

Innovations

Comparative Effects of Cartoon Concept and Lecture Method on Students' Attitude towards Ecology in Senior Secondary Schools in Delta State

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Abstract: *The study aimed to compare the effect of cartoon concepts and lecture methods on students' attitudes on ecology in senior secondary schools in Delta state. The study additionally examined how sex influences students' attitudes regarding ecology. Two research questions and two hypotheses were developed and examined for the study. The research used a 2 x 2 pretest, posttest, planned variation quasi-experimental factorial design. The population consisted of 18,874 senior secondary two (SS 11) pupils attending four hundred and seventy-four (474) public senior secondary schools in Delta state. The sample size consists of two hundred and thirty five (235) SSII Biology students from four (4) public coeducational secondary schools in Delta State. Data on student's attitude towards ecology was acquired using Biology attitude scale (BAS). The BAS and lesson plan generated for the study were face validated by professionals in the subject. Using the Cronbach Alpha reliability method, the BAS's reliability was determined to be 0.9. The research questions were answered using means and standard deviations, and the hypothesis was tested at the 0.05 level of significance using the t-test inferential statistics. The study's findings demonstrated that biology students' attitudes to ecological topics were significantly impacted by the use of cartoons in the classroom. Furthermore, there is no sex-dependent difference in the attitudes toward ecology between the lecture approach and the instructional strategy that incorporates cartoons.*

Introduction

Biology, the science of life, is taught in all senior secondary schools in Nigeria. According to Nwosu (2003), biology draws students who are interested in both science and the arts. It is a prerequisite for studies in various professions such as medicine, nursing, pharmacology, biochemistry, and agriculture. Ecology is an important concept in biology because, unlike other concepts, it includes issues such as food scarcity, pollution, population, radiation, disease, health, hygiene, family life, natural resource management and conservation, biotechnology, and ethics, all of which have an impact on people's daily lives.

In an effort to meet the goals of science education in Nigeria and to move the national economy forward into a more technological world, educators are challenged to teach in a way that encourages a positive attitude toward the subject and ensures student retention of material, so that students can no longer rely on teacher or terminal exams to demonstrate mastery of the year's content but must master the content themselves. According to Ajaja and Kpangban (2007), successful scientific teaching and learning require a concentration on hands-on and mind-on activities.

This is consistent with the goals of science education in Nigeria and the development of the national economy. However, in order for hands-on activities to be carried out, teachers must become more productive, motivational, facilitative, innovative, encouraging, pre-emptive, innovative, project-based, resourceful, impactful, skillful, problem-solving, encouraging, and technological in their profession (Davis, Hartshorne & Ring 2010, Musa, Ziatdinov & Griffiths, 2013). To completely realize this goal, Biology teachers and students should employ practical, activity-based, problem-solving, experimental, and learner-centered instructional methodologies. One of such learner-centered teaching approaches that can match the above-mentioned requirement is the usage of cartoon concepts as instructional strategies.

The majority of learners find cartoons lively and interesting because movement and colors help to sustain attention, and cartoons are often regarded visually beautiful. Animations are very effective in catering to various learning styles. Visual learners are shown transitional pictures, auditory learners may rely on accompanying narrations, and kinesthetic learners may benefit from a more sophisticated, interactive animation that may be adjusted to experience the various impacts. The material is delivered consistently, as all learners are given the same information in a similar style, and comprehension of words is not a barrier to learning.

As a teaching approach, purported benefits include greater comprehension, attention and interest, motivation to learn, improved attitudes, productivity, creativity, and divergent thinking (Parrott 1994). Other advantages include reduced academic stress and anxiety, boredom, and disruptive conduct (Povell and Andrsea, 1985). Furthermore, it is widely acknowledged that visual memory can be more readily to recall than verbal memory, and various kinds of visual communication resources, such as drawings, illustrations, and pictures, can help students form a neural information network and improve visual memory (Ozalp, 2006; Tyler-Wood et al., 2018).

Another form of instruction to explore for this topic is the Lecture technique, which is characterized as a teacher-centered approach. Teachers are the primary authority figures in the teacher-centered approach. Students' primary responsibility is to passively acquire content (via lectures and direct teaching), with the goal of testing and evaluation as the end result. The lecture technique is one of the most often utilized teacher-centered approaches. Danmole and

Adeoye (2004) accept that no one technique is optimal for teaching science, particularly Biology, of which Ecology is a section. They also agreed that strategies involving active student engagement, such as cooperative learning, guided exploration, scaffolding, analogy, and problem solving, may significantly boost learning.

However, Igboegwu (2012) views most Biology instructors' techniques as unsuitable and uninspired. According to Treagust (2002), instructors' content expertise affects both the content and instructional processes, impacting what and how they teach.

Attitudes determine how a person thinks, feels, and behaves to an item. If pupils have a positive attitude about an item or subject, it is simpler to guide them toward desirable goals. According to Bansal (2017), inadequate instructional practices that do not foster meaningful learning lead to students developing unfavorable feelings and behaviors toward learning materials, which has a detrimental impact on their performance.

There is substantial evidence that sex affects students' views toward science disciplines in general, and biology in particular. In this study, "sex" refers to both male and female school students. Because majority Delta State schools are coeducational, it is critical to examine if cartoon-based instructional strategies and lectures influence male and female students' attitudes about biological ideas in different ways. This is one of the research's justifications. Reviewing empirical studies on the influence of cartoon-incorporated educational strategies on students' attitudes yielded conflicting results. In light of this, the purpose of this study is to compare the impact of the cartoon idea and the lecture approach on students' attitudes on ecological in Delta State's senior high schools.

Statement of Problem

Biology, as a science discipline, plays an important role in modifying the environment and enhancing the quality of life. It is absolutely necessary for a country's technological advances. Biology, being a core scientific topic, may help students get into numerous professional fields such as nursing, medicine, pharmacy, agriculture, engineering, and geology. Hence, there is a need for good teaching and learning of biology in Nigerian secondary school.

According to Naylor and Keogh (1999), cartoons are preliminary drawings, meaning any major sketch or design on paper that depicts scenarios with or without sound replication and is generally hilarious. They are illustrations that express a variety of perspectives on ordinary events. The graphics have a fascinating appeal that encourages students to debate their thoughts on the hilarious images. They serve as testing and instructional tools. For this study, cartoons are entertaining drawings that communicate the tale of everyday events on paper or in film. According to Naylor and Keogh (1999), features of cartoons include the presenting of various viewpoints about an issue, the use of visual

pictures, the limited use of written language, and circumstances that youngsters are familiar with.

There is rising worry regarding whether teaching technique in our secondary schools will be able to reverse the downward trend in students' low academic success in Biology (WAEC Chief Examiner's Report, 2007-2019). The incapacity of teachers to educate in a meaningful way was recognized as one of the causes contributing to pupils' low performance in both internal and external examinations (Senior School Certificate Examinations). This necessitates the use of student-centered teaching approaches such as cartoon-based training, which allows students to create learning objectives, complete learning tasks, and attempt to monitor and manage their cognition.

Biology instructors could use different ways, such as a cartoon-incorporated teaching style, which stimulates students' active participation and engagement throughout the learning process while also instilling a positive attitude about the topic. Cartoons not only attract students' attention, but also hold it throughout the learning process, allowing pupils to overcome difficulties via critical thinking and have a positive attitude about education. Thus, the purpose of this study was to determine if the use of a cartoon-incorporated educational technique enhances male and female secondary school students' attitudes about ecology more than the lecture method.

Research Questions

To guide this study the following research questions were raised:

1. What is the effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students' attitude towards Ecological concepts?
2. What is the difference in mean attitude scores between male and female students taught with cartoon-incorporated instructional strategy and with the lecture method?

1.4 Hypotheses

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

H₀₁ There is no significant effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students' attitude towards Ecological concept

H₀₂ There is no significant difference in mean attitude scores between male and female students taught with cartoon-incorporated instructional strategy and with the lecture method.

Methodology

This study used a 2 x 2 pretest, posttest, planned variation quasi-experimental factorial design. The study is divided into two teaching approach groups (Cartoon-incorporated Instructional approach and Lecture Method), as

well as two gender levels. The two teaching styles were grouped into four experimental intact courses. A complete class was employed to avoid disrupting classroom instruction. The experimental group A was taught using the Cartoon-incorporated Instructional Strategy, while experimental group B was taught using the lecture technique.

The study's population consists of all public senior secondary school two (SS 2) biology students in Delta State, which includes 18,874 male and female biology students from 474 public senior secondary schools spread across the state's three senatorial districts. Out of Delta State's three senatorial districts, four (4) schools were chosen at random. Two hundred and thirty-five (235) SSII Biology students from four public coeducational secondary schools in Delta State make up the sample size. A straightforward random procedure was used to choose the samples. (After eliminating single-sex schools, and balloting with replacement). The primary goal is to guarantee that every Delta State coeducational school has an equal opportunity of being chosen for this research.

To ascertain their equivalency, the four groups underwent pre-testing. For six (6) weeks, the research assistants at the school exposed the experimental group A to the treatment, which is a cartoon-incorporated instructional strategy, while the experimental group B was exposed to the lecture method. Both groups were then post-tested to determine the impact of the treatment. The students learned about habitat, trophic levels, energy flow, and autotrophy/heterotrophy throughout the course of the treatment.

There are two sections to the Biology Attitude Scale (BAS): "A" and "B". Students' biographical information, including their sex (male or female) and school name, is contained in Section A. In contrast, part B consists of 20 questions. The researcher created the Biology Attitude Scale (BAS) to gauge students' attitudes about ecology. Twenty items make up the Biology Attitude Scale (BAS), which assesses students about their attitudes toward biology. Three experts—a biology education lecturer from the Department of Science Education, a measurement and evaluation specialist from the Department of Guidance and Counseling at Delta State University Abraka, and an experienced biology teacher from Army Day Secondary School in Effurun, face-validated the instrument. The Biology Attitude Scale (BAS) was given to 30 biology students at a secondary school in Edo State who were not enrolled in the study's sample, in order to determine the instrument's reliability.

The Biology Attitude Scale (BAS) was tested for reliability using Cronbach Alpha, and a reliability coefficient of 0.86 was found. This demonstrates the instrument's dependability. Descriptive and inferential statistics were used to examine the acquired data for the research. Descriptive statistics were used to

address research questions one and two. Using the t-test in inferential statistics, hypotheses 1 and 2 were examined at the 0.05 level of significance.

Findings:

235 students in all, including 111 students of both sexes for experimental group A and 124 students of both sexes for experimental group B, were employed in this study. The study questions and hypotheses were solved using the findings from the students' pretest and posttest. Mean and standard deviation were used to answer research questions 1 and 2, and the t-test for inferential statistics was used for analyzing the results. To find out if there were any notable differences between each group, the pre-test and post-test results were examined. As seen, the findings are displayed in tables and charts.

Research Questions 1

What is the effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students' attitude towards Ecological concepts?

Table 1

Effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students' attitude towards Ecological concepts

Groups	N	Test	Mean	Standard Deviation	Mean Difference
Cartoon	111	Pretest	48.83	3.82	1.85
		Posttest	50.68	4.38	
Lecture	124	Pretest	49.09	3.55	0.19
		Posttest	49.10	3.55	

The impact of the lecture technique and the cartoon-incorporated teaching strategy on biology students' attitudes about ecological principles is displayed in Table 1. Prior to the intervention, the mean attitude score of the students in the group that used cartoons as an educational approach was 48.83; however, following the intervention, the attitude score increased to 50.68. Students' attitudes toward ecological concepts were impacted by the cartoon-incorporated educational technique, as evidenced by the relatively minor mean difference of 1.85. The mean difference between the pretest and posttest attitude scores for students who were taught using the lecture approach is 0.19.

Research Questions 2

What is the difference in mean attitude scores between male and female students taught with cartoon-incorporated instructional strategy and lecture method?

Table 2

Mean attitude scores between male and female students taught with cartoon-incorporated instructional strategy and lecture method.

Method	Sex	N	\bar{x}	SD	Mean Difference
Cartoon	Male	51	50.49	4.34	0.09
	Female	60	50.83	4.435	
Lecture	Male	64	48.91	3.26	0.39
	Female	60	49.30	3.86	

The mean attitude scores of male and female students taught using different instructional strategies are displayed in Table 2. The mean attitude score for male students who were taught using the cartoon-incorporated teaching technique was 50.49, whereas the mean attitude score for female students was 50.83. When teaching ecological topics through the use of cartoons as an instructional approach, the mean attitude difference between male and female students is 0.09. Male and female students who were taught utilizing the lecture approach had mean attitude ratings of 48.91 and 49.30, respectively, with a mean difference of 0.39. The findings indicate that there were insignificant mean attitude differences between the different research groups.

Hypothesis 1

There is no significant effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students’ attitude towards Ecological concept

Table 3:

Paired Sample t-test on Effect of Cartoon-incorporated instructional strategy and Lecture method on Biology students’ attitude towards Ecological concepts

	N		Mean	Std. Deviation	T	Df	P	Effect size
Cartoon	111	pretest	48.82	3.82	-5.960	110	0.000	0.246
		posttest	50.68	4.38				
Lecture	124	pretest	49.09	3.55	-0.080	123	0.936	0.000
		posttest	49.10	3.55				

According to Table 3, students who were taught utilizing the cartoon-incorporated teaching technique had significantly higher mean pretest (48.82) and posttest (50.68) attitude scores [$t(110) = -5.960$; $p = 0.000$; $\eta^2 = 0.246$]. Therefore, for students who are taught utilizing the instructional technique that incorporates cartoons, the second null hypothesis is rejected. An

improvement in the students' attitude toward ecology after being taught using the cartoon-incorporated instructional strategy is implied by the effect size of 0.246, which shows that the difference between the pretest and posttest mean attitude scores of students taught using this instructional strategy is 24.6% ($0.246 * 100$). The mean pretest (49.09) and posttest (49.10) attitude ratings for the students who were taught by lecture technique did not change significantly [$t(123) = -0.080$; $\rho = 0.936$; $\eta^2 = 0.000$]. As a result, the second null hypothesis for students who received instruction through lectures is not rejected.

Hypothesis 2

There is no significant difference in mean attitude scores between male and female students taught with cartoon-incorporated instructional strategy and lecture method.

Table 4

Independent Sample t-test of the difference in the mean attitude scores on Ecological concepts between male and female students' taught with Cartoon-incorporated instructional strategy and the Lecture method.

Methods	Sex	N	\bar{x}	SD	T	df.	Sig. (2-tailed)	Decision
Cartoon	Male	51	50.49	4.34	-0.410	109	0.682	Not Rejected P > 0.05
	Female	60	50.83	4.44				
Lecture	Male	64	48.91	3.26	-0.616	122	0.539	Not Rejected P > 0.05
	Female	60	49.30	3.86				

The mean attitude scores on ecological concepts for male and female students who were taught using a cartoon-incorporated teaching technique did not differ significantly, as indicated by Table 4 [$t(109) = -0.410$; $\rho = 0.682$]. Additionally, the mean attitude ratings of male and female students who were taught utilizing the lecture approach did not differ significantly [$t(122) = -0.616$; $\rho = 0.539$]. As a result, null hypothesis number six was accepted. According to the results, there was no statistically significant difference in the attitude ratings of male and female students who were taught ecology using different teaching techniques.

Discussion of findings

This research examined how students' ecological achievement at Delta State was influenced by an educational technique that utilized cartoons. To direct the investigation, two (2) hypotheses and two (2) research questions were developed. The t-test in inferential statistics was used to evaluate the hypotheses at the 0.05 level of significance. According to the study's findings, both groups' pre-test attitudes were the same. This could be because, prior to therapy, the pupils were exposed to the same curriculum. Based on these concerns from the

study questions and null hypotheses, the previously examined data were evaluated and debated.

Although there was a slight increase in the mean attitude score following the intervention, it was not significant enough to be compared to the lecture method group. This indicates that there is a significant difference between the mean pretest and posttest attitude scores of students taught using the cartoon-incorporated instructional strategy. The study population could be the cause of this slight improvement. In contrast to primary school kids, secondary school students are starting to lose interest in cartoons, which explains the little increase in their attitude scores.

This study is in line with Norfarah et al, where he reported that cartoon substantially improved student's attitudes towards science, This study also agrees with that of Akinlade et al. (2019) who found a significant difference between the cartoon group's Attitude pretest post mean scores of the learners taught using the cartoon incorporated instructional strategy.

The study once more established that there is no discernible difference in the mean attitude scores of male and female students who are taught ecological concepts using the lecture technique and an instructional style that incorporates cartoons. This suggests that the lecture approach and instructional studies that included cartoons did not distinguish between the sexes in terms of students' attitudes on ecology. The fact that the teaching strategies equally pique, maintain, and excite the interest of both men and women throughout instruction may be the basis for this. These results run counter to those of Akinlade et al. (2019), who found that male and female students' attitudes on cartoons that taught photosynthesis and respiration in plants differed significantly.

According to Akinlade et al., the usage of cartoons improved students' knowledge, comprehension, and attitude toward biology, while sex remains a hurdle because of social values. The discrepancy between the two findings might be due to variations in the study's location and substance. Akinlade focused his study on photosynthesis, which he conducted in Edo state, but the current study focuses on ecology and was conducted in Delta State. When exposed to the lecture style, Murad (2009) similarly discovered a significant difference in the mean attitude ratings of male and female students. The results of the current investigation contradict this. The disparity between the two findings is most likely due to the different research subject and study location. Murad reported on English and Israel, while the current study is about ecology and Nigeria.

Conclusion

According to the study's findings, using cartoons in the classroom can help kids develop a more positive attitude about ecology. It may be claimed that the educational technique of using cartoons to teach biology is one of the best. Furthermore, there is no sex-dependent difference in the attitudes toward

ecology between the lecture approach and the instructional strategy that incorporates cartoons.

Educational implication of the study

The study's conclusions have some educational implications for biology instructors, students, and curriculum developers, among others.

1. If the proper teaching strategy is applied, all biology ideas can be learned.
2. According to the study, using cartoons as a teaching tool is a suitable way to foster a good attitude toward the environment and its practical applications.

Recommendations

The following recommendations were made in light of the study's results and conclusions.

1. Biology instructors are expected to evaluate their current teaching strategies and implement those that lead to improved student performance.
2. To promote the adoption of active learning strategies, biology should be given more time in the schedule.

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