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Effects Of Experiential Learning And Lecture Method On Students' Achievement And Interest In Biology In Delta Central Senatorial District

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ABSTRACT
This study investigated the effect of experiential learning and the lecture method on students' achievement and interest in Biology within the Delta Central Senatorial District. Two research questions and their corresponding hypotheses were formulated to direct the investigation. The research employed a quasi-experimental methodology. The population comprised all 14,673 SS II Biology students. A sample of 257 SSII Biology students was employed for the investigation. The research utilised two instruments: BAT and BIS, all of which were validated by three experts. The reliability index of the BAT was calculated using the Kuder-Richardson 21, resulting in an r-value of 0.85, while the BIS yielded an r-value of 0.70 according to Cronbach's Alpha. The collected data were analysed using mean, t-test, and ANCOVA statistics. The study's results showed no significant difference in the mean achievement and interest scores of students taught Biology through experiential vs lecture methods. Thus, it was concluded that experiential learning and the lecture method produced comparable effects on students' achievement and interest in Biology. It was recommended that Biology educators should combine experiential learning with traditional lecture methods to create a more dynamic and inclusive educational environment.
Keywords: Experiential learning, lecture method, academic achievement, interest

INTRODUCTION

Biology is a scientific discipline focused on the study of life and living organisms. Ekong et al. (2021) defined it as a scientific discipline that involves the systematic study of life, ranging from microbes to bigger forms. Biology is an intellectually engaging field whose importance to humanity, similar to that of science, is paramount. Biology clarifies changes in human physiology, tackles critical challenges, offers insights into the essence of life, promotes scientific investigation, and improves understanding of the environment. Ude and Onah (2017) contend that Biology promotes engaging pastimes such as gardening, insect collection, bird watching, and environmental conservation, while also offering insights into heredity and its applications in genetic engineering, forensic science, blood transfusion, banking, and paternity determination.

Despite its popularity and perceived ease among students, the success rate in external examinations has been inadequate over the years. This corresponds with the earlier conclusions of Osuafor and Okonkwo (2015) and Agboghoroma and Oyovwi (2015) that the academic achievement of Biology students in

external assessments has been insufficient. Multiple researchers (Adodo & Oyeniyi, 2009; Obialor & Osuafor, 2016) attribute the inadequate achievement of students in Biology to several factors, including a lack of instructional materials, the absence of well-equipped biology laboratories in educational institutions, insufficient scientific instruments for practical lessons, and the application of ineffective teaching strategies by most biology educators.

To improve students' academic achievement, educational psychologists and scientific educators continue to find characteristics (both personal and environmental) that may promote educational progress (Baba & Akinbobola, 2017). The instructional methods and strategies employed by educators in the classroom are pivotal among the environmental aspects that intrigue academics focused on improving academic attainment. As a result, various research projects have been undertaken and are currently underway to explore alternative instructional approaches in biology that improve learners' understanding, retention, and examination achievement.

The lecture method of instruction entails instructors utilising a chalkboard while students participate with pen and paper. Sunal (2015) characterised it as a pedagogical approach wherein the educator instructs students to acquire knowledge through memorisation and recitation methods, hence hindering the development of critical thinking, problem-solving, and decision-making skills. Adeoye (2017) posited that the approach is teacher-centered, with the educator monopolising the classroom, leading to student disengagement and passivity, perhaps making the set objectives unachievable. The lecture method is a one-sided engagement in which the lecturer speaks authoritatively to the students, without allowing them to ask questions or provide comments during the session (Hussain, Azeem & Shakoor, 2011). The benefits of the lecture method include the flexibility to introduce new topics or deliver thorough summaries to students, the capacity to teach groups of varying sizes, and the opportunity for the instructor to convey substantial material in a short timeframe. The lecture method, a teacher-centered approach, designates the educator as the principal source of information, imparting concepts to students who passively receive the knowledge, hence reinforcing the teacher's authoritative role in the classroom.

The experiential learning approach differs from the lecture method and can be utilised to instruct Biology. Coker and Porter (2015) characterised experiential learning as an active educational process in which students "learn by doing" and reflect on experiences gained through various hands-on laboratory experiments, practical exercises, outdoor activities, and studio projects. Knowledge is generated through the transformation of experience, acknowledging that learning is an all-encompassing process that incorporates all life experiences (Jennings & Wargnier, 2020). This pedagogical approach fosters experiential learning by actively involving learners in the educational process.

The experiential learning method was first introduced by David Kolb in 1984. Kolb asserted that to enhance their knowledge and develop problem-solving skills, effective learning must encompass four processes: concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Concrete experience learning emphasises the necessity for individual learners to be open-minded and proficient in applying a systematic approach to challenging situations. During the reflective observation process, students examine essential demonstrations through virtual visualisations and articulate their insights into the underlying explanations and mechanisms of these events. Reflection is crucial for converting experience into knowledge, as it enables individuals to assess the validity and relevance of their experiences. The Experiential Learning Method (ELM) is a type of experience-based learning in which learners derive meaning from their personal experiences.

Experiential learning includes various methods that provide students with practical, collaborative, and reflective experiences, thereby improving their comprehensive acquisition of new knowledge and skills (Morris, 2020). Kolb & Kolb (2017) assert that knowledge within the Experiential Learning Model (ELM) is acquired through the transformation of personal experiences. A learning experience is not merely an event; it is a deliberate endeavour with an objective recognised by learners. Kolb & Kolb (2017) assert that experiential learning is inductive, learner-centred, and activity-oriented. Experiential learning entails deriving meaning from tangible experiences, thereby reducing dependence on instructors.

The facilitator of experiential learning guides the process instead of controlling it. Beard and Wilson (2018) assert that to improve experiential learning, the educator assumes the role of a facilitator, assuming a less authoritative stance in the classroom and embracing a constructive, non-dominant approach to the learning process. Subject-matter experts assist students in organising and tying their ideas to the fundamental principles of the subject (Awolere, 2015). Educators consistently advocate for and integrate critical thinking into their instruction. Educators must engage in continuous learning to attain expertise in this endeavour. The teacher additionally functions as a mentor and facilitator of learning, as students are not entirely permitted to pursue their education alone. The learner must engage actively in the learning process as the instructor provides nuanced guidance (Awolere, 2015). To foster student empowerment, the instructor adopts the role of a participatory observer. Andresen, Boud, and Cohen (2020) contend that experiential learning enhances student engagement, promotes deeper learning, improves academic achievement, and develops career and life skills. Experiential learning allows students to connect new concepts with existing knowledge, so augmenting their earlier comprehension. This enhances problem-solving skills, especially in examinations, by promoting independent thought, engagement, and a creative and analytical mindset, so improving academic achievement and interest in Biology.

Academic achievement is the result of education. It denotes the degree to which a student, educator, or institution has fulfilled their educational objectives. Bell (2012) defined it as the propensity to seek accomplishment and participate in activities where success depends on an individual's effort, skills, courage, determination, or passion. Answers (2020) asserted that exceptional academic achievement relies on diligent effort, and an effective teaching method must illustrate to students how to learn, retain information, and self-motivate, thereby promoting active engagement in the educational process, which enhances both academic success and student interest. Interest is an educational construct that influences particular facets of students' affective domain, which is crucial in the teaching and learning process. Interest is an emotion, an inclination, and an effort to cultivate a connection to a specific subject. In education, interest is defined by heightened attention and concentration throughout classroom and academic activities. It is a motivational factor and emotionally influenced characteristic that impacts the learner's willingness to engage in educational activities. The study sought to identify the more successful pedagogical approach, either experiential learning or the lecture method, in enhancing students' academic achievement and engagement in biology.

Statement of the Problem

Despite the importance of Biology in students' daily lives and its contribution to national development and economic prosperity, students have persistently exhibited insufficient achievement in the subject in both internal and external assessments, eliciting significant concerns among all stakeholders in the education sector. Extensive study has demonstrated that students' insufficient achievement is due to multiple factors, including educational methodologies. Researchers, federal and state governments, and professional organisations have consistently sought to improve students' academic achievement in Biology through publications, seminars, workshops, conferences, and symposia for educators. Nonetheless, only negligible or erratic advancement has been noted over the years. The inadequate results in the topic require investigation into innovative and stimulating pedagogical approaches for teaching science, especially Biology. The research question is: Does the application of experiential learning enhance students' achievement and engagement in Biology relative to the lecture method?

Research Questions

The subsequent research questions were articulated to direct the investigation.

1. What is the disparity between the mean achievement scores of students instructed in Biology using experiential versus lecture methods?
2. What is the disparity between the average interest scores of students instructed in Biology using experiential versus lecture methods?

Hypotheses

The subsequent null hypotheses were evaluated at a 0.05 alpha level:

1. There is no substantial difference between the mean achievement scores of students instructed in Biology through experiential and lecture methods.
2. There is no substantial difference between the average interest scores of students taught Biology using experiential and lecture methods.

Purpose of the Study

The purpose of the study is to assess the effect of experiential learning and lecture method on students' achievement and interest in Biology within the Delta Central Senatorial District. The study aims to:

1. analyse the disparity between the average achievement scores of students instructed in Biology through experiential and lecture methods;
2. evaluate the disparity in the average interest scores of students instructed in Biology through experiential and lecture methods.

Review of Related Literature

The study is based on the theory of constructivism. Constructivism emphasises the active participation of learners in knowledge construction through experiential engagement and interaction with their environment. Jean Piaget and Lev Vygotsky are prominent proponents of this notion. Piaget's theory underscores the importance of experiential learning in fostering cognitive development, suggesting that students achieve enhanced learning outcomes through active engagement with materials and real-world contexts (Piaget, 1970). Vygotsky's concept of the Zone of Proximal Development (ZPD) underscores the importance of guided contact and collaboration, which are fundamental elements of experiential learning approaches (Vygotsky, 1978). In this setting, experiential learning can facilitate enhanced academic achievement and sustained interest among biology students by allowing them to actively interact with biological processes.

Studies comparing the effects of experiential learning versus lecture approaches in education have repeatedly shown that the efficacy of teaching tactics is contingent upon the setting. Adeniji et al. (2021) observed no significant differences in student accomplishment between the two strategies when applied to scientific instruction. The study stressed that well-structured lectures, reinforced with illuminating examples, can reach outcomes comparable to experience learning. Similarly, Okoye and Akinola (2020) evaluated the introduction of experiential learning in a primarily lecture-driven system and discovered no change in student achievement, attributing this to inadequate teacher preparation and a lack of resources to support experiential activities. Olawale and Abimbola (2021) found that although active learning methods such as experiential learning might increase engagement, teacher excitement and the perceived relevance of the subject exert a more significant impact on sustained interest. Adeyemi et al. (2020) similarly discovered that experiential learning had a negligible effect on student achievement and did not substantially enhance interest levels, since extrinsic motivators such as family support and professional aspirations were more influential. These findings correspond with Bello and Adekunle (2021), who noted that the quality of teaching, encompassing interactive and pertinent lesson delivery, was more significant for engagement than the teaching method itself. Research on resource availability elucidates the difficulties associated with adopting experiential learning. Eze et al. (2022) emphasised that resource limitations, including insufficient laboratory equipment and inadequately qualified workers, frequently compromise the efficacy of student-centered pedagogical approaches. These constraints may elucidate why results in experiential learning and lecture methodologies frequently seem analogous in resource-limited settings. Ekong et al. (2021) observed that although experiential learning slightly enhanced accomplishment, it necessitated considerably greater resources and time, hence constraining its scalability relative to conventional lectures. Ogundele and Nwosu (2022) assessed the influence of contextual factors on the efficacy of teaching approaches. They asserted that teacher quality, resource availability, and external motivators were more pivotal to educational outcomes than the selection of teaching approach. This corresponds with earlier research, which continually emphasises the significance of execution quality and contextual factors in ascertaining the efficacy of instructional approaches.

While extensive research has investigated the effect of experiential learning and lecture methods on students' achievement and interest in science education, the majority of studies have primarily focused

on Chemistry, Physics, and Mathematics, with inadequate attention given to specific disciplines such as Biology, especially in secondary schools in the Delta Central Senatorial District. This is the gap addressed by the study.

METHODOLOGY

The research utilised a quasi-experimental design. The study's population comprised 14,673 students, with a sample of 257 SSI1 Biology students' six intact classes. Stratified random sampling was utilised to select the six senior secondary schools. The six schools were classified into two categories: experiential and lecture. The researcher developed tools titled the "Biology Achievement Test (BAT)" and the "Biology Interest Scale (BIS)" for data collecting. The BAT comprises fifty items, with the multiple-choice questions pertaining to six themes in Biology. An expert in scientific education evaluated the face and content validity of the instruments. The researcher performed a reliability assessment using Kuder-Richardson 21 and Cronbach's alpha, yielding coefficients of 0.85 for BAT and 0.79 for BIS. The treatment entailed educating students in the experiential group in Biology by experiential learning, whilst those in the lecture group were instructed using the lecture method. Pretest and posttest were administered using BAT and BIS before and after therapy. The gathered data were examined using mean, t-test, and analysis of covariance (ANCOVA).

PRESENTATION OF RESULTS

✓ *What is the disparity between the mean achievement scores of Biology students instructed by experiential methods vs those taught via lecture methods?*

Table 1: Descriptive statistics illustrating the mean achievement scores of Biology students instructed through experiential learning and lecture methods

Groups	N	$\bar{X}$	$\bar{X}_{diff}$	SD
Experiential	131	54.44	0.46	5.19
Lecture	126	53.98		6.31

Table 1 demonstrates that students educated through experiential learning obtained a mean score of 54.44, whereas those instructed via the lecture method achieved a mean score of 53.98. A mean difference of 0.46 favours students taught through experiential learning.

✓ There is no substantial difference between the average achievement scores of students instructed in Biology using experiential and lecture methods.

Table 2: ANCOVA data comparing the mean scores of students in Biology instructed by experiential and lecture methods

Source	Type III sum of square	Df	Mean Square	F	Sig.
Corrected model	486.926	2	243.463	1.730	0.001
Intercept	11988.921	1	11988.921	380.	0.00
Pre-achievement	473.399	1	473.399	661	0.000
Groups	712.733	1	12.733	15.031	0.525
Error	7999.728	254	31.495	0.404	
Total	763742.000	257			
Corrected total	8486.654	256			

Table 2 demonstrates that the variance noted in Table 1 is not statistically significant, given that the calculated significance value of 0.525 exceeds the alpha threshold of 0.05. This suggests that there is no significant disparity in the average accomplishment scores of students educated through experiential learning vs those instructed using the lecture method. The hypothesis H01, which posits that there is no significant difference between the mean accomplishment scores of students educated through experiential learning and those instructed via the lecture method, is not rejected.

✓ *What is the disparity between the average interest scores of students instructed in Biology using experiential versus lecture methods?*

Table 3: Descriptive statistics illustrating interest scores of students instructed through experiential learning and lecture methods at pretest and posttest

Groups	Testing	N	$\overline{X}$	$\overline{X}_{diff}$	SD
Experiential	Pretest	131	19.25	0.86	3.71
Lecture	Pretest	126	18.40		3.40
Experiential	Posttest	131	51.72	0.53	5.72
Lecture	Posttest	126	51.19		7.40

Table 3 demonstrates that students educated via experiential learning got a mean interest score of 19.25. Participants trained by the lecture method demonstrated a mean interest score of 18.40, indicating a mean difference of 0.86 in favour of the experience group. At posttest, the average interest score of students taught by experiential learning was 51.72. The group taught by the lecture method achieved a mean interest score of 51.19, indicating a mean difference of 0.53 favouring the experiential group.

H_{02}: There is substantial difference between the average interest scores of students taught Biology using experiential and lecture methods.

Table 4: Independent sample t-test statistics comparing the mean scores of students instructed in Biology using experiential and lecture methods at posttest

Groups	N	$\overline{X}$	$\overline{X}_{diff}$	SD	Df	t-cal.	Sig. (2-tailed
Experiential	131	51.72		5.72			
			0.53		255	0.640	0.523
Lecture	126	51.19		7.40			

Table 4 demonstrates that the observed difference is not significant, as the estimated significance value of 0.523 exceeds the alpha threshold of 0.05. Consequently, the null hypothesis H02, which posits that there is no significant difference in the mean interest scores of students instructed in biology via experiential and lecture methods, remains unrefuted.

DISCUSSION

The study indicated no substantial difference in the average achievement scores of students instructed in biology via experiential learning compared to the lecture method. This observation may be ascribed to the organised framework of the lecture method, which guarantees the effective transmission of curriculum content, akin to experiential ways when executed proficiently. Additionally, students' familiarity with traditional teaching methods might have neutralized the potential benefits of experiential learning in this context. This finding lends credence to that of Adeniji et al. (2021) who reported that when lectures are well-organized and supplemented with illustrative examples, they can produce outcomes comparable to interactive methods. Okoye and Akinola (2020) also found that in traditional educational systems, students often perform similarly across instructional methods unless alternative strategies are supported by extensive teacher training and resources. This finding also corroborates that of Eze et al. (2022) found that in resource-constrained environments, the benefits of experiential learning are often undercut, leading to similar achievement levels as traditional lectures. Similarly, Bello and Adekunle (2021) found that a teaching method's effectiveness is largely dependent on its execution quality rather than its inherent characteristics, which may explain the comparable achievement scores in this study.

The study indicated no substantial difference in the average interest scores of students taught biology via experiential learning versus the lecture method. This may result from contextual factors such teacher enthusiasm, perceived importance of biology, and other motivators, which may eclipse the impact of the teaching method. Furthermore, the lack of novelty in the teaching methods might have diminished their impact on students' interest. Olawale and Abimbola (2021) noted that teacher enthusiasm and the

relevance of content to students' lives significantly influence interest levels, often outweighing the instructional method. Ogundele and Nwosu (2022) noted that extrinsic motivators, including job aspirations and family support, are more pivotal in maintaining students' interest in science courses than the instructional approach. This study's findings support those of Adeyemi et al. (2020), which indicate that in environments where students are familiar with traditional approaches, experiential learning may not enhance interest unless it has innovative components. This study corroborates the research of Ekong et al. (2021), which indicated that including practical examples and real-life applications into lectures can render them as engaging as experiential learning, thus equilibrating interest levels.

CONCLUSION

The study's findings led to the conclusion that experiential learning and the lecture method yield similar benefits on students' achievement and interest in Biology in the Delta Central Senatorial District. This suggests that the quality of teaching and contextual factors may play a more decisive role in determining educational outcomes than the choice of instructional method alone.

RECOMMENDATIONS

Based on the study's findings, the subsequent recommendations were proposed:

1. Biology educators should integrate experiential learning with conventional lectures to foster a more dynamic and inclusive educational atmosphere.
2. The government should enhance teacher capacity to effectively integrate active learning strategies within lectures and experiential methods.
3. School administrators should encourage teachers to make lectures more interactive by incorporating problem-solving tasks, discussions, and real-life examples.

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