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COMPARATIVE EFFECTS OF ANIMATED AND NON-ANIMATED COMPUTER ASSISTED INSTRUCTIONS ON STUDENTS' INTEREST IN BIOLOGY IN AWKA SOUTH LGA OF ANAMBRA STATE

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ABSTRACT

Studies have shown that biology students' performance and accomplishment have remained uneven. This discrepancy may be the consequence of students' disinterest in the subject, which has put their readiness to enroll in biology and related courses at the university in jeopardy. It is still unknown which pedagogical approach could improve students' interest in the subject, despite the fact that well-designed instructional strategies have been proposed to mitigate the issue. We examined how students' interest in biology was affected by the use of animation as an instructional strategy and by computer-assisted instruction that was not animated. Our pretest-posttest control group design was non-randomized. The study was guided by two null hypotheses and two research questions. Participants in the study included 120 SS I Biology students from two public secondary schools in Awka South Local Government area. The study used a quasi-experimental research design. The Biology Interest Scale (BIS) was the tool used to collect the data. The tool was verified. Cronbach Alpha was used to determine the instrument's reliability, and the results showed a reliability coefficient of 0.84. The research questions were answered using mean and standard deviation, and the research hypotheses were tested using Analysis of Covariance (ANCOVA). Students who were taught biology using an animated computer-assisted instructional strategy (ACAIS) scored higher on interest than their counterparts who were taught biology using a non-animated computer-assisted instructional strategy (NACAIS), according to the findings. The researcher suggested, among other things, that school administrators and stakeholders should provide computers and other teaching resources that will allow teachers to adopt and students to learn using animated computer assisted instructional strategy (ACAIS) and that teachers receive training on how to use ACAIS to increase students' interest through seminars, workshops, and conferences.

Keywords: Animation, non-animation, computer assisted instruction, interest, Biology.

Introduction

Science and technology education form the foundation for sustainable national development by protecting human societies from ignorance, illiteracy, disease and poverty. Science provides knowledge while technology provides ways of using this knowledge. Science is an intellectual activity carried out by

humans that is designed to discover information about the natural world in which humans live and to discover the ways in which this information can be organized into meaningful patterns (Arokoyu 2020). The teaching of science begins from early education level (pre-basic level) through higher education. Science education is meant to expose the learners to scientific nature, processes, and attitudes and equip learners with skills of professional scientist and this starts from senior secondary school (Osokoya, 2013).

Senior secondary school is an academic program that is universal and compulsory for all Nigerian children. The goal of senior secondary school is to equip students' with knowledge and skills that will prepare them for successful integration into higher education, the workforce, and society at large, enabling them to live productive and fulfilling lives. (Federal Republic of Nigeria, 2020). In specific terms, senior secondary school education should give learners opportunity to discover and develop their potentials. There are various subjects offered in the senior secondary school. One of them is Biology.

Biology is the study of plants and animals which provides scientific literacy required for national growth and development. The knowledge of Biology is needed by all students in the senior secondary schools be it science or art to cope with the anatomical, physiological, social and physical challenges of the world. Biology is a core subject in senior secondary school curriculum and also one of the requirements for studying science and the science related courses in the tertiary institutions. The three main objectives of Biology as stated in the national policy of education are: learning of Biology will provide the students with suitable laboratory and field skills in Biology, meaningful and relevant knowledge in Biology, scientific knowledge that is applicable in health, agriculture, personal and community daily life in matters and development of functional scientific attitudes, (FRN, 2013).

In spite of the relevance of Biology as the basis on which scientific and technological studies rest, interest of students has been significantly poor, this is demonstrated in their poor and inconsistent achievement in the subject.

Presently, the common method of Instructional delivery applied by teachers in senior secondary schools in Nigeria is lecture method which involves verbal presentation of subject matter or content. Lecture method as a conventional method, is didactic, stereotypic and non-result oriented. It is often described as "talk and chalk" method because it presents information to the students who merely listen. Teachers do all the talk while students listen and copy notes on the chalkboard after the lesson (Akpoghol, Ezeudu, Adzape, & Otor, 2016). This teacher centered approach dominate the educational systems in Nigeria except in few private schools that are well equipped with modern Information and Communication Technology (ICT) facilities such as computer laboratories with computer and internet facilities, interactive whiteboards, learning software, multimedia, and devices for Computer Assisted Instructions (CAI)

CAI has the ability to improve teaching and learning, it can therefore be employed in the classroom in teaching Biology effectively.

According to Gana (2022), CAI is student centered and can help students in concretizing the abstract aspect of any subject in secondary school. Therefore, there's need to employ the use of computer in the classroom to make teaching and learning more interactive. Computer Assisted Instructions (CAI) packages are basically software programmes developed for self-education, and can be used as a teaching aid. Several researches have been carried out on the use of computer in teaching and learning and it has been noted that computer makes teaching and learning effective. Okorie (2022) discovered that CAI not only enhances teaching and learning but also sustains students' interest during the learning process. Similarly, Ojo (2022) revealed that in order to make teaching and learning more effective, Computer Assisted Instructions (CAI) should be an established means of instruction in secondary schools. In order to further explore the usefulness of computer in teaching and learning, there is need to investigate the effectiveness of using computer in every subject in secondary schools. One of the ways computer can be deployed in the classroom is through animated and non-animated means (Ojo, (2022), Clark and Mayer (2020) noted that animation is a computational simulation of processes that combines textual text, charts, maps, static images, and self-motivated visuals into a synthetic motion picture. It has been found that animation can be in form of a cartoon when used solely for pleasure and as well can be used as instructional material (Hamzat, Bello & Abimbola 2023). Distinct sorts of images with text have different functions in forming mental models as a substitute for just absorbing knowledge, (Hamzat, Bello & Abimbola 2023).

Encoding information, storing it in long-term memory, and retrieving it may be improved through animation that blends aural and visual features (Paivio as cited in Hamzat, Bello & Abimbola, 2023). When used for instructions over modern techniques, animations boost descriptive and procedural learning while also promising increased efficiency (Mayer,2020). Animation appeals to both the sight and hearing senses of the learner there by fostering the retention, interest and recalling ability of the learners

The use of animated materials such as cartoon instruction reduces the learning task and time; it creates room for consistency and learning mastery by increasing retention, safety and motivation (Owolabi & Oginni 2022). Learners enjoy interactive learning through cartoon teaching since it is efficient, effective and flexible. It facilitates communication and appeals to senses of sight and hearing at the same time, it provides concrete basis for the comprehension of abstract concepts and makes for a more meaningful and permanent learning (Owolabi & Oginni 2022). With the advent of the internet and electronic learning that can be communicated over the World Wide Web, teachers now have several new and exciting ways to present information. The cartoon style allows the incorporation of animation, moving pictures, and sound into lessons, which extends teachers abilities to present materials that encourage student interaction with the subject matter. Pictures and animations help bring to life scientific principles and also inculcate interest among students in reading and learning

of sciences. Non-animated way of computer usage has all the characteristics of animated computer but there is no element of motion embedded (Mayer, 2020).

Interest is a feeling of like or dislike towards an activity. Interest is a feeling somebody has when one wants to know or learn more about something. It is a zeal or willingness to participate in an activity for which one derives some pleasure (Ojo, 2022). According to Ukegbu (2019), the interest of students is thwarted by several factors which include negative attitude of teachers and influence of other people's attitude. Also, students' interest can be generated and sustained through several methods. These include motivation, relevant set induction techniques, effective use of instructional materials, most especially use of computer. Interest in Biology could be achieved when students are made to see the importance of what they are about to learn. It involves linking the new concept to be learnt to the learners' previous experience. Ojo (2022) noted that interest is used as a motivating force through which learning should take place. According to Okorie (2016), both the animated and non-animated ways of using computer has the ability to arouse and sustain student's interest during lessons.
However, Ibe (2023) noted that new ways of accessing the processes that link interest and learning are required. Ojo (2022) suggested that in addition to more standard quantitative and qualitative methodologies, the complexity of academic development in specific domains requires the creation of alternative techniques that can increase and sustain the interest of students regardless of gender.

Gender has been identified as one of the factors influencing students' interest in Biology (Nworgu, 2020). Gender issues as a factor or variable are not yet skewed to any direction. There are different findings on gender matters, some in favour of males, others in favour of females and sometimes no gender differences are found. Giginna (2020) remarked that science subjects are traditionally taught and reflected in a masculine approach to the world that tends to marginalize women. Gana (2022) found no significant difference in the achievement between male and female students in periodic table. This agrees with Isiyaku (2018) who also found no significant difference between male and female SS 1 students' performance in Biology scores. Contrary to these findings, Josiah (2021) ascertained that there exists a significant gender difference in favour of boys in computational problems while girls out performed boys in verbal problems. In view of the fact that gender issues are still inconclusive, gender implication especially as it affects interest needs more verification especially in computer technology.

There have been several researches on the relative effects of different modes of CAI on students' interest in science subjects like biology, chemistry and physics. However, findings have generated discrepancies among science education researchers over the years. For instance, Ezenwa and Anyanwu (2022) reported a no statistically significant difference in the post-test mean scores of students taught solid geometry using animated and non-animated modes of CAI. On the other hand, Bamidele and Yoade (2022) found that there was a significant difference in the interest of

Biology students taught with animated and non-animated computer assisted instruction in favour of the animated group. Therefore, there remains an inconclusive research report on the use of the different modes of CAI to enhance students' interest in various science disciplines. Hence, the need to examine the effects of animated and non-animated computer assisted instructions on students' interest in Biology.

Statement of the problem

The poor and fluctuating interest of students in Biology is alarming and has attracted the attention of many stakeholders in education sector and researchers alike. Evidence from Senior Secondary School Certificate Examination (SSCE) over the years showed that candidate's performance in Biology is not encouraging. This scenario will persist if not urgently addressed. Evidence in literature has shown innovations in teaching and learning, yet achievement which is a sign of interest in the subject continues to decline. This persistent decline could be as a result of lack of interest on the part of the students and teachers' use of ineffective methods and strategies in Biology teaching which among other factors have contributed to the student's lack of interest in the subject. Efforts at improving student's interest in Biology have therefore necessitated a search for potentially viable instructional approaches such as computer assisted instruction.

From available literature, computer can be deployed in the classroom through several ways like animated and non-animated computer assisted instructions. From the literature available, empirical evidence about effects of animated and non-animated computer assisted instruction on senior secondary school student's interest in Biology in Awka Education Zone of Anambra State is grossly lacking. Also, gender influence on student's interest which has been reported in literature with many contradictions is yet to be empirically investigated with regards to student's interest when taught Biology with animated and non-animated computer assisted instructions. Consequently, the problem of this study is: could the use of animated and non-animated computer assisted instruction have effect on senior secondary school student's interest in Biology?

Purpose of the Study

The general purpose of the study was to investigate effects of animated and non-animated computer assisted instructions on senior secondary school student's interest in Biology. Specifically, the study sought to determine the:

1. Mean interest scores of students taught Biology using animated and non-animated computer assisted instructional strategy.
2. Mean interest scores of male and female students taught Biology using animated and non-animated computer assisted Instructional strategy.

Scope of the Study

The study considered only Senior Secondary School One (SSS 1) students in public coeducational secondary schools in Awka South L. G. A. of Anambra State and was limited to the concept of Reproductive system and Ecological concept which tend to appear too abstract for the students.

Research Questions

The following research questions were posed to guide the study.

1. What are the mean interest scores of students taught Biology using animated and non-animated computer assisted instructional strategies?
2. What are the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted Instructional strategy?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance in the study:

HO_1 There is no significant difference in the mean interest scores of students taught Biology using animated and non-animated computer assisted instructional strategies.

HO_2 There is no significant difference in the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted Instructional strategy.

Methodology

This study adopted a quasi-experimental research design. Specifically, a non-equivalent pretest, posttest, non-randomized experimental group design was used. Quasi-experimental design according to Nworgu (2015) is an experiment where random assignment of subject to both experimental and control group is not possible. This design was considered appropriate because randomization of students would not have been appropriate thus we used intact classes for both experimental groups respectively. Prior to the main experiment, we conducted baseline analysis (pretest) to determine if significant differences exist among the groups but found no significant differences among the groups, indicating that the groups were relatively equal/ homogeneous. This study was carried out in Awka South Local Government Area of Anambra State. Awka South Local Government is under Awka Educational Zone of Anambra State. It shares boundaries with Awka North, Dunukofia, Anaocha and Ekwusigo Local Government Area. Awka South Local Government Area has 17 public schools, 16 are co-educational schools while one is a single sex school. Awka south Local Government Area was chosen for the study because it would help improve the interest of a good number of students at the end of the study. The population of the study was 2,036 senior secondary school one (1) Biology students (1,006 males and 1,030 females) in the 17 public secondary schools in Awka South Local Government Area ((statistics and records section of the Post Primary School Management Board (PPSMB). Awka South Education Zone as at 2023–2024. Public schools were used because they have more qualified teachers with various years of experience, unlike the private schools that have part-time teachers with limited experience. The rationale of choosing SS1 is based on the fact that this set of students is just being introduced into the senior secondary school. Also Reproductive system and Ecological concept (population) used are in SS1 scheme of work and students do find the topic difficult to assimilate. A sample of one hundred and two (120) SS1 students gotten from two schools in Awka South Local Government Area was involved in the study. Purposive and simple random sampling technique was used. Firstly, two schools in the area of the study were

purposively sampled because they recorded poor achievements in Biology for the past years. Secondly they were co-educational schools because gender is one of the moderating variables under study. Thirdly, the schools were selected because they are better equipped with ICT facilities than other schools in the area. In the second stage, simple random sampling was applied to assign the two schools to the experimental groups. Simple random sampling technique was used to assign one class each to the experimental groups. At the end, fifty four (54) students comprising twenty (20) males and thirty four (34) females formed the animated computer assisted instruction group while sixty six (66) students comprising twenty four (24) males and forty two (42) females formed the non-animated computer assisted instruction group. The instrument used for data collection was Biology Interest Scale (BIS). Biology Interest Scale (BIS) was adapted from Chinese Interest scale developed by Luo Zheng, Dong Yun, Xu wenjie in 2019. The researcher modified some of the statements to suit her purpose by replacing the Chinese with Biology terms in the items. The researcher includes some of the concepts taught to the students in the items. This instrument contains twenty (21) items which are measures of students' interest in Biology and were structured on a four-point scale of Strongly Agree (SA) (4-point), Agree (A) (3-point), Disagree (D) (2-point) and Strongly Disagree (SD) (1-point). The negative statements were scored in the reverse order i.e. Strongly Agree (SA) (1-point), Agree (A) (2-point), Disagree (D) (3-point) and Strongly Disagree (SD) (4-point). It was used for both the pretest and post- test. The BIS was subjected to face validation. The validation was done by three experts in the faculty of Education of the Nnamdi Azikiwe University, Awka, two from department of Science Education and the other from Educational foundation. Their opinions were considered in modifying the questions. To obtain the reliability of the instruments, trail testing was done. (20) SS1 Biology students outside the area of the study were used for the pilot study. Cronbach Alpha Formula was used to determine the reliability coefficient of BIS as 0.84. This was used because the responses to the items in the instrument are polychotomously scored. In other words, the responses did not involve pass or fail (true or false) answers, rather rating was done according to response options given by the respondents. The instrument for data collection (BIS) was administered to the students before the experimental treatment. This served as the pre-test of the study. At the end of the study, the instrument was reshuffled and re-administered to the students as the post-test. This was done to prevent the students from realizing that they had responded to the same instrument previously. Data were Analyzed using mean and standard deviation to answer the research questions while the Analysis of Covariance (ANCOVA) was used in testing the hypotheses at an alpha level of 0.05. This implies that any p value that is less than 0.05 is significant and therefore the hypothesis was rejected. Any p value that is equal to or greater than 0.05 is not significant and therefore the hypothesis was not rejected.

Experimental Procedure

The researcher visited the study schools to obtain permission from the principals to enable her carry out the study with the SS1 Biology

students. The study lasted for six weeks; the first week was used for the administration of the instruments (pre-test) while the actual study lasted for four weeks. The sixth week was used for the administration of the BIS (Post-test). The researcher approached two regular Biology teachers. One of the Biology teachers is knowledgeable in operating computer specifically for one of the experimental group. The teacher who taught the experimental group A with animation received training in the implementation logistics of the method. The teacher assistant in the second experimental group B received no training, but was given scripted lessons that were in line with the direct instruction without the blend of animation. Each lesson was presented sequentially in the following manner. Thus, presenting the biology concepts with pictorial illustrations followed by students' activities and evaluation questions. Each student was to carry out the activities in the computer package under the guidance of the teacher. The lessons are prepared and stored in CD Rom. Though the teachers were trained on the implementation of the programs before the actual classroom implementation, the researcher ensured that the research assistants adhered to the plan of the implementation by regularly holding review sessions with the teachers to ascertain how they fared in the implementation of the intervention programs. The essence of these sessions was to uncover any problem that could confound the implementation fidelity. During session, the two teachers in the two intervention programs reported they encountered no problems with the implementation, and the students were engaged in the classes. The researcher had two random observations for each of the intervention programs. Through the random observations, a qualitative judgment was provided as the researcher met and discussed their observations, there was a consensus reached that they followed the lesson scripts given to them. The research assistants in the two groups were provided lesson scripts to follow throughout the period of the intervention based on each of the instructional approaches. The fidelity protocol did not involve collection of quantitative data.

Results

Research Question 1: What are the mean interest scores of students taught Biology using animated and non-animated computer assisted instructional strategies?

Table 1: Mean and standard deviation of pretest and posttest interest scores of students taught Biology using animated instructional strategy (ACAIS) and non-animated computer assisted instructional strategy (NACAIS)

Strategies	Pre-test			Post-test		
	N	Mean	SD	Mean	SD	Mean Gain
ACAIS	54	52.85	3.55	72.50	3.18	19.65
NACAIS	66	51.74	5.73	63.94	3.17	12.20

The results in Table 1 reveals that the students who were taught Biology using animated computer assisted instructional strategy (ACAIS) had a pretest mean interest score of 52.85 and a standard deviation (SD) score of 3.55 and a posttest mean interest score of 72.50

with a SD of 3.18. Also, a mean gain of 19.65 was obtained for the students taught Biology using ACAIS. On the contrary, the students who were taught Biology using non-animated computer assisted instructional strategy (NACAIS) had a pretest mean interest score of 51.74 and a SD of 5.73 and a posttest mean interest score of 63.94 and a SD of 3.17. The mean gain of 12.20 was obtained for students taught Biology using NACAIS. Also, there is a low score variation in the posttest mean interest score of the NACAIS (3.17) compared to those taught using ACAIS (3.18). This implies that students who were taught Biology using animated computer assisted instructional strategy (ACAIS) had a better interest score than their counterpart taught using non-animated computer assisted instructional strategy (NACAIS). Hence, animated computer assisted instructional strategy (ACAIS) is more effective in enhancing students' interest in Biology than the non-animated computer assisted instructional strategy (ACAIS).

Research Question 2: What are the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted instructional strategies?

Table 2: Mean and standard deviation of pre-test and post-test mean interest scores of male and female students taught Biology using animated and non-animated computer assisted instructional strategies

Strategies	Pre-test			Post-test		
	N	Mean	SD	Mean	SD	Mean Gain
Male	44	51.39	5.43	67.82	4.85	16.43
Female	76	52.74	4.50	67.78	5.61	15.04

The results in Table 2 shows that male students who were taught Biology using animated and non-animated computer assisted instructional strategies had a pretest mean interest score of 51.39 and a SD score of 5.43 while the posttest mean interest score of 67.82 and a SD score 4.85 was obtained. On the other hand, the female students who were taught Biology using animated and non-animated computer assisted instructional strategies had a pretest mean interest score of 52.74 and a SD score of 4.50 while a posttest mean interest score of 67.78 and a SD score of 5.61was obtained. The use of animated and non-animated computer assisted instructional strategies reduced the variation of scores of male students (4.85) while it increases that of their female counterparts (5.61). When teaching Biology to male and female students using animated and non-animated computer assisted instructional strategies, the mean gains were 16.43 and 15.04 respectively. This suggests that male students taught Biology using animated and non-animated computer assisted instructional strategies lightly had a better interest than their female counterparts.

Hypothesis One: There is no significant difference in the mean interest scores of students taught Biology using animated and non-animated computer assisted instructional strategies.

Table 3: Analysis of covariance (ANCOVA) of the significant difference in the mean interest scores of students taught Biology by strategies and gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2183.900[a]	4	545.975	52.945	.000	.648
Intercept	4199.309	1	4199.309	407.221	.000	.780
PretestInterest	7.130	1	7.130	.691	.407	.006
Strategies	2007.530	1	2007.530	194.677	.000	.629
Gender	.121	1	.121	.012	.914	.000
Strategies * Gender	.799	1	.799	.077	.781	.001
Error	1185.892	115	10.312			
Total	554855.000	120				
Corrected Total	3369.792	119				

The results in Table 3 shows that for the effect of animated and non-animated computer assisted instructional strategies on students' mean interest scores in Biology, an F-ratio value of 194.677 was obtained with the probability value of .00 which is less that 0.05 level of significant (p <.05). Therefore, the null hypothesis was rejected. Hence, the inference drawn is that there is a significant difference in the mean interest scores of students taught Biology using animated computer assisted instructional strategy (ACAIS) and those exposed to non-animated computer assisted instructional strategy (NACAIS) in favour of those taught using ACAIS. In term of effect size, Table3 shows that Partial Eta Squared .629 (62.9%) in interest scores of students is attributed to the treatment which is large enough to be effective.

Hypothesis Two: There is no significant difference in the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted instructional strategies.

The results in Table 3 shows that for the effect of animated and non-animated computer assisted instructional strategies on male and female students' mean interest scores in Biology, an F-ratio value of .012 was obtained with the probability value of .914 which is greater than the 0.05 level of significance (p >.05). Therefore, the null hypothesis was not rejected. Hence, the inference drawn is that there is no significant difference in the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted instructional strategies. In terms of effect size, Table 3 also shows that Partial Eta Squared .000 (0.00%) in Biology students' interest scores is attributed to effect of gender.

Discussion of the Findings

The findings of the study showed that students who were taught Biology using animated computer assisted instructional strategy (ACAIS) had a better interest score than their counterpart taught using non-animated computer assisted instructional strategy (NACAIS).

The findings of the study equally showed that there is a significant difference in the mean interest scores of students taught Biology using

animated computer assisted instructional strategy (ACAIS) and those exposed to non-animated computer assisted instructional strategy (NACAIS) in favour of those taught using ACAIS. As students who were taught Biology using animated computer assisted instructional strategy (ACAIS) had a better interest score than their counterpart taught using non-animated computer assisted instructional strategy (NACAIS). Therefore, animated computer assisted instructional strategy (ACAIS) is more effective in enhancing students' interest in Biology than the non-animated computer assisted instructional strategy (ACAIS). Also, there is a large effect size which shows that 62.9% in interest scores of students is attributed to the treatment. This could be because ACAIS improves collaboration, communication skills, transfer of knowledge to real-world situations and motivation which can trigger students' interest. This significant difference may be due to the ability of the animated software to trigger, enhance and sustain students' motivation and interest throughout the teaching and learning process (Hassan, Kareem & Mohammed, 2016). Hence, animated computer assisted instruction gave the learners opportunity to use more sense organs in the learning process. Therefore, the active participation of students with their sensory organs in the learning process may have been responsible for the overall higher interest mean score which the students had with the animated computer assisted instruction. This finding is also in agreement with the findings of Rosali (2020) who reported that computer assisted instruction significantly enhanced physics students' interest in physics. This finding could be because students taught using animated CAI in the classroom found the teaching more interesting because it was colorful and fun.

The findings of the study equally revealed Male students taught Biology using animated and non-animated computer assisted instructional strategies slightly had a better interest than their female counterparts. However, further analysis showed that there is no significant difference in the mean interest scores of male and female students taught Biology using animated and non-animated computer assisted instructional strategies. This could be because the treatments used in this study promote students interest irrespective of their gender. This finding is in line with Ibenegbu, Nzewi and Aniaku (2020) who revealed that gender had no significant influence on the interest of male and female students in Biology. On the other hand, Bawaneh (2019) reported that there was a significant influence of gender and students' interest in Biology in favour of the female students.

Conclusion

Based on the findings of this study, the researcher concluded that animated computer assisted instructional strategy (ACAIS) is an effective instructional strategy that can be used to improve the interest of students in Biology compared to the non-animated computer assisted instructional strategy (NACAIS). Also, gender has no influence on students' interest in Biology. This implies that animated computer assisted instructional strategy (ACAIS) is a gender friendly instructional strategy that can be used to effectively teach Biology to both male and female students.

Recommendations

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

1. Teachers should be trained on how to use animated computer assisted instructional strategy (ACAIS) to improve students' interest and achievement through seminars, workshops and conferences.
2. School administrators and stakeholders should make provision for computers and other instructional materials that will enable teacher adopt and students to learn using ACAIS.
3. Animated computer assisted instructional strategy should be integrated into the teacher education syllabus by the curriculum developers during the pre-service training of Biology teachers.
4. Students should be given equal opportunity just as seen in the ACAIS classrooms regardless of their gender in order to develop and sustain their interest and achievement in Biology.

REFERENCES

Akpoghol, T.V, Ezeudu, F.O, Adzape, J.N &Otor, E. E. (2016). Relative effect of lecture method supplemented with music and computer animation on senior secondary school students' retention in electrochemistry, Journal *Education & practice, 7(4)*,87-95.

Arokoyu, A.A. (2020). Elements of contemporary integrated science curriculum. Impacts on science Education. Journal of Education *Research 11(1)*

Bawaneh, A. K. (2019). The effectiveness of using mind mapping on tenth grade students' immediate achievement and retention of electric energy concepts. *Journal of Turkish Science Education, 16(1),* 123-137. *Doi: 10.12973/tused.10270a*

Federal Republic of Nigeria (2020). National policy on education. Abuja: NERDC

Gana, C. S. (2022). Computer-assisted instruction: A tool for concretizing abstract concepts in secondary school subjects. Journal of Educational Technology, 5(2), 123-134.

Hamzat, A. Y., Bello, T. M., & Abimbola, O. R. (2023). The role of animation as instructional material in secondary education. Journal of Instructional Design, 12(2), 145-160.

Hassan, A.M, Kareem, W.B, Mohammad. B. M (2016). Effect of ICT on achievement and interest of junior secondary school students in basic science and technology. *A paper presented at the 29th Annual National conference of science teachers association of Nigeria (STAN)* held at Government college, Ado Ekiti, 15-20 August, 2016.363-368.

Ibenegbu, Q. O., Nzewi, U. M. & Aniaku, O. I. (2020) Stimulating studnets' interest in Biology using blended teaching approach. *Journal of the Nigerian Academy of Education, 14(2),* 228-238.

Luo, Z., Dang, Y., & Xu, W. (2019). Development and validation of the Academic Interest Scale for Adolescents. *Journal of Adolescent Research, 34(2), 147-173. https: //doi.org/10.3389/fpsyg. 2019. 02301*

Ojo, M. K. (2022). The importance of computer-assisted instruction in enhancing secondary school education. International Journal of Educational Technology, 7(4), 300-315.

Okorie, J. A. (2022). The role of computer-assisted instruction in sustaining students' interest in learning. Journal of Educational Development, 10(3), 215-227.

Osokoya M.M(2013). Teaching methodology in basic science and technology classes in South West Nigeria, *Asian journal of Education, (4),* 206-214.

Owolabi, O. T, & Oginni, O. I (2014). Effective of animation and multimedia teaching on students' performance in science subjects, *British journal of education, society & behavioral science 3(2).*

Owolobi, T & Ogini, O.S (2014). Effectiveness of animation and multimedia teaching on students' performance in science subjects. *British journal of Education, society and behavioral science, 4(2),* 201-210

Rosali, L. (2020) Effect of Computer-Assisted Instruction (CAI) on the Academic Achievement in Secondary Physics. Open Access Library Journal, 7, 1-11. doi: 10.4236/oalib.1106319.