Effect of Interactive Video Variations on Secondary School Biology Students' Academic Achievement in Ecology in Abeokuta, Ogun State, Nigeria

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DOI: 10.56201/rjmcit.vol.11.no5.2025.pg47.60

Abstract
The study investigated the effect of Interactive Video Variations Strategy on Secondary School Biology Students' Academic Achievement in Ecology. Gender and Situational Interest served as moderating variables for the study. Quasi-experimental research design was used. 5870 SS2 Biology Students formed the population while 117 were selected through multistage sampling procedure as the sample. A purposive sampling technique was used to select two (2) public schools that took part in the study where intact classes were randomly selected. Instruments for data collection were: Ecology Achievement Test (EAT)(r=0.72), Ecology Situational Interest Inventory (ESII)(r=0.85). Data were analyzed using frequency, percentage, mean and Analysis of Covariance (ANCOVA) at 0.05 level of significance. The results revealed that there was a significant main effect of Interactive Video Variation on student academic achievement in Ecology ($F_{(1,108)} = 36.504, p < 0.05$). There was no significant main effect of gender on students' academic achievement in Ecology, $F_{(1,108)} = 0.606, p > 0.05$. There was no significant main effect of situational interest on students' achievement in the Ecology in Biology $F_{(1,108)} = 1.706, p > 0.05$. There was no interaction effect of treatment and gender on students' academic achievement in Ecology $F_{(1, 108)} = 0.122, p > 0.05$. There was no significant interaction effect of treatment and level of situational interest on students' achievement in Ecology aspect of Biology $F_{(1,108)} = 0.538, p > 0.05$. There was no interaction effect of Gender and situational interest on students' academic achievement in Ecology ($F_{(1,108)} = 0.093, p > 0.05$). There was no significant interaction effects of treatment, gender and situational interest on students' achievement in Ecology ($F_{(2, 189)} = 1.383, p > 0.05$).
The study concluded that Interactive Video Variations is more effective for teaching Ecology. It was recommended among others that teachers should use Interactive Video Variation regularly so as to enhance students' understanding and retention of ecological concepts.

Keywords: *Interactive Video Variation, Ecology, Gender, Situational Interest*
Word Count: 308

Introduction

Biology is crucial for national development, and it is important for obtaining good academic achievement. Biology curriculum in secondary schools has been organized in such a way that different aspects of it will be studied by learners at different levels and classes, that is, from senior secondary school one to three (SS1-3). Ecology is one important branch and aspect of Biology that

student's start learning about its concepts right from senior secondary school one and two, for its importance in the subject of Biology and the numerous benefits it offers to life.

Ecology holds significant importance in the Senior Secondary School Examination, such as the West African Examination Council (WAEC) curriculum, from which a considerable number of questions arise each year. This branch of Biology focuses on studying living organisms and their interactions with each other and the environment. It aims to educate learners about these organisms and their environmental relationships (Adeosun, 2025). Cary institute of ecosystem stated that Ecology encompasses the scientific study of processes that influence the distribution and abundance of organisms, their interactions, and the flow of energy and matter, emphasizing the connections among living things and their surroundings. Studying Ecology according to the British Ecology Society (2023) provides a foundation for conserving natural resources, predicting the ecological impacts of pollution and climate change, understanding sustainable use of nature's resources without exhausting them, and protecting endangered species. However, students often struggle to grasp the concepts within this area of Biology. Based on the researcher's observations as an educator, Ecology presents complex and abstract ideas that cannot be effectively taught solely in the classroom. Real-world explorations are necessary to solidify understanding and facilitate hands-on activities. The current curriculum in Nigeria supports a student-centered approach to education, promoting teaching that progresses from the known to the unknown, simple to complex, concrete to abstract, and general to specific, encouraging students to actively engage and participate in the learning process for better academic outcomes (Adepoju 2024).

Academic achievement is the attainment of an individual in a subject. It indicates the strength and weakness of a learner in a particular subject. It is the most appropriate measure for predicting how successful an individual or organization is (Adeosun 2024) Umar (2018). It measures the success or otherwise of an accomplishment of a student. It is the remarkable change in the student performance obtained due to their exposure to certain program of instruction (Saratu etal 2020) It is the estimate of comprehension, skills acquired and transformation obtained by learners in their subjects in relation to the objectives of such subject (Akuche etal 2020).

Despite the importance of Biology to national development stated the chief examiners report of West Africa Examination Council (WAEC) reported that students are not doing well in Ecology an important aspect of Biology. It was stated that student find it challenging or difficult to answer questions that has to do with Ecology. This shows in the choice of question that student answers or are unable to answer during their external examination as Ecology was listed as one of the aspect in Biology that student have not being doing well in during the noble examination (WAEC Examiners report). This assertion can be supported with the report of chief examiners report of WAEC 2018-2022(www.waeconline,org.ng). Student seem to be failing as most learners find Ecology boring hence lack curiosity and interest to learn it and this has affected their performances in the concept. Previous researches reported that student academic achievement in Biology over the years is not encouraging and also studies conducted on students' academic performance in science showed low performance over the years (Akinbadewa 2020), (Saratu 2020). It then behoves teachers of this subject in secondary schools and other stakeholders, researchers especially, to seek ways of keeping the percentages of failure in Biology under constant check.

This inability of students to perform well in questions relating to Ecology as well as low academic achievement of students in the subject as stated by previous studies may be attributed to many factors such as teachers' instructional strategies, the broad curriculum, laboratory facilities, school-related factors, teachers related factors and students' attitudes among many others. From the

researcher's experience as a teacher who has been teaching the subject for years, students find the concepts of Ecology difficult to comprehend and pass, especially during the terminal Secondary School Certificate Examination (SSCE). Furthermore, from a study recently carried out during the researchers' master's program, Biology teachers in the study location mainly use chalk-talk (Lecture) and demonstration methods. The chalk talk method used by teachers may not effectively impact the deep knowledge of biological concepts, especially Ecology, in learners (Adeosun 2024). Njoko (2021) & Desai (2022) stated that the use of proper teaching strategy makes a good teaching-learning of subjects in schools and lecture method may not effectively enhance students' deep understanding of concepts of Ecology. The need for constant upgrading becomes imperative more so, that the achievement of students in the subject is always a source of concern to all stakeholders in education. Hence there is need for teachers to adopt innovative and suitable teaching strategies to bring out desirable outcome in students since teaching strategy is crucial for the achievement of success in science. It is against this background that this present study investigates into the effect of Interactive Video Variations Strategy on secondary school Biology students' academic achievement in Ecology in Abeokuta.

Teaching strategies are instructional methods used by teachers to present teaching material to students in such a way that learners' get the best from the lesson, enhance the knowledge of the concept taught, practice various skills, and actively participate in the teaching learning process. Teaching strategies are of various types such as demonstration, inquiry-based learning, blended learning, flipped classroom, cooperative learning, analogy, video instructional packages and the use of multimedia instructional strategies, among many others. The present study, in an attempt to proffer a solution to the foregoing problem, seeks to look into the use of multimedia strategies in teaching, particularly the use of the Interactive Video Variation Strategy.

At this juncture, incorporating multimedia visual aids into teaching is essential. According to Enefu (2021) the application of visual aids in the teaching of science subjects, particularly Biology, makes learning more engaging through various technological tools, including digital videos, computer simulations, projectors, display screens, cameras, smart boards, smart phones, animations, cartoons, virtual learning platforms, and the World Wide Web, among others. The Interactive Video Variation (IVV) teaching strategy is a system of passing information with various forms of communication such as text, video, audio, still photographs, sound, animation, images and interactive content with the aid of laptop, computer, projector and so on (Al-Snaid). It focuses on using interactive video content to engage students and deepen their understanding of the subject matter. Video-based instruction offers students a unique learning experience. This method provides consistent teaching while visually and realistically conveying specific concepts. IVV encourages active student participation which involves utilizing various educational video resources, such as teacher-created videos, YouTube videos, or pre-recorded clips available on different educational platforms, to convey knowledge about specific concepts Al-Snaid (2020), Saratu (2020) & Enefu (2021). As pointed out by the same source IVV approach is crucial for Biology students in secondary schools to keep pace with their peers in other developing countries. The interactive aspect of these videos enables students to create, investigate relationships, hypothesize about properties, and test those hypotheses in Ecology. Therefore, Biology students should be exposed to a diverse range of educational interactive videos on Ecology concepts to leverage technology effectively in addressing the complexities of the subject through the Interactive Video Variation (IVV) teaching strategy.

From the foregoing, it is envisaged that this approach (IVV) will produce a better result than what is being obtained from the more prevailing conventional teaching approach. This is because, unlike

the Interactive Video Variation strategy adopted in this study, the conventional method of teaching recognizes the teacher as the alpha and omega of the class. In this environment, the teacher does more of the talking while students only participate in the form of response(s) to the teacher's question(s). On the other hand, the students play a more passive role. This may not give room for students to personally develop their understanding and thinking, which the constructivist approach epitomizes. Gender and situational interest are moderating variables considered in this study.

Statement of the Problem

The poor academic performance of students in Ecology has been a threat to students' achievement in Biology and a great concern to the education sector, as pointed out by the chief examiners' report of the West African Examination Council (WAEC). The importance attached to Ecology makes it a vital aspect of Biology, where questions always come from during the West African School Certificate Examination (WASSCE) conducted by this noble examination body annually. But it was reported that students are not performing well in this aspect of Biology, as reported by the WAEC chief examiners' report. Previous studies also reported that students find it uneasy to answer questions that have to do Ecology aspect of Biology Haris & Usman (2015) Oka, (2020), Zumyil (2019), Umunnakwe (2021), Saratu, (2020). From researchers' observation as a teacher who has been teaching this aspect of Biology for years, students do not find the concept of Ecology easy to understand and pass during internal and external examinations. Many factors have been attributed to this. Previous researches known to the researchers have worked on the use of video instructional packages, cartoon strategy, virtual laboratory, virtual field trips, simulations to the study of Ecology at the senior secondary school levels within and outside Nigeria but much work has not been carried out on the use of Interactive Video Variations as interventions on the teaching and learning of Ecology in the present study location. This study therefore applied proactive measures as interventions to drive home better outcomes from the teaching and learning of Ecology at the senior secondary school level. Hence, this study on the effect of Interactive Video Variations strategy on senior secondary school students' academic achievement in Ecology, Abeokuta metropolis, Ogun State.

Aim and Objectives of the Study

This study examines the effects of Interactive Video Variation strategy on Biology students' academic achievement in Ecology, Abeokuta, Ogun State, Nigeria. The specific objectives are to:

i. investigate the main effect of Interactive Video Variation strategy on Biology students' academic achievement in Ecology;
ii. examine the main effect of students' gender on student academic achievement in Ecology;
iii. examine the main effect of students' situational interest on student academic achievement in Ecology;
iv. investigate the interaction effect of the treatment (IVV) and gender on student academic achievement in Ecology;
v. examine the interaction effect of the treatment (IVV) and situational interest on student academic achievement in Ecology;
vi. examine the interaction effect of the student's gender and situational interest on student academic achievement in Ecology;
vii. investigate the interaction effect of the treatment (Interactive Video Variation), gender, and situational interest on student academic achievement in Ecology.

Hypotheses

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

Ho1. There will be no significant main effect of treatment (Interactive Video Variation strategy) on students' academic achievement in Ecology.

Ho2. There will be no significant main effect of gender on students' academic achievement in Ecology.

Ho3. There will be no significant main effect of situational interest on students' academic achievement in Ecology

Ho4. There will be no significant interaction effect of treatment (Interactive Video Variation) and gender on students' academic achievement in Ecology

Ho5. There will be no significant interaction effect of treatment (Interactive Video Variation) and situational interest on students' academic achievement in Ecology'

Ho6. There will be no significant interaction effect of gender and situational interest on students' academic achievement in Ecology.

Ho7. There will be no three-way interaction effect of treatment, gender, and situational interest on student academic achievement in Ecology.

Methodology

This study adopted a pre-test, post-test quasi-experimental research design. The population for this study comprised all Senior Secondary School Two Biology students (SSII) of 2023/2024 academic session in the senior secondary schools own by Ogun state government in Ogun State which is about 5870 students. (Source: Ogun State Teaching Service Commission).

A multistage sampling procedure was used for the selection of the sample. Two local governments were selected with a simple random sampling technique out of the three Local Government Areas in Abeokuta Metropolis. Purposive sampling technique was used to select two (2) public schools, one from each local government that took part in the study. The selected schools have functioning computer laboratories and personal computers. They are mixed schools. They have being presenting candidates for the Senior Secondary Certificate Examination (SSCE) yearly for the past five years (Both NECO and WAEC). They have qualified and well-experienced Biology teachers with a minimum of B. Sc (Ed) in Biology or its equivalent. The selected schools were randomly assigned to treatment using simple random sampling techniques. That is, one school was assigned to each of the groups (IVV and Control groups). Lastly, in each of the selected schools, simple random sampling technique was adopted to select the arm of the SSII Biology class where an intact class was engaged in the study.

Table 1.1 Sample Distributions into Strategies

School	Male	Female	Total	Strategy Used
School 1	15	21	36	Interactive Video Variation
School II	42	39	81	Conventional Method
Total	57	60	117	

Source: Field Work 2025

Two instruments were used for data collection: Ecology Achievement Test (EAT) that contained 30 multiple choice questions with option A-D adapted from past West African Examination Council (WAEC) questions on habitats, plant adaptation, and succession Ecology. Ecology Situational Interest Inventory (ESII) adapted from Linnenbrink-Garcia, Durik, Conley, Barron, Tauer, Karabenick, and Harackiewicz (2010) contained 20 items rated on four Likert scales: 4 - Very True of Me; 3- True of Me; 2- True of Me, and 1- Very Untrue of Me. Instructional Guide was developed to serve as teacher guide. Instructional guide for Interactive Video Variation Strategy (IGIVVS) contained lesson notes and some educative interactive videos suitable for the different topics that were considered by this study which were adopted from YouTube to avoid time wastage served as a guide for research assistants in experimental group (IGIVVS group). Instructional Guide for Conventional Strategy (IGCS) contained lesson note that serve as guide for teacher in control group were also used. Face and content validity of the items were carried out by experts in the field of test and measurement. The reliability index of the instrument was obtained through a pilot test on 50 Biology students who were not part of the main study. Reliability of EAT was established using the Kuder Richardson 20 Formula ($KR_{20} = 0.75$) while Cronbach Alpha was used for reliability of ESII (Alpha= 0.85).

The researcher went to the selected schools with letter of introduction to obtained permission from the principals of the school concerned before the commencement of treatment. Two research assistants were trained and took part in the study. The treatment lasted for 8 weeks. The first week was used for training of research assistants. Week two was used for pre test, weeks three to seven (3-7weeks) was used for teaching, where two teaching strategies were used for the experimental stage: Interactive Video Variations and the Conventional Method. Post–test was administered on the 8th week of the study. The data generated were subjected to One Way Repeated Measure ANOVA and Analysis of Covariance (ANCOVA).

Results and Discussion of Findings

Seven null hypotheses were generated and tested on the dependent variable. Analysis of Covariance (ANCOVA) was adopted in this study for data analysis.

Hypothesis One: There will be no significant main effect of treatment (interactive video variation strategy) on students' academic achievement in Ecology.

Table 1: Summary of Analysis of Covariance (ANCOVA) of students' academic achievement in Ecology by Treatment (IVV and Conventional), Gender, and Situational Interest

Dependent Variable: Post-Test

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1368.360[a]	8	171.045	6.371	0.000	0.321
Intercept	1690.474	1	1690.474	62.965	0.000	0.368
Pre-test	189.581	1	189.581	7.061	0.009	0.061
Treatment	980.058	1	980.058	36.504	0.000	0.253
Gender	16.275	1	16.275	0.606	0.438	0.006
Situational Interest	45.794	1	45.794	1.706	0.194	0.016
Treatment * Gender	3.272	1	3.272	0.122	0.728	0.001
Treatment * Situational Interest	14.449	1	14.449	0.538	0.465	0.005
Gender * Situational Interest	2.508	1	2.508	0.093	0.760	0.001

Treat * Gender * SI	10.968	1	10.968	0.409	0.524	0.004
Error	2899.555	108	26.848			
Total	40538.000	117				
Corrected Total	4267.915	116				

a. R Squared = .321 (Adjusted R Squared = 0.270)

Table 1 shows the summary of the analysis of covariance (ANCOVA) of students' academic achievement in Ecology by treatment (Interactive Video Variation (IVV) Strategy and Conventional Method), Gender, and Situational Interest. The table reveals that after adjusting for the covariance (pre-test in EAT), the effect of treatment on students' achievement in the Ecology aspect of Biology was statistically significant, $F_{(1,108)} = 36.504$, $p < 0.05$. Consequently, the null hypothesis, which stated that there was no significant main effect of the Interactive Video Variation (IVV) Strategy on students' academic achievement in Ecology, was therefore rejected. The table further shows that the partial Eta square, (η^2) was 0.253, considered a medium effect size. This implies that the treatment accounted for 25.3% of the variance experienced in students' achievement in Ecology (Interactive Video Variation (IVV) Strategy). The results of estimated marginal means and pairwise comparison of students' achievement in the Ecology aspect of biology are presented in Tables 2 and 3

Table 2: Estimated Marginal Means of Students' Achievement in Ecology by Treatment (Interactive Video Variation (IVV) Strategy and Conventional)

Dependent Variable: Post-Test

Treatment Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
IVV Group	22.737[a]	1.038	20.679	24.795
Control Group	15.521[a]	0.583	14.366	16.677

a. Covariates appearing in the model are evaluated at the following values: Pre-Test = 11.50.

Table 3: Pairwise Comparison of Students' Achievement in Ecology by Treatment (Interactive Video Variation (IVV) Strategy and Conventional), Gender and Situational Interest)

Dependent Variable: Post-Test

(I) Treatment Group	(J) Treatment Group	Mean Difference (I-J)	Std. Error	Sig. [b]	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
IVV Group	Control Group	7.215*	1.194	0.000	4.848	9.582
Control Group	IVV Group	-7.215*	1.194	0.000	-9.582	-4.848

Based on estimated marginal means

*. The mean difference is significant at the 0.05 level.

b. Adjustment for multiple comparisons: Sidak.

Table 2 further reveals that the Experimental Group (Interactive Video Variation (IVV) Strategy) has the highest mean score $\bar{x} = 22.737$ while participants in the Control Group (Control) with a mean score $\bar{x} = 15.521$. Table 3 further confirmed that the difference between the experimental group and the Control Group was statistically significant.

Hypothesis Two: There will be no significant main effect of gender on students' academic achievement in Ecology.
Table 1 shows that there is no significant main effect of Gender on students' Achievement in Ecology, $F_{(1,108)} = 0.606$, $p > 0.05$. Therefore, the stated null hypothesis that there is no significant main effect of Gender on students' Achievement in the Ecology aspect of Biology was accepted. The estimated marginal means show that female participants with high academic achievement in the Ecology aspect of biology ($\bar{X}= 21.24$) than male participants with low achievement mean scores in the ecology ($\bar{X}= 19.57$). However, the mean difference of 1.128 between Male students and their female counterparts was not statistically significant.

Hypothesis Three: There will be no significant main effect of situational interest on students' academic achievement in Ecology
Table 1 shows that there was no significant main effect of situation interest on students' academic achievement in the Ecology aspect of Biology, $F_{(1,108)} =1.706$, $p > 0.05$. As a result of this, the null hypothesis was accepted.

Hypothesis Four: There will be no significant interaction effect of treatment (Interactive Video Variation) and gender on students' academic achievement in Ecology.
The result in Table 1 shows that the interaction effect of treatment and gender on students' post–test academic achievement in Ecology was not statistically significant at $F_{(1, 108)} =0.122$, $p > 0.05$. The null hypothesis, which states that there will be no interaction effect of treatment and gender on academic achievement in Ecology, was therefore accepted. The partial Eta square, (η^2) = 0.001, confirms that there was no effect size.

Hypothesis Five: There will be no significant interaction effect of treatment (Interactive Video Variation) and situational interest on students' academic achievement in Ecology.
As shown in Table 1, there was no significant interaction effect of treatment and level of situational interest on students' achievement in Ecology in Biology in secondary schools in Abeokuta metropolis, $F_{(1,108)} = 0.538$, $p > 0.05$. The null hypothesis was therefore accepted.

Hypothesis Six: There will be no significant interaction effect of gender and situational interest on students' academic achievement in Ecology.
Table 1 revealed that there was no interaction effect of Gender and situational interest on students' academic achievement in Ecology ($F_{(1,108)} = 0.093$, $p > 0.05$). The null hypothesis was therefore accepted.

Hypothesis Seven: There will be no three-way interaction effect of treatment, gender, and situational interest on student academic achievement in Ecology.
Table 1 showed that the interaction effect of treatment, gender, and situational interest on student academic achievement in Ecology was not significant, $F_{(1, 108)} = 0.409$, $p > 0.05$. The null hypothesis was therefore accepted. The partial Eta square, ($\eta^2 = 0.004$) is an indication of a low effect size.

Discussion
The findings reveal that after adjusting for the covariance (pre-test in EAT), the effect of Interactive Video Variation on students' achievement in the Ecology aspect of Biology was statistically

significant, $F_{(1,108)} = 36.504$, $p < 0.05$. Consequently, the null hypothesis, which stated that there was no significant main effect of the Interactive Video Variation (IVV) Strategy on students' academic achievement in Ecology, was therefore rejected. The 25.3% variance experienced in students' achievement in Ecology was accounted for by the treatment (Interactive Video Variation (IVV) Strategy). Also, the findings further reveal that the Experimental Group Interactive Video Variation (IVV) Strategy has the highest mean score $\bar{x} = 22.737$, while participants in the Control Group (Control) with a mean score $\bar{x} = 15.521$. The results confirmed that the difference between the experimental group and the Control Group was statistically significant.

This finding corroborates the result of Nwakolo etal (2022) which revealed that there was a significant difference in the achievement of students taught Biology using Video Instructional Package and those taught with the lecture method. It was also in agreement with the findings of Saratu (2020) which revealed that video-based instructional packages improved students' achievement in Biology. The findings from this study supported that of Akinbadewa (2020) which recorded that multimedia instructional packages used in teaching and learning Biology in secondary schools enhanced students' engagement and positive attitudes toward learning.

This finding also aligned with that of Akuoma et al (2021) whose result revealed that the experimental group obtained a higher mean performance score, and no significant difference existed between location and academic performance. Learning through Videos has been demonstrated to be more effective than traditional methods of teaching and learning (Fan, Bower & Siemon 2024).

On the main effect of Gender on students' achievement in Ecology aspect of Biology, it was discovered that the effect was not statistically significant. This means that the student's scores in the post-test in EAT, after adjusting for a covariate (pre-test score), were independent of their gender. This may be associated with the fact that both male and female were exposed to the same instructional strategies. Hence, they tend to benefit the same way.

In addition, the findings aligned with previous research conducted in Biology, where the tenth-grade Biology students who were taught with a simulated experiment revealed that there was no gender difference in their academic achievement (Jack & Sam 2020). This present study also agrees with the study of Ogar & Effiong (2022) which recorded that gender has no significant effect on academic achievement and retention in Basic science. However, this study contradicts those who found gender differences in the academic achievement of undergraduate students they studied, where their male participants performed significantly better than the female participants in all learning tasks, regardless of the type of multimedia used (Park, Kim, Cho & Han 2019).

The findings revealed that the main effect of level of situational interest, on students' achievements in Ecology aspect of Biology, was not statistically significant ($F_{(1,108)} = 0.606$, $p > 0.05$). The results showed that the interaction effect of treatment and gender on students' achievement in the Ecology aspect of Biology was not statistically significant. This implies that the effect of the teaching strategy was consistent across genders. This finding agrees with other researchers who reported that no gender differences in learning strategy and students' achievement in secondary school Biology (Ani, Ododo, Ikwueze & Tafi 2022). The findings of this study lend credence to other studies in biology, basic science, and chemistry that compared conventional methods with video instructional package, scaffolding strategy, instructional simulation, self-regulated learning strategy, and multiple intelligence-based instructional strategy respectively that reported a non-significant interaction effect of instructional strategies and gender on students‟ achievement

(Hope etal 2024, Adepoju 2024, Jack etal 2020 Renninger etal 2018 & Shelby etal 2021).

However, it contradicts previous studies that reported that gender had a significant difference in academic achievement in Biology (Tugtekin etal 2022 & Akuoma etal 2021).
There was no significant interaction effect of treatment and level of situational interest on students' achievement in the Ecology aspect of Biology. That is, the academic achievement in Ecology was not jointly affected by the instructional approach (IVV) employed and their level of situational interest. In many research studies, interest has been found to have no significant effect on achievement in Biology in school. This was also supported by a previous study that affirmed that ICT-based instruction promotes student-centered learning. It was further explained that it focuses on students' needs, abilities, interests, and learning styles with the teacher as a facilitator of learning. According to the relevant research on interest, it generally presents conflicting conclusions on the relationship between environmental stimuli, individual interest, situational interest, and learning performance (Adepoju 2024). However, a recent study showed that individual interest did not directly affect learning performance (Lippa 2022).
The findings revealed that there was no significant interaction effect of gender and level of situational interest on students' achievement in the Ecology aspect of Biology. This simply infers that the interaction of the student's gender and level of situational interest is inconsequential in enhancing their academic achievement in Ecology. It is expected that gender and level of situational interest should jointly propel the students' achievement in Ecology since both gender and interest are considered as positive reinforcement and motivation, which quickens students' curiosity and urge for further learning (Amadi 2019). However, in support of the findings of the current study, a previous study observed that gender had no significant influence on students' interest in English grammar. In another development, another study found gender differences in pedagogic and didactic interest in favour of female student teachers (Hoghein & Federic 2022, Heo). The results showed that the three-way interaction effect of treatment, gender, and situational interest on students' achievement in the Ecology aspect of Biology was not significant. This corroborates findings from previous studies on the interactive effect of treatments, gender, and situational interest on students' achievement in a science-related subject (Haris & Osaman 2015 Heo & Toomey 2020 & Mills etal 2019).

Conclusion

The findings of this study clearly indicated that Interactive Video Variation Strategy enhance Students' Ecology Achievement better than Conventional Method. There was no gender difference between the achievement of male and female students. There was no significant main effect of level of situational interest on student academic achievement Student gender and level of situational interest does not jointly affect Ecology achievement, not interaction effect of treatment, gender and level of situational interest.

Recommendation

Recommendation was made based on the findings of this study that:
1. Biology teachers should maximize the advantages of technology such as the use of interactive videos to ease their lesson deliveries and promote learning.
2. Teachers should adopt appropriate instructional strategy that is capable of neutralizing gender effect as it was clearly indicated in the study that gender difference was not a barrier in this study.

3. Instructional strategy that can increase students' interest to learn and enhance their engagement and motivation in learning Ecology and other aspect of Biology should be used by teachers since situational interest has an influence on students' achievement.
4. Curriculum planners, policy makers should lay more emphasis on the need to embrace a constructivism approach to teaching and learning Biology.
5. Government, policy maker, Parent teacher association and old student forum should donate educational technology infrastructure to schools to support innovative teaching methods among teachers.
6. The ministry of education and teaching service commission should provide adequate training through workshops and seminar to serving teacher to keep them updated about the use of technology and innovative teaching approaches in discharging their duties.

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