi. The reliability of the instrument was established using Kudder-Richardson Formula 20 which yielded coefficient of internal consistency of 0.82. Data were collected by administering the CSAT as pretest, posttest and retention test. The data obtained were analyzed using mean and Analysis of Covariance (ANCOVA). The findings showed animated media instruction was significantly effective in enhancing students' achievement in computer studies. The study recommended that computer technology and its accompanying accessories needed for the effective integration and use of animated-media in the classroom during lesson delivery should be provided by the government.

Keywords — Achievement, animated-media, education zone, file organisation, instructional strategies, retention, students

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1 INTRODUCTION

The advancement in computer studies and its application to various areas of life as well as its indispensable use in different professions cannot be over-emphasized. In education, computer and its accessory gadgets can be used to make instructional delivery easier and more understandable. [1] stated that in recent times, computer animations are also used to create live three dimensional images, simulated videos or motion pictures with interactive interface that can be used to teach and learn educational concepts. The various applications of computer technology in teaching and learning have given rise to many innovative teaching strategies. According to [2], computer studies is the study of computer and its possible application to different fields of life.

In the field of medicine for instance, computer programming can be used to perform surgical procedures, image internal organs of human body to identify health abnormalities, and keep patients' record of medical history [3]. In banking, a network of limitless transaction has been made possible through computer studies. With e-transact, people can carry out business transactions in the comfort of their homes. Similarly, security systems are beefed up through computer devices programmed to detect weapons of assault. In physics and engineering, computer studies have advanced to the level of creating programmed robotics for any kind of operations, pounding machines, millers, and computerized machines of all kinds. These various applications make very resplendent, the importance of computer studies in our world today [4]. Despite the inevitable nature and importance of computer studies, majority of the students seem to possess little or no competent applicable knowledge in computer studies [5]. Fac-

tors implicated for this ugly situation include lack of skillful computer teachers, lack of comprehensive computer textbooks, lack of power, and small computer laboratories that cannot be used to teach large number of students. Most prominent among these factors as noted by Adebayo and Oladele is the lack of computer practical lessons.

One popular maxim that has gained unanimous acceptance in the world today is the idea that practice makes perfect. Computer studies bereft of practical lessons can be hardly understood. Secondary school computer studies teachers could pose such excuse as lack of time for practical lessons, lack of enough computer accessories for practice and lack of power. Thus, students who receive computer lessons only hold theoretical knowledge of computer studies without the ability to apply such knowledge. Also, it emphasizes doing rather than accumulation of knowledge since computer studies is a practical subject. This lack of practice in turn negatively affects the students' achievement in computer studies resulting in poor achievement [3].

[5] opined that the poor achievement in various subject areas has been attributed in a number of studies to lack of practicals and poorly equipped laboratories. Students' poor achievement especially in Nnewi Education Zone in external examinations has also shown that students clearly lack the necessary skills required to carry out simple computer operations. Common questions such as: list the steps required to save a document, what is the function of "shift Key"? Describe how to rename a file and how can one prevent a computer system from being infected with a virus? which constitute likely examination questions were failed by students on ac-

count of the fact that they lack operational knowledge of computer studies. The question becomes; how can students be brought to learn Computer studies by practice given the lack of power and poorly equipped Computer studies laboratories common in secondary schools? One useful innovative strategy of instruction that comes to mind is the use of animated-media instructional strategy.

Instructional use of animated media are computer operations that involve the use of interactive simulations, motions pictures, moving texts and cartooned videos to enhance the teaching and learning of concepts. Animations find great application in various field of life and can be suitable for learning computer operations. Animations are effective because they can be more realistic for showing change; they can demonstrate in action the computer systems' concepts to be taught and animations can show real-time changes as to how to perform a task, they are thought to be natural and effective for conveying change and information real-time [2]. Animations are useful for elaboration, for gaining students' attention, facilitating easy retention and recall.

According to [5], animation is the process of making the illusion of motion and changes by means of the rapid display of a sequence of static images that minimally differ from each other. Animation can be recorded with analogue media, a flip book, motion picture film, video tape, digital media, including formats with animated Graphics Interchange Format (GIF), Flash animation and digital video. To display animation, a digital camera computer, or projector are used along with the new technology that are produced. Animation creation methods include the traditional animation creation method and those involving stop motion animation of two and three-dimensional objects, paper cut-outs, puppets and clay figures. Images are displayed in a rapid succession, usually 24, 25, 30, or 60 frames per second. The introduction of animation in teaching may facilitate learning by engaging more senses of the learners, which in turn may enhance their achievement and retention of learning.

The uses of animated media instructional strategies have been shown in a number of studies to enhance students' achievement and retention in various subject areas [5], [3], [4]. Animated media instructional strategies are often seen as possible solutions to the challenges of power and lack of adequate computer facilities for teaching and learning computer studies [2]. They can be used to demonstrate to the students in an easier and understandable manner, the operation of computer and improvement of practical application of computer knowledge in operating computers. This could help students as an alternative in the absence of real computer practical and hold beneficial boost to computer studies achievement and retention of learning.

2 STATEMENT OF PROBLEM

Computer studies achievements by secondary school students have continually remained poor both in internal and external examinations like Senior Secondary Certificate Examination. The most implicated factors in the case of Nnewi Education Zone are lack of power and adequate computer laboratory that can be used for computer practical lessons. Knowledge of computer studies with efficient application of such knowledge in operating the computer machine constitutes a problem to learning computer studies as computer studies is by its nature a practical subject. Possible solution that could attend the issue of power and computer equipment in the laboratory for practical lesson and proper guidance for efficient application of these computer machines are therefore very essential. The use of animated media instructional strategies in teaching and learning may likely help to overcome most of these problems. Although, animated media instructional strategies have proved effective in teaching and learning various subject areas like biology, chemistry, there are little of such studies where animated media instructional strategies have been applied in teaching computer studies to secondary school students in Nnewi Education Zone of Anambra state.

3 OBJECTIVES OF THE STUDY

Specifically, the study sought to find out:
1. Difference between the mean achievement scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.
2. Difference between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

4 RESEARCH QUESTIONS

1. What is the difference between the mean achievement of scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method?
2. Difference between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method?

5 HYPOTHESES

1. There is no significant difference between the mean achievement of scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

2. There is no significant between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

6 METHOD

This study adopted the quasi-experimental design, specifically, the pretest, posttest, non-equivalent, control group design. The area of the study is Nnewi Education Zone in Anambra State of Nigeria. The population of the study consists of 4, 873 senior secondary school two (SS2) computer studies students. The sample for the study comprised of 133 senior secondary school two (SSII) students representing 2.73 percent. The sample was obtained using multi-stage sampling. First, purposive sampling was used to obtain three co-educational schools. The reason for selecting the three schools is because they are among the schools that have the facilities to enable the experimentation with CAI and animated media instruction and the schools are also coeducational. The three schools selected were categorized into experimental group one, two and control group using random sampling (balloting without replacement). The names of the three schools were labelled on pieces of papers and folded. These were picked at random. The first school picked was coded C and that became the experimental group I, the second school that was picked was coded A became experimental group II, and the last B became the control group.

The instrument for the study is a Computer Studies Achievement Test (CSAT) constructed by the researcher. CSAT items were constructed based on four topics in computer studies SS2 scheme of work namely: computer data conversion, file organization, basic file operations and file security. The topics were selected because they form part of the SS2 students' scheme of work. The CSAT items constructed according to the subject content with the use of a Table of Specifications. Three lesson packages were prepared with the concept of Microsoft word processing and computer appreciation. Each lesson in the plan lasted for two lesson periods of 80 minutes. The instrument was validated by two experts from Nnamdi Azikiwe University, Awka and one experienced computer studies teacher. The reliability of the CSAT was established using the Kudder-Richardson Formula 20 (KR-20). The instrument was administered to 40 students outside the study area in Onitsha. The generated scores were computed for reliability index using the KR-20 Formula. The coefficient of internal consistency of the instrument obtained is 0.82.

The regular classroom teachers of the experimental groups were used as research assistants in the study. They were brief for two weeks on the lesson packages. Before the treatment commenced, the experimental and control groups were given pretest in the first week. Demonstrations on the concepts taught were done using animation and narratives embedded in the animation. For each demonstration, the students attempted the same steps after watching the demonstration under the guidance of the teacher. After the treatment, the students were given pretest. The retention was administered after three weeks of the posttest. Data relating to the research questions were analyzed using mean and standard deviation. Analysis of covariance (ANCOVA) was used to test the hypotheses. The decision rule for the hypotheses was to reject the null hypotheses if Pvalue is less than 0.05, otherwise, the null hypotheses was not rejected.

7 RESULTS

7.1 Research Questions 1: What is the difference between the mean achievement of scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method?

TABLE 1
MEAN PRETEST AND POSTTEST ACHIEVEMENT SCORES

Source of variation	N	Posttest Mean	Retention Mean	Loss in Mean	Posttest SD	Retention SD
Animated media	43	48.84	47.67	1.17	6.06	7.89
Conventional	49	38.98	34.49	4.49	6.85	5.60

Table 1 shows that the group taught computer studies using animated media instructional strategy had higher gain in mean achievement score of 29.13 while the conventional method group had gain in mean achievement score of 11.84.

7.2 Research Questions 2: Difference between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method?

TABLE 2
MEAN PRETEST AND POSTTEST RETENTION SCORES

Source of variation	N	Posttest Mean	Retention Mean	Loss in Mean	Posttest SD	Retention SD
Animated media	43	48.84	47.67	1.17	6.06	7.89
Conventional	49	38.98	34.49	4.49	6.85	5.60

Table 2 shows that the group taught using animation had loss in mean score of 1.17 and those taught using the conventional group had loss in mean scores of 4.49.

7.3 Hypothesis 1: There is no significant difference between the mean achievement of scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

TABLE 3
ANCOVA ON SIGNIFICANT DIFFERENCE IN MEAN
ACHIEVEMENT SCORES

Source of variation	SS	Df	MS	F	P-value	Decision
Corrected Model	2472.717ª	2	1236.358			
Intercept	15539.003	1	15539.003			
Pretest	247.252	1	247.252			
Method	2053.331	1	2053.331	51.571	.000	S
Error	3543.588	89	39.816			
Total	180800.000	92				
Corrected Total	6016.304	91				

Table 3 shows that there was significant main effect of the treatment on the achievement scores of the students, $F_{(1, 91)} = 51.571$, P (0.000) <0.05. Thus, the null hypothesis was rejected. Therefore, there is significant difference between the mean achievements score of students in computer studies taught with animated media instructional strategy those taught using conventional method.

7.4 Hypothesis 2: There is no significant between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

TABLE 4
ANCOVA ON SIGNIFICANT DIFFERENCE IN MEAN
ACHIEVEMENT SCORES

Source of variation	SS	Df	MS	F	P-value	Decision
Corrected Model	3226.978ª	2	1613.489			
Intercept	164.366	1	164.366			
Posttest	1692.806	1	1692.806			
Method	36.818	1	36.818	1.292	.025	S
Error	2536.881	89	28.504			
Total	140825.000	92				
Corrected Total	5763.859	91				

Table 4 shows that there was no significant main effect of the treatment on the achievement scores of the students, $F_{(1, 91)} = 1.292$, P (0.259) >0.05. Thus, the null hypothesis five was not rejected. Therefore, there is significant between the mean retention scores of students taught computer studies using animated-media instructional strategy and those taught using conventional method.

8 DISCUSSION, CONCLUSION AND RECOMMENDATION

The findings of the study revealed that animated media was effective in enhancing students' achievement and retention in computer studies. The use of animated media provided the students with richer learning experience than they had when they were taught using conventional method. The students had greater level of interaction with the learning material. This interaction gave the students certain level of responsibility towards their learning. The students' interest in the lessons improved and they asked a lot of questions which depicted their interest in the learning. The interest to learning incited their motivation to learn. The use of animated media which sustained their motivation to learn was further expressed in their discussions on the concepts learnt and how they answered questions at the end of the lesson. The combi-

nations of visual and audio sensations in the learning process enhanced the encoding of the learning contents taught. The students had better understanding through the use of animated media.

This finding may also be due to the fact that animation reduced the level of abstraction and cognitive load associated with processing the material learnt. Thus, the students may have focused on the instructional resources and learnt the content meaningfully. The students showed excitement and interest in the use of the animated media instructional strategy. The more they familiarized themselves with the contents of the lesson, the more the lesson content reached their long term memories. Also, because they interacted with the computer and the learning materials over repeated times for different lesson, they were able to recall their learning with ease. This is unlike those in the conventional method group. The students may not have properly conceptualized the concepts taught. This confusion may not have allowed them to properly store the information and therefore the poor retrieval of learning materials.

The findings of the study also showed that although students taught using animated media instructional strategy had higher retention than those in the conventional group, animated media instructional strategy was not significantly effective in enhancing students' retention compared to the conventional method. The use of animated media instructional strategy reduces the abstraction in the understanding of the concepts taught. This is because animations brings to cognition, that which the students ought to put more effort to understand with simple animation of images. [1] noted today, computer animations are also used to create live three dimensional images, simulated videos or motion pictures with interactive interface that can be used to teach and learn. Today, there are various animations on various subject areas available in animation host sites.

In this study, different animations relating to the contents taught was downloaded from these sites and integrated into the students learning. With the motivation to learn noted when the students was introduced to animation, the teacher was moved to provide more animations for students. It was observed that the more animations the students saw, the more the lesson became clearer and the more they are able to reproduce what was taught. The effect of the animation as observed from the study revealed that they are natural and effective for conveying change and information real-time [2]. The findings of the study however did not support the findings of [6] who reported significant differences in mean retention scores in favour of students exposed to weather concepts using Animated-Media strategy.

The study concludes that animated media instructional strategy is significantly effective in enhancing students' achievement and retention in computer studies. Based on the finding and conclusion of the study, the following recommen-

dations are made:

1. Computer studies teachers should teach computer studies by integrating the lesson contents with animations of the concepts to be learnt.

2. Incentives and financial motivations should be given to teachers of computer studies by the government and other educational stake holders to enable them acquire personal computers (PCs) for use in the preparation and development of lesson animated media instructional strategy.

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