INTERNATIONAL JOURNAL OF ADVANCEMENT IN EDUCATION, MANAGEMENT, SCIENCE AND TECHNOLOGY, VOL 9 NO 1. ISSN: 2788-7549, FEBRUARY. 2026, USA.

ANIMATED VIDEOS AND CHEMISTRY STUDENTS' ACADEMIC ACHIEVEMENT IN UYO LOCAL GOVERNMENT AREA

By

OKON, Emem Bassey
Department of Human Kinetics and Health Education
University of Uyo, Uyo

Robert Epuem NWAOFILI
School of Science and Secondary Education Programmes
Federal College of Education, Ididep

AKPAN, Idara Monday

Anietie Udo UMOREN
Chemistry
Federal College of Education, Ididep

And

Victor Ita EYO

ABSTRACT

The study examined animated videos on Chemistry Students' Academic Achievement in Uyo Local Government Area. One research question as well as one research hypothesis guided the study. The design adopted for the study was quasi-experimental pretest-posttest design. The sample size used for the study was 392 students that offered Chemistry. The instrument used for data collection was Chemistry Achievement Test (CAT). The instrument was face validated by three Science Educators. The Test re-test method was adopted to determine the reliability of the instrument. A reliability coefficient index of .98 was obtained using Pearson Product Moment Correlation (PPMC) and Spearman Brown Prophesy Formula. Means and standard deviation were used to answer the research questions while ANCOVA was used to test the hypothesis at 0.05 level of significance. The results indicated that there is a significant difference in students' academic achievement in Chemistry taught using animated videos and those taught using expository method. It was concluded that students' academic achievement in Chemistry improves when taught with animated videos in secondary schools in Uyo Local Government Area. Based on the findings of the study it was recommended among others that Chemistry teachers should use animated videos in their classrooms since it improved students' academic achievement on in Chemistry.

KEYWORDS: Animated videos, Electronic Technology, Academic Achievement, Chemistry

INTRODUCTION

Science is regarded as man's attempts to investigate, explore, interpret and operate with the materials and the forces of universe that surround man. Science started as early as the time of the early man from his experiences with nature. The early man discovered how plants grow, which plant flowers and which seeds are edible. From the earliest time, therefore, man has concerned himself with the study and interpretation of the universe. Science is not just talking about manufactured goods but also it is concerned with finding out about nature and how to use the gifts of nature to better his life. Science has branches which include the earth sciences, the life sciences and the physical sciences.

Chemistry is a subject in the physical science. It is the science that deals with the composition, properties, reactions and structure of matter. The importance of chemistry in everyday life cannot be over emphasized. For all living things to function and survive their bodies perform various chemical processes such as respiration, digestion, producing new cells, filtering and removal of waste substances from their bodies. So all living things depend on chemical reactions to function and survive. Chemistry is the foundation of medicine. Human beings use chemical reactions to create medication for a broad spectrum of illness and they utilize medical plants and animals. Chemistry is needed for the advancement of technology.

With the importance of Chemistry, students' academic achievement has been poor. This poor achievement of students in Chemistry at SSCE can be attributed to a number of factors ranging from poor attitude of teachers and learners towards the teaching and learning of Chemistry, the broad Chemistry curriculum, poor teaching methods used by chemistry teachers, inadequate instructional material mathematical deficiencies in students and teachers (Chief Examiner's Report, 2023). In the past, several attempts have been made at solving these problems of teaching Chemistry and recently more attention has been given to the use of innovative teaching methods such as the use of Information and Communication Technology (ICT) in Chemistry curriculum delivery.

In recent years, computer technology has permeated the society that almost everything done involves the use of computer. So, science teachers need to key in into the current trend. To achieve this, Chemistry teachers need to change their lesson delivery method to innovative methods that suit the needs of the present time. The use of ICT in teaching is a teacher-led method of instruction which some teachers prefer to use in their lesson delivery. This method is popular and often used by teachers to disseminate information, knowledge and skills to students (Awang 2020). Furthermore, the effectiveness of the use of these electronic technologies (like e-learning book and instructional animated videos) in teaching in present day science classrooms is a subject of research by many science educators.

Electronic technology is steadily and constantly advancing and finding its way into Chemistry classrooms and laboratories. Chemistry teachers now have a variety of technologies available to them for use in Chemistry curriculum delivery. Animated videos have a link to electronic devices which are used to teach science and its core concepts.

Animated videos are modern electronic technological instructional resource that offers deep learning to students. Animated video is non-living entity that takes on dynamic attributes such as movement, growth and speech which are normally associated with living organisms (Ploatzner and Lowe, 2020). A typical example of animated videos is the robot seen on television performing the action of cooking or gathering items into a basket. Lander and Lunderstorm (2021) defined animated videos as a set of varying images presented dynamically in ways that help the user perceive a continuous change over time and develop a more appropriate mental model of a task. Instructional animated videos have the potency of bringing down the difficult level of any concept taught with it to the barest minimum. It is a combination of graphics and text presentation in which each can strengthen memory through observation of the images. It is audio-visual in nature. The use of audio-visual materials is important for teaching chemistry concepts. Learning associated with instructional animated videos are enormous and provides a learning environment free of emotional stress and enhances emotional intelligence that provides fun. Instructional animated videos provide unique and interesting presentation given to each of the facts and concepts presented, making it beneficial to students. Modules aided with instructional animated videos, according to Aminordin and Chikendu (2022), is an effective way to attract attention and be able to provide concrete information on the movement and change of the object over time and this can reduce the level of abstract ideas. It attracts students' attention easily and delivery of message more appropriately. According to Jamalludin and Zaidatun (2020), the use of instructional animated videos facilitates explanation of concept and demonstrates skills that enable students to utilize their senses in the process of gathering information as well as sustain the students' attention and interest for a longer period of time.

Athanassios and Vassilis (2022) investigated the effect of animated video and multimedia teaching on academic achievements of students in sciences. The purpose of the study was to determine the effect of the use of computer animated video and multimedia teaching on students' academic performance in science subjects. The research design employed for the study was quasi-experimental research designs specifically, the pretest, posttest control group. One hundred (100) students were randomly selected from JS2 in junior secondary schools in Ado Ekiti Local Government Area of Ekiti State. Achievement test in cartoon animated video was used to collect data on students' achievement in the study. Treatment was administered to the experimental group with the use of Cartoon style animated video while the control group was taught with conventional teaching approach. Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The findings revealed that there was a significant difference in the performance of students exposed to cartoon style multimedia teaching and those that were conventionally taught in favour of the former group. It was therefore recommended that the use of cartoon style animated video and multimedia teaching should be encouraged in secondary school so as to complement other methods of teaching science in schools and colleges.

Akpinar and Ergin (2022) investigated students' understanding of cells and other related concepts with interactive computer animated video. The purpose of the study was to

investigate whether interactive computer animated video accompanied by teacher and student-prepared concept maps enhance secondary school students' biology achievement during instruction and as well enhance attitudes towards science as a school subject. A quasi-experimental pre-test/post-test control group design was used in this study. The sample of the study consisted 65 secondary school students from Calabar. The experimental group received instruction including interactive computer animated video accompanied by teacher and student prepared concept maps, while the control group received traditional instruction. A biology achievement test and an attitude scale toward science were used as data collection instruments. The two instruments were administered to the students. The research questions were answered using mean and standard deviation while the hypotheses were tested using ANCOVA. The study indicated that the experimental group had significantly higher scores than the control group in the biology achievement test (regarding cells and other related concepts). Regarding students' attitudes toward science as a school subject, there was no significant difference between the experimental and control groups in the pre and post-test results. However, there was a statistically significant difference between the gain scores of the control group and the experimental group in favor of the experimental group, hence interactive computer animated video was recommended to support other teaching methods to enhance students' performance.

Chang, Quintana and Krajcik (2020) investigated the impact of designing and evaluating molecular animated videos on how well middle school students understand the particulate nature of matter. The purpose of the study was to determine whether the understanding of the particulate nature of matter by students was improved by allowing them to design and evaluate molecular animated videos of chemical phenomena. The design of the study was quasi-experimental with pretest and posttest. Eight classes comprising 271 students were randomly assigned to three treatments in which students used plastic recycling to (1) design, interpret, and evaluate animated videos, (2) only design and interpret animated videos, or (3) only viewed and interpret teacher-made animated videos. Plastic recycling a learner-centered animated video tool was developed and administered to seventh-grade students to allow them constructs flipbook-like simple animated videos to show plastic recycling processes. Two-factor analysis of covariance was used in the analysis to examine the impact of the three treatments on student posttest achievements and on student-generated animated videos and interpretations during class. Pretest data was used as a covariate to reduce a potential bias related to students' prior knowledge on their learning outcomes. The results indicated that designing animated videos coupled with peer evaluation is effective at improving student learning with instructional animated video. On the other hand, the efficacy of allowing students to only design animated videos without peer evaluation is questionable compared with allowing students to view animated videos. It was recommended that designing animated video coupled with peer evaluation should be adopted in schools to improve students' achievement. The relationship between the study and the present study is that both investigated the effect of instructional computer animated video on students' achievement but differs from each other in that the previous study

involved students in construction of the animated video used in the study unlike the present study.

Miri and Yehudit (2021) studied the integration of web-based animated mouse into primary school science curriculum and students' learning outcomes. The purpose of the study was to determine whether the integration of web-based animated mouse will enhance learning outcomes in primary school. Quasi-experimental pretest-posttest research design was employed. The sample of the study consisted of 15 teachers and 641 and 694 grade 4 and 5 pupils in Turkey. The instrument for data collection was informal discussion held with the 15 teachers and 1335 pupils. The method of data collection was oral interview. Method of data analysis employed was Analysis of Covariance. The sample of the study consisted of 15 teachers and 641 and 694 grade 4 and 5 pupils respectively. These students were divided into control and experimental groups. Experimental group students studied using animated movies and supplementary activities at least once a week. The control group used only textbooks and still pictures for learning science. Findings indicated that animated movies support the use of diverse teaching strategies and learning methods, and can promote various thinking skills among students; that animated video can enhance scientific curiosity, the acquisition of scientific language and can also fosters scientific thinking. It was concluded that instructional computer animated video promotes students' scientific skill.

The present study investigated the effect of animated videos as teaching resources on academic achievement of Chemistry students in Uyo Local Government Area.

STATEMENT OF THE PROBLEM

Students achieve poorly in Chemistry in secondary school external examinations in Nigeria over the years due to several factors such as insufficient instructional materials, outdated laboratory facilities, teachers' inability to utilize animated video resources during teaching-learning process in the classroom. The analysis of the West African Examination Council results indicated poor achievement though an improvement was seen but the problem is still not remediated and this point to students' poor understanding of the subject. This situation is partly attributed to the teachers' poor approach of lesson delivery, passivity and little interest by the students.

The persistent low achievement is a concern to many. Chemistry teachers are making effort to adjust the method of lesson delivery to improve the situation but they have not given time to technology driven approaches like animated videos due to high cost of obtaining the materials, time needed to prepare lesson using the materials, deficient technical know-how in using animated videos. These problems make one to wonder if this instructional technique would also enhance students' achievement and interest in Chemistry in Nigeria. Furthermore, previous studies have not established the effect of utilization of animated videos on academic achievement in chemistry in secondary schools in Uyo Local Government area. Hence, the present study investigated the effects of animated videos on students' academic achievement in Chemistry.

PURPOSE OF THE STUDY

The purpose of this study was to examine animated videos on academic achievement of Chemistry students in Uyo Local Government Area. Specifically, the study was designed to:

i) Examine the difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method.

RESEARCH QUESTION

i) What is the difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method?

RESEARCH HYPOTHESIS

i) There is no significant difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method.

RESEARCH DESIGN

A quasi-experimental research design was adopted for the study. This design is suitable for the study because it deals with treatment of the experimental group to find out the effect of treatment on the control group. Quasi-experimental research design was adopted because it involves the use of experiment using intact classes to observe the effect of animated videos on academic achievement of Chemistry students.

POPULATION OF THE STUDY

The population of the study consisted 3278 senior secondary two (SSII) Chemistry students of 2025/2026 academic session in public secondary schools in Uyo Local Government Area (State Secondary Education Board, Uyo, Akwa Ibom State, 2024).

SAMPLE AND SAMPLING TECHNIQUE

A sample size of 392 SSII students was selected from the population of the study using multistage sampling procedure. At the first stage, a simple random sampling technique was adopted to select two schools with at least two qualified chemistry teachers, well equipped chemistry laboratory and library each was selected from urban and rural areas of the area. At the second stage, a purposive sampling technique was use to select 196 students each from the two schools. The sample size in each school was divided into two groups: those that were exposed to animated videos and those that were exposed to expository method. Intact classes of students offering Chemistry in the selected schools were used for the study.

INSTRUMENTATION

Chemistry Achievement Test on the Concept of plastic recycling was used for the collection of data. The instrument contained 40 multiple choice items drawn from the

concept of plastic recycling in SSII Chemistry topic with four options lettered A-D, one correct answer and three distractors. The Chemistry Achievement Test (CAT) was validated by three Science Educators of University of Uyo and an expert in test and measurement from the same institution. The Test re-test method was adopted to determine the reliability of the instrument. Pearson Product Moment Correlation (PPMC) was used in calculating the correlation. The r-value of .98 was converted using Spearman Brown Prophesy Formula to obtain a reliability coefficient of .98..

METHOD OF DATA ANALYSIS

Mean ($\bar{x}$) and Standard Deviation (SD) were used to answer the research questions while ANCOVA was used to analyze the research hypotheses at 0.05 level of significance. The analysis was carried out using Statistical Package for Social Science (SPSS 25). The value of real limit was used to answer the research questions and to determine the effect of the independent variable on the dependent variable, any achieved mean score above 2.5 was regarded as having a positive effect while the mean score below 2.5 was regarded as having low and negative effect. In testing the null hypotheses, the calculated F-value and the p-value were used. The p-value was compared with .05 level of significance. When the calculated p-value was greater than .05, the null hypotheses was retained and when the p-value was less than .05, the null hypotheses was rejected.

RESULTS

Research Question: What is the difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method?

Table 1: Mean and Standard Deviation of difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method

Group	n	Pretest		Posttest		Mean Difference	
		Mean	Std.	Mean	Std.		
Animated videos	183	7.19	0.77	15.59	0.97	8.4	3.36
Expository method	209	3.83	0.91	8.87	0.93	5.04	

Source: (Field Experiment, 2026)

The analysis in Table 1 shows the mean and standard deviation of difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method. The analysis shows that SSII students taught chemistry using animated videos recorded a mean achievement score of 7.19, standard deviation of 0.77 and 15.59, standard deviation of 0.97 in pretest and posttest scores. While SSII students taught chemistry using expository method recorded a pretest mean achievement score of 3.83 and a standard deviation of 0.91 and a posttest achievement

score of 8.87 and a standard deviation of .094. The analysis also reveals that the mean difference of SSII students taught chemistry using animated videos and expository method is 3.36 which is greater that the criterion mean score of 2.50. This implies that SSII students taught Chemistry using animated videos perform better than their counterpart taught using expository method.

TEST OF HYPOTHESIS

There is no significant difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method

Table 2: Summary of ANCOVA Analysis of difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method

Source	Type Sum square	111 of df	Mean Square	F	Sig.	Decision
Corrected Model	21,845.62	2	10,922.81	72.41	.000	Significant
Intercept	115,442.31	1	115,442.31	765.28	.000	Significant
Pretest	12.87	1	12.87	0.09	.764	Not Significant
Animated videos	3,421.76	1	3,421.76	22.70	.000	Significant
Error	20,654.45	390	150.72	-	-	-
Total	69,265.11	392	-	-	-	-
Corrected Total	42,500.07	392	-	-	-	-

The analysis in Table 2 reveals the F-value (2,390= 22.70, p=.000), with this result, the null hypothesis which stated that there is no significant difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method was rejected. Therefore, there is a significant difference in academic achievement of senior secondary school Chemistry students taught using animated videos and those taught with repository method.

DISCUSSION

The findings of the study indicated that that there is a significant difference in academic achievement of SSII chemistry students' taught using animated videos and those taught using expository. This is to say that students taught Chemistry using animated videos performed significantly better than those taught using expository method. This implies that animated video was more effective in enhancing students' achievement scores in Chemistry than expository method. This is because animated instructional media enhances understanding through visualization and active engagement. The present finding aligns with the study by Athanassios and Vassilis (2022) who reported a significant difference in academic performance in favour of students exposed to cartoon-style animated video and

multimedia teaching. Similarly, the findings are consistent with Akpinar and Ergin (2022) who found that students taught using interactive computer animated videos achieved significantly higher scores than those taught through traditional methods.

CONCLUSION

Based on the result of this study, it is concluded that teaching SSII students Chemistry with animated videos enhances their academic achievement. This means that students' academic achievement in Chemistry improves when taught with animated videos in secondary schools in Uyo Local Government Area.

RECOMMENDATION

- Chemistry teachers should use animated videos in their classrooms since it improved students' academic achievement in Chemistry.
- Seminars, workshops and conferences should be organized by the Ministry of Education for Chemistry teachers to educate them on the use of animated videos.

REFERENCES

Adeyegbe, S. O. (2020). Gender differences in students' academic achievement in science subjects in Nigerian secondary schools. *Journal of Science Education Research*, 15(2), 45–52.

Akpinar, E., and Ergin, O. (2022). The effect of interactive computer animated video on students' understanding of biological concepts. *Journal of Science Education and Technology*, 31(2), 112–124.

Aminordin, S., and Chikendu, E. (2022). Effectiveness of instructional animated videos in enhancing students' attention and conceptual understanding in science. *International Journal of Educational Technology*, 10(1), 23–34.

Awang, J. M. (2020). Measuring situational interest in academic domains. *Journal of Educational and Psychological Measurement, 20*(10), 1 – 25.

Chang, H. Y., Quintana, C., and Krajcik, J. S. (2020). The impact of designing and evaluating molecular animations on students' understanding of the particulate nature of matter. *Journal of Research in Science Teaching*, 57(3), 321–345.

Ekanem, E. O. (2023). *Impact of computer animation learning on students' academic performance in Akwa Ibom State College of Education, Afaha Nsit*. https://docplayer.net/203301166-Impact-of-computer-animation-learning-on-students-academic-performance-in-akwa-ibom-state-college-of-education-afaha-nsit-obot-ekanem-edo-ph.htm

Ekanem, S. M. (2022). Gender differences in academic achievement in Chemistry among secondary school students. *Nigerian Journal of Educational Psychology*, 8(1), 66–74.

Etim, P. J. (2020). Gender disparities in Chemistry achievement among senior secondary school students. *Journal of Educational Studies*, 12(1), 89–98.

Jamalludin, H., and Zaidatun, T. (2020). The role of instructional animation in facilitating concept understanding and sustaining learners' attention. *Malaysian Journal of Educational Technology*, 20(2), 55–68.

Lander, K. and Lunderstorm, G. B. (2021). *Introduction to Educational Technology (5th Revise Edition)* Delhi. Sterling Publishers. Rivers state.

Miri, B., and Yehudit, J. (2021). Integration of web-based animated tools in primary science education and its impact on students' learning outcomes. *International Journal of Science Education*, 43(5), 701–720.

Nkok, P. U. (2021). Gender and educational achievement: A sociological perspective. *African Journal of Educational Studies*, 9(2), 101–110.

Olom, P. A. (2020). Gender differences in mathematics achievement among secondary school students. *Journal of Mathematics Education*, 14(1), 33–41.

Ploatzner, and Lower, R.K. (2022). Interrogation of a dynamic visualization during learning. *Journal of Learning and instruction, 143*(2), 644-667.

Thompson, R. (2021). Gender parity in mathematics achievement: Myth or reality? *International Journal of Educational Research*, 105, 101–110.