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Effect of Animation Instructional Strategy on Students' Achievement in Biology in Senior Secondary Schools in the FCT Abuja, Nigeria

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Annotation: This study investigated the effect of animation instructional strategy on students' achievement in biology in senior secondary schools in the FCT Abuja. The study was guided by two research questions and two hypotheses formulated in line with the purpose of the study. The quasi-experimental research design was employed. The population of the study composed of twenty-two thousand, seven hundred and thirty-six (22,736) SS II students from public senior secondary schools in the FCT Abuja, Nigeria. Sample size of the study constituted of one hundred and twenty-five (125) SS II biology students from two intact classes from the sampled schools in the study area. Data collection was conducted using Biology Achievement Test (BAT), Face and content validation of the instrument were carried out by the supervisors of the study and a Biology Education expert from the Department of Science and Environmental Education, Faculty of Education, University of Abuja. The reliability of the instrument was obtained using the Kuder Richardson 21

(KR-21) which yielded an index of 0.87. Descriptive statistics, which involved frequency counts, percentage, mean( ), and standard deviation were used for analyzing data related to the research questions raised while, the independent t-test statistics was used for testing of the formulated hypotheses at 0.05 level of significance. Results showed that the animation instructional strategy had significant effect on students' achievement, without gender differences. It was recommended that teachers should be provided with training and resources to effectively use animation instructional strategy to teach Biology since it enhances students' achievement. Every student should be given equal opportunity irrespective of gender during the use of animation instructional strategy to enhance their academic achievement since it has been found to be gender friendly.

Keywords: Animation Instructional Strategy, Biology, Achievement.

INTRODUCTION

In the contemporary world, technology is an indispensable tool which has turned the world to a "global village". Technology has become essential tool in every endeavour due to the fact that it makes activities of every profession easy. It has been integrated in every work of life such as financial, economic, agriculture as well as education (Wantulok, 2015). The use of animation instructional strategy in teaching biology has gained significant attention in recent years. Studies have shown that animation can enhance students' achievement and retention of complex biological concepts (Zanin, 2015; Gafur, et al., 2024). Research has constantly demonstrated that traditional teaching methods often result in low student engagement and motivation, particularly in subjects like Biology. In contrast, Animation Instructional Strategy has been shown to increase students' interest and motivation leading to improved academic achievement (Magaji, et al., 2024). In Nigeria, research has shown that student often struggle with the abstract and complex nature of biology concepts, leading to poor academic achievement (Gafur, et al., 2024 & Salisu et al., 2024). Therefore, there is a need for innovative instructional strategies like the Animation Instructional Strategy to enhance teaching and learning outcomes in Biology. Animation Instructional Strategy involves presentation of learning media using both photographic and verbal forms such as spoken and printed text (Abdullah & Mesut, 2015). It encompasses images in motion or as series of varying images presented dynamically according to user action in ways that

help the user to perceive a continuous change over time and develop a more appropriate mental model of the task (Zanin, 2015). The affability of learning through animation allows for a wider range of stimuli, thus increasing students' engagement in learning. Animation Instructional packages are tools that have the capacity to improve quality learning. They seek to arouse students' interests, stimulates thinking and concretizes knowledge that could otherwise not be explained in abstract terms (Bamidele & Yoade, 2017). Despite the entertainment potentials of animation, it has the capacities of enhancing instructional delivery across the levels of education irrespective of subject (Tukura, 2015). Animation Instructional Strategy captures student's attention and keep them engaged for longer periods (Rashid et al., 2024). Therefore, when learners' attention is captured, interest in the subject is present, and the outcome is academic achievement (Renninger & Riley, 2018). Gender was adopted as a moderating variable in this study.

The inconsistencies in reviewed previous studies related to the present study highlight the need for further investigation. This study explores the Effect of Animation Instructional Strategy on student's achievement in Biology in senior secondary schools in the FCT, Abuja, Nigeria.

Purpose of the Study

The study examined the effect of animation instructional strategy on students' achievement in biology in senior secondary schools in the Federal Capital Territory, Abuja, Nigeria. Specifically, the study;

1. Investigated the difference between the mean achievement scores of senior secondary school students taught Biology using the Animation Instructional Strategy and their counterparts taught with the conventional method of teaching in the FCT, Abuja, Nigeria.
2. Determined the difference in the mean achievement scores of male and female senior secondary school students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria.

Research Question

1. What is the difference between the mean achievement scores of senior secondary school students taught Biology using the Animation Instructional Strategy and their counterparts taught with the conventional method of teaching in the FCT, Abuja, Nigeria?
2. What is the difference between the mean achievement scores of male and female Senior Secondary School students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria?

Hypotheses

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

Ho_1: There is no significant difference between the mean achievement scores of Senior Secondary School students taught Biology using the Animation Instructional Strategy and their counterparts taught using the conventional method of teaching in the FCT, Abuja, Nigeria.

Ho_2: There is no significant difference between the mean achievement scores of male and female Senior Secondary School students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria.

Review of Related Literature

Ramatu Gimba and Oluwole (2015), examined the effect of Computer Animation with focus on simulation instructional package on students' achievement and retention in mathematics in senior secondary schools in Niger State. A quasi-experimental design was employed. Targeted population of the study was SSII students in Lavun Local Government Area of the State. The sample size of the study consisted of 156 SSII students from two intact classes in two purposively

selected public schools in the study area. Data for the study was gathered through Mathematics Achievement Test and analysed using Analysis of Covariance (ANCOVA) statistics.

The study revealed that students taught Arithmetic progression through computer simulated instructional package retained the concepts learnt more than their counterparts taught using conventional lecture method. However, there was no significant difference in the retention of boys and girls taught using the package.

Similarities between the reviewed study and the present study lies between research design, method of data collection as well as method of data analysis, while differences between the studies include location and subject. The reviewed study was conducted in Niger state with focus on Mathematics while the present study was conducted in the FCT, Abuja with focus on Biology in senior secondary schools.

Abdullah and Mesut (2015) compared the effect of Animation with focus on concept cartoons and activity based instruction on academic achievement in mathematics in middle schools in Turkey. The quasi-experimental research design was adopted. Population of the study comprised of sixth grade students at a middle school in Gümüşhane. Sample size 42 students was used in the study. Achievement test was used for data collection. Data obtained were analyzed using t-test and ANCOVA. Results of the study revealed that there was significant difference in academic achievement between students taught with the two methods in favor of concept cartoon. The finding also showed that concept cartoon method is an effective method of teaching topics of divisibility rules and prime numbers.

Similarities between the reviewed study and the present study lies between objective, research design, method of data collection as well as method of data analysis. On the other hand, differences between the studies include scope, location, subject, sample size, and statistics for data analysis, partly. The reviewed study was conducted in Turkey with focus on mathematics while the present study was conducted in Nigeria with focus on biology in senior secondary schools.

Atsumbe, et al (2015) examined the effects of Animation on students' achievement and retention in basic electricity at technical colleges in Benue State. The study adopted quasi-experimental research design. The population of the study comprised of 82 technical college one students offering basic electricity. The instrument used was Basic Electricity Achievement and Retention Test. Data collected were analyzed using mean and ANCOVA at 0.05 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. In totality, the reviewed study is similar with the present study except for scope, location and subject. While the reviewed study focused on the effects of animation on students' achievement and retention in basic electricity at technical colleges in Benue State, the present study focused on biology in senior secondary schools in the FCT, Abuja, Nigeria.

Cheng and Tsai (2016) investigated the effect of animation-based instruction on male and female students' learning outcomes in botany in Taiwan. The Quasi experimental research design was adopted. The population the study comprised of 100 male and 100 female students in schools in Taiwan. Using the Quasi-experimental design a pretest and posttest questionnaires were administered to 100 male and female students. The students were divided into two groups, control group and experimented group, the experimental group received animation-based instruction, while control group received traditional instruction. Descriptive statistics were used to analyze the demographic data of the students. Inferential statistics (t-test and ANOVA) were used to compare the mean scores of the experimental and control groups, the study found that animation-based instruction improved male and female students' learning outcomes in botany, also the female students showed a higher improvement in learning outcomes compared to male students.

The reviewed study is similar with the present study in all ramifications. However, the study is different from the present study in terms of scope, subject, level of treatments, and location. The

present study examined the effects of animation instructional strategy on students' achievement in biology in senior secondary schools in FCT, Abuja, Nigeria, while the reviewed study investigated the effect of animation-based instruction on male and female students' learning outcomes in botany in Taiwan.

Gambari, Shittu, Daramola and Jimoh (2016) investigated the effects of Animation Instructional packages on achievement of students in mathematics among senior secondary schools in Minna, Nigeria. The study adopted quasi-experimental design. 120 students were randomly selected from four secondary schools that constituted the sample of the study. Data were collected using achievement test, and the data were analyzed with ANCOVA and Sidak Post-hoc test. The results revealed that there is significant difference in the mean achievement score of students taught mathematics using TO, TA, TN and TAN Video Type Instructional packages. Gender was found to have no significant effect in the mean achievement score of students taught using TO, TA, and TN. However, there was a significant difference between male and female students taught Trigonometry with TAN.

The reviewed study is similar with the present study in all ramifications. However, the study is different from the present study in terms of scope, subject, level of treatments, and location. While the reviewed study was conducted in Minna, Niger State with focus on mathematics, the present study was carried out in senior secondary schools in the FCT, Abuja, Nigeria with focus on Biology.

Falode, Sobowale, Saliu, Usman and Falode (2016) examined the effect of Computer Animation Instructional Package (CAIP) on academic achievement of senior secondary school agricultural science students in animal physiology in Minna, Niger State. The quasi-experimental research design was adopted. The sample of the study was 88 senior secondary school students selected from intact classes of two co-educational public schools. Instrument of the study was titled Animal Physiology Achievement Test (APAT). Data of the study were analyzed using t-test statistics. Findings revealed that there was significant difference between the mean achievement scores of the two groups in favour of those taught with CAIP. Also, the treatment improved the achievement of both male and female students.

Holistically, this study is similar to the present study except for scope, subject, and location. While this study was conducted in Minna, Niger State with focus on Agricultural Science, the present study focused on the effect of Animation Instructional Strategy on students' achievement in biology in senior secondary school in the FCT, Abuja, Nigeria.

Ikwuka and Samuel (2017) investigated the effect of computer animation on chemistry students' academic achievement in senior secondary schools in Anambra State, Nigeria. The quasi-experimental research design was employed in the study. Targeted population of the study was SSII students in Awka South LGA of Anambra State. The sample size for the study comprised of 100 students from two selected co-educational secondary schools. Chemistry Achievement Test (CAT) was used for data collection. Data of the study were analyzed using descriptive and ANCOVA statistics. It was revealed that Computer Animation Chemistry Instruction (CACI) had significant effect on students' academic achievement in chemistry; and that gender had significant effect on the academic achievement of students in chemistry; the male students performed better based on the findings of this study.

The reviewed study is related to the present study generally except in subject, level of education and location. The reviewed study was conducted in Awka South LGA of Anambra State with focus on Chemistry in senior secondary schools while the present study was carried out in the FCT, Abuja with focus on Biology in senior secondary schools.

Hamzat, Bello and Abimbola (2017) examined the effects of Computer Animation Instructional Package on secondary school students' achievement in practical biology in Ilorin, Nigeria. The study adopted a pretest, posttest, control group, non-randomized and non-equivalent quasi-

experimental design. Two intact classes (with 32 and 30 students) from two secondary schools were purposively sampled. The instruments used were Biology Practical Achievement Test for data gathering and Computer Animation Instructional Package as the treatment instrument. Descriptive and t-test statistics were used for data analysis. The study revealed that computer animation instructional package significantly improved students' achievement in practical biology.

The two studies are similar generally except for location. While this study was conducted in Ilorin, Kwara State with focus on biology, the present study was carried out in the FCT, Abuja, Nigeria.

Chikendu (2018) investigated the effect of Instructional Computer Animation on secondary school students' achievement and interest in chemistry in Anambra State. The study adopted a quasi-experimental design. Population of the study comprised the 2927 senior secondary year-two chemistry students in the 61 state owned secondary schools in Awka Educational Zone. The sample size of 186 students was drawn from two co-educational secondary schools. The results of the study revealed that instructional computer animation had significant effect on students' achievement and interest in chemistry. Female students performed better than the male students taught using Instructional Computer Animation.

The reviewed study is similar with the present study except in some features which include subject, sample size, and location as well as statistics used for data analysis. While the reviewed study was conducted in Anambra State with focus on chemistry, the present study was carried out in the FCT, Abuja with focus on Biology in senior secondary schools.

Amal and Samar (2018) investigated the effect of Computer Animation via movies on biology students' academic achievement in the Faculty of Educational Sciences and Arts University of Jordan. The study adopted a pretest post-test control group quasi-experimental design. The population of the study consisted of all the students of the Faculty of Educational Sciences and Arts (FESA) enrolled in the class for the year 2017-2018. The sample of the study consisted of 70 students enrolled in the biology course for the same year. Instrument of the study comprised of 40 items prepared to assess students' academic achievement in biology as a whole, and their achievement of higher and lower levels of thinking in biology. Data analysis was carried on SPSS software for adequate results. The findings of the study showed that students taught with animation have higher achievement in biology than those taught with conventional method. It implied that animation had a positive effect on students' achievement in biology on general, and on achieving the higher and lower levels in thinking in biology.

The reviewed study shared same features with the present study in terms of variables, research design, and method of data collection as well as data analysis. Nevertheless, the study differed from the present study in terms of location, subject, as well as level of education of participants. This study was conducted at a University in Jordan with attention on biology while the present study was carried out in the FCT, Abuja with focus on biology in senior secondary schools. The reviewed study also compared movie with animation while the present study investigate the effect of Animation Instructional Strategy on Students' Achievement in Biology in senior secondary schools in the FCT, Abuja, Nigeria.

Chikendu and Okoli (2020) investigated the effect of instructional computer animation on secondary school students' achievement in chemistry in Anambra State. The quasi-experimental design was adopted. The sample consisted of 186 students drawn secondary schools in Awka Education Zone. Chemistry Achievement Test (CAT) was used to collect data for the study. Mean and standard deviation were used to answer the research questions while Analysis of Covariance was used to test the null hypotheses at 0.05 level of significance. It was revealed that instructional computer animation had significant effect on students' achievement. Female students performed better than the male students taught using instructional computer animation.

This study and the present study shared similarity, however, their differences are minor. While their similarities include objective, design, instrument, and method of collection and data analysis;

their difference include scope, location, subject, and sample size. The reviewed study investigated the effect of instructional computer animation on secondary school students' achievement in chemistry in Anambra State while the present study examined the effects of animation instructional strategy on students' achievement in Biology in senior secondary schools in the FCT, Abuja, Nigeria.

Anekwe and Opara (2021) investigated the effect of Animation Instructional Strategy on students' academic achievement and retention of chemical bonding among senior secondary school students in Otuocha Education zone of Anambra state. A pretest, posttest, control group quasi-experimental design was adopted for the study. The population of the study was 6,234 SS1 students from where a sample size of 203 students was randomly selected. Chemical Bonding Achievement test (CBAT) was used for collection of data. The data obtained were analyzed using mean and standard deviation to answer research questions and Analysis of Covariance (ANCOVA) was used to test formulated hypotheses. Results showed that students who were taught chemical bonding using animation outperformed and retained the concept of chemical bonding than those taught using lecture method without gender difference.

The similarities between the reviewed and present studies are broad including independent and dependent variables, research design, and method of data collection, as well as data analysis. On the other hand, the reviewed study differs from the present study in terms of location, subject, sample size as well as level of education of participant. The present study examined the effects of animation instructional strategy on students' achievement in Biology in senior secondary schools in the FCT, Abuja, while the reviewed study investigated the effect of animation instructional strategy on students' academic achievement and retention of chemical bonding among senior secondary school students in Anambra State.

Pius, Abumchukwu and George (2021) examined the effects of Animated-media Instructional Strategy on students' achievement and retention in chemistry in Anambra State. The design of the study was quasi-experimental. The population of the study was 1,250 SS2 chemistry students from the 24 co-educational public secondary schools in Awka Education Zone. Sample size of the study was 122 students. Data were collected using Chemistry Achievement Test and Chemistry Retention Tests. Descriptive statistics and analysis of covariance (ANCOVA) were adopted for data analysis. The result showed that the animated-media instructional method enhanced students' achievement and retention in chemistry without gender differences.

The reviewed study is similar with the present study except for scope, location, sample size and focused subject. While the reviewed study was conducted Anambra State with focus on chemistry in senior secondary schools, the present study was carried out in the FCT, Abuja, Nigeria with focus on Biology in senior secondary schools. Similarly, while the reviewed study utilized ANCOVA for its data analysis, the present study used independent t-test for data analysis.

Okpoebo and Ishiaka (2022) investigated the effect of Animated Instruction on students' achievement and interest in citizenship education in Nasarawa State. The quasi-experimental research design was adopted. The population of the study comprised 3,456 civic education students in tertiary institutions and polytechnics in Nasarawa Local Government Area. Sample size of the study was 109 students from the two intact classes. Students' achievement questionnaire and students' interest questionnaire were used for data collection. The descriptive statistics and independent t-test were employed for data analysis. It was revealed that animated instructional resources enhanced students' achievement and interest in citizenship education.

This study is similar to the present study in terms of objective, design, instrument, and statistics for data analysis. The differences between the studies are within scope, location, subject, and sample size. The present study examined the effects of animation instructional strategy on students' achievement in biology in senior secondary schools in the FCT, Abuja, Nigeria. While the reviewed study investigated the effect of Animated Instruction on students' achievement and interest in citizenship education in Nasarawa State.

METHODOLOGY

The study employed a quasi-experimental design with pretest, posttest, and non-equivalent control groups. Intact classes were used, where Animation Instructional Strategy and Conventional teaching methods were applied respectively. A research design was adopted, Direction of this study based on this design is presented as adapted in Ekpo (2016) thus:

Experimental group O_1 x_1 O_3

Control group O_1 x_2 O_3

Where: O_1 and O_1 represent pretest for both experimental and control groups

O_3 and O_3 represent posttest for both experimental and control groups

x_1 represent treatment for experimental group

x_2 represent conventional teaching for control group

The entire SS II students in 88 public senior secondary schools across the six Area Councils in Federal Capital Territory, Abuja for 2024/2025 school session composed the population of the study. SS II Students' population in the schools were twenty-two thousand, seven hundred and thirty-six (22,736) (FCT Secondary School Board, 2024).

The sample size comprised of 125 SS II students from two randomly selected secondary schools in the FCT namely Government Secondary School Kuje in Kuje Area Council and Senior Secondary School Garki in Abuja Municipal Area Council. Two classes from selected sampled schools were constituted respectively into experimental and control groups. Instrument for data collection was the Biology Achievement Test (BAT) which was validated by two experts in the Department of Science and Environmental Education, University of Abuja. The instrument was tested for reliability using KR-21 Statistical tool which gave an index of 0.87.

Participants in the study were taught for six weeks with distinct lesson plans for each group. The experimental group were taught using the Animation Instructional Strategy while the control group were taught with the Conventional teaching method. Data collection occurred in two phases; pretest, and posttest. Data of the study were subjected to descriptive and independent t-test statistics. The descriptive statistics of frequency counts, percentage, means ( ), and standard deviation were used for analysing data related to the research questions raised, the independent t-test statistics was used for testing of the formulated hypotheses at 0.05 level of significance. The decision to accept or reject each hypothesis was based on the significance value (p-value) obtained. If the p-value was less than or equal to 0.05, the null hypothesis (H_0) was rejected, conversely, if the p-value was greater than 0.05, the null hypothesis was accepted.

Data Presentation, Analysis and Interpretation

Table 1: Sample Size and Gender of Participants in the Study

Groups	No. of students			Percentage (%)
		M	F	
Experimental	67	31	36	53.6
Control	58	25	33	46.4
Total	**125**			**100.0**

Table 1: presents the sample size and gender of the study according to groups. Out of 125 students, 67 (53.6%) were assigned to experimental group, while 58 (46.4%) were in the control group. This indicated that the experimental group had a larger proportion of students compared to the experimental group, comprising over 60% of the sample.

Answers to Research Questions

Research Question One: What is the difference between the mean achievement scores of senior

secondary school students taught Biology using the Animation Instructional Strategy and their counterparts taught with the conventional method of teaching in the FCT, Abuja, Nigeria?

Table 2: Summary of Descriptive Statistics for Research Question One

Group	Number	Mean	Standard Deviation
Control	58	59.34	4.57
Experimental	67	80.06	4.94
Difference		**20.72**	**0.37**

Source: Field Survey (2025)

Data presented on Table 2 showed results of descriptive statistics for research question one. The mean achievement scores of 59.34 and 80.06 were recorded for control and experimental groups respectively with a difference of 20.72 in favour of the experimental group. Also, the standard deviation to the scores were 4.57 and 4.94 for control and experimental group respectively with difference of 0.37 in favour of the experimental group. Hence, there is significant difference between the mean achievement scores of senior Secondary school students taught Biology using the Animation Instructional Strategy and their counterparts taught with the conventional method of teaching in the FCT, Abuja, Nigeria.

Research Question Two: What is the difference between the mean achievement scores of male and female senior secondary school students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria?

Table 3: Summary of Descriptive Statistics for Research Question Two

Group	Number	Mean	Standard Deviation
Male	31	79.10	4.70
Female	36	80.89	5.05
Difference		**1.79**	**0.35**

Source: Field Survey (2025)

Data presented on Table 3 showed results of descriptive statistics for research question two. The mean achievement scores of 79.10 and 80.89 were recorded for male and female students respectively with a difference of 1.79 in favour of female students. The standard deviation to the scores were 4.70 and 5.05 for male and female students in the same order with difference of 0.06 in favour of female students. Hence, there is difference between the mean achievement scores of male and female students taught Biology using the Animation Instructional Strategy in senior secondary schools in the FCT, Abuja, Nigeria

Test of Hypotheses

Hypothesis one: There is no significant difference between the mean achievement scores of senior secondary school students taught Biology using the Animation Instructional Strategy and their counterparts taught using the conventional method of teaching in the FCT, Abuja, Nigeria.

Table 4: Summary of Result for Hypothesis One

Group	N	Mean	SD	df	t–value	*p*-value	Decision
Control	58	59.34	4.57	123	24.21	0.01	**Significant**
Experimental	67	80.06	4.94				

Source: SPSS Outputs (2025)

Data on Table 4 showed results of the independent samples t-test for hypothesis one. From the Table, the calculated independent samples t-test (t-value) is 24.21 while the p-value, 0.001 is less than 0.05, hence, hypothesis two is rejected. This implies there is significant difference between the mean achievement scores of senior secondary school students taught Biology using the

Animation Instructional Strategy and their counterparts taught using the conventional method of teaching in FCT, Abuja, Nigeria. The difference favoured the experimental group.

Hypothesis Two: There is no significant difference between the mean achievement scores of male and female senior secondary school students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria.

Table 5: Summary of Result for Hypothesis Two

Group	N	Mean	SD	df	t–value	*p*-value	Decision
Male	31	79.10	4.70	65	1.49	0.14	**Not Significant**
Female	36	80.89	5.05				

Source: SPSS Outputs (2025)

Data on Table 5 showed results of the independent samples t-test for hypothesis two. From the table, the calculated independent samples t-test (t-value) is 1.49 and the p-value, 0.14 is greater than 0.05, hence, hypothesis five is not rejected. This implies there is no significant difference between the mean achievement scores of male and female senior secondary school students taught Biology using the Animation Instructional Strategy in the FCT, Abuja, Nigeria.

Discussion of findings

The comparative analysis of achievement scores unequivocally demonstrates the superior effectiveness of the Animation Instruction Strategy in boosting senior secondary school students' achievement in Biology. The finding confirms that Animation Instruction Strategy enhances students' engagement and, comprehension thereby boosting their achievement in Biology in senior secondary schools in the FCT, Abuja. This finding supports the findings of Ramatu Gimba and Oluwole (2015), who revealed that Animation Instructional Strategy significantly improved students' achievement and retention in Mathematics in senior secondary schools in Niger State. Also, Abdullah and Mesut (2015) disclosed significant effect of animation with focus on concept cartoons and activity based instruction on academic achievement in mathematics in middle schools in Turkey.

Likewise, Atsumbe, et al (2015) revealed significant effect of Animated Instruction on students' achievement and retention in basic electricity at technical colleges in Benue State. The gender-neutrality of animation may be attributed to its interactive and engaging nature, which can resonate with both male and female students equally.

However, this finding disagrees with the finding of Ikwuka and Samuel (2017) in terms of gender difference in students' interest in chemistry achievement in Awka South Local Government Area of Anambra State. This finding concurs with the findings of Tukura (2015) who revealed that animation instructional strategy significantly improved students' achievement in social studies without gender bias in Niger State.

For research question two and hypothesis two, the findings shows a difference in mean achievement score in favour of the female students. Which disagree with the findings of the study which indicated that the animation instructional strategy is a gender-neutral that effectively enhances achievement in Biology of both male and female senior secondary school students.

Conclusion

Going by the findings of this study, the study reveals that the use of Animation Instructional Strategy is an effective strategy for enhancing students' achievement in Biology. This strategy benefits both male and female senior secondary school students equally, indicating that it is gender friendly. By incorporating animation into teaching and learning practices, educators can create a more engaging and interactive learning environment, leading to improved learning outcomes. Overall, the findings confirms that Animation Instructional Strategy is a valuable tool for teaching and learning Biology, and in promoting better students' achievement in Biology.

Without gender differences.

Recommendations

In line with the findings of the study, the following recommendations were proffered:

i. Education ministry and School administrators should provide teachers with training and resources to effectively use animation instructional strategy to teach Biology since it enhances students' achievement.

ii. Teachers should give every student should be given equal opportunities irrespective of gender when using the Animation Instructional Strategy in teaching and learning Biology since it has been found to be gender friendly and can enhance their achievement equally.

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