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Effectiveness of Peer-Tutoring and Experiential Instructional Strategies in Improving Secondary School Biology Students' Learning Outcomes

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Abstract:
Introduction: The research determined the effectiveness of Peer-tutoring Instructional Strategy (PTIS) and Experiential Instructional Strategy (EIS) on Biology students' academic performance and self-efficacy in schools.
Methods: The research adopted a pre-test, post-test, control group quasi-experimental research design. The data collected were analysed with the use of One-way Analysis of Covariance (ANCOVA) and Two-way Analysis of Variance (ANOVA).
Results: The findings of the study indicated that there existed a significant difference in the effectiveness of PTIS, EIS, and CIS on the academic performance of Biology students in senior secondary school in ($F=39.65$, $p=0.00$) as well as the self-efficacy of Biology students ($F=24.778$, $p=0.000$).
Discussion: Further analysis revealed that EIS was comparatively more effective than the other two instructional strategies in promoting self-efficacy and performance.
Conclusions: The study concluded that the implementation of Experiential Instructional strategy had better effectiveness on the learning outcomes of Biology students.

Key words: science, biology, self-efficacy, peer-tutoring instructional strategy, experiential instructional strategy.

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Introduction

Science is an encompassing field that finds relevance in the day-to-day activities of humanity, seeking knowledge and meaning for most human endeavours in an objective and innovative way, thereby making life sustainable. It involves the investigation and verification of natural occurrences. Hazim (2015) defines science as a methodical process that organizes data into verifiable explanations and predictions of the cosmos, emphasizing the role of data organization in understanding cosmic events. Examples include knowledge acquisition and educational practice. Heintz (2009) argues that the scientific method relies on the careful evaluation of evidence to further our understanding of the physical and social universe. The importance of science necessitates its teaching in schools to equip learners with the requisite knowledge to contribute to society. Effective societal changes are impossible if the education level and content taught do not match the aspirations of society members. Consequently, in Nigerian schools, science subjects are divided into Physics, Chemistry, Mathematics, Basic Science, Agriculture, and Biology, among others. These subjects are ingrained in the secondary school curriculum to ensure that learners are knowledgeable about the world around them.

The National Policy on Education (NERDC, 2004) guides Nigeria's education system, including both formal and non-formal learning environments. To ensure that all Nigerians can fully participate in and benefit from their society, the National Educational Research and Development Council (NERDC) has developed a basic concept for education in the country. This body develops the curriculum for different science fields, allowing various external examination bodies to determine how the curriculum's content will be achieved. However, it has been observed that learners' performance in these fields has not been optimal, indicating that much needs to be done to improve their understanding of the world. One of the science subjects most affected by poor academic performance is Biology, with students' performance in this subject being particularly discouraging.

The COVID-19 pandemic led to complete lockdowns in major cities worldwide, including Nigeria, causing schools to close early. It was hypothesized that COVID-19 could negatively affect the performance of senior secondary school students who had not yet taken the National Examination Council or the West Africa Senior Secondary Certificate Examination in 2020, particularly in the science subjects of Chemistry, Biology, and Physics (Oyinloye, 2020). Biology, a branch of natural science that studies living things, seeks to explain to learners the concepts surrounding living organisms. Biologists conduct various types of research on plants, animals, and microorganisms. Biological research has rapidly changed and significantly impacted people's lives. Today, humans can create vaccines and antibiotics, cultivate disease-resistant crops, perform organ transplants, and manipulate DNA (Augustine, 2018). The National Policy on Education states that all secondary schools must offer Biology as a science course. The purpose of Biology lessons is to give learners a solid understanding of the subject so they can apply scientific concepts in practical contexts, such as healthcare and agriculture. Additionally, students in Biology classes should gain sufficient laboratory and field experience and develop a realistic and practical scientific approach. Focusing on these goals in the classroom may help students learn in ways that benefit their development and community growth. However, student performance in Biology tests suggests they have not yet achieved a thorough understanding of these concepts (Ezekiel, Yilshik, and Joseph, 2021). Aligned with these guiding principles, the overarching aim of the educational concept is to enrich individuals' lives and enhance community well-being. To achieve these objectives, the policy delineates specific goals for Biology education, aiming to cultivate an inquisitive, educated, and rational mindset essential for advocating democratic ideals and fostering national development through the nurturing of proficient learners.

These goals may be achieved with the right instructional strategies, including carefully selected learning opportunities. Traditional teaching methods, such as lectures, have been used by teachers for centuries to impart knowledge and understanding. This method, often referred to as conventional teaching, involves the teacher standing at the front of the room and presenting material to passive students (Ezeani, 2004). Consequently, many pupils learn not to think critically or ask questions. The traditional method is marked by a one-way flow of information, where the instructor teaches the class (Nworgu, 2009). This "teacher-centered" or "teacher-dominated" approach, characterized by students' passive role as "listeners" who take notes, may hinder the development of creative, innovative, and critical thinking skills. However, developing relevant learners in the 21st century requires strategies that encourage creativity, critical thinking, and innovation, which traditional approaches may not offer (Kim, Raza, and Seidman, 2019). This shows the need to ensure that learners are actively engaged in the practice of teaching and learning, so that thry can learn by experience and active engagement. Experts emphasise that experiential learning can enhance student engagement. This strategy represents a contemporary pedagogical approach that, from a scientific perspective, is linked to various procedures employed by researchers to analyse their surrounding environment and presenting their findings substantiated by empirical evidence (Kozuchova et al., 2023). This will likely affect academic outcomes, potentially producing learners who are not globally relevant or meeting educational goals and objectives. As educational attainments are measured via students' learning outcomes, the onus lies on the school system and teaching environment to engage in learning models that support 21st-century learning (Anthony, 2018).

Arief (2019) stated that a student's academic achievement is influenced by both cognitive and non-cognitive characteristics and the cultural milieu during the learning process. It is generally agreed that students' academic performance drives the entire educational system. Abaidoo (2018) opined that a school's success or failure is based on its students' academic performance. Additionally, some academics argue that pupils' academic success provides the groundwork for future learning and skill development. Abdullah (2016) defines academic success as acquiring knowledge evaluated by grading from an instructor and/or fulfilling educational objectives established by students and instructors within a specific time frame. These goals are evaluated through test results or continuous assessment. Existing works by Auwalu et al. (2014), Adewale et al. (2016), and Ihekwoaba et al. (2020) attest to issues with students' performance in Biology classes. Salami (2012) opined that several factors, including inadequate teaching methods, a lack of laboratory resources, a scarcity of qualified Biology teachers, poorly conceived curricula, and government policies, contribute to less-than-desirable academic outcomes in Biology among senior secondary schools. Capa (2012) observed that many Biology teachers struggle with using effective teaching strategies. While traditional methods, such as lectures, are often used by Biology teachers, alternative approaches have been shown to increase students' motivation and performance in the classroom. Efforts to improve Biology education could focus on addressing barriers to learning essential content, competencies, and scientific understandings. One option is using creative and engaging teaching techniques to involve students actively in their studies. Participating in academic activities has been shown to boost academic performance and other learning outcomes, such as self-efficacy.

Self-efficacy refers to an individual's belief in their ability to achieve a goal or succeed in a particular domain. Atoum and Al-Momani (2018) define it as the confidence in one's capacity to complete tasks and the likelihood of success or failure. Self-efficacy encompasses confidence in one's abilities across various contexts, such as work, school, and life (Köseoglu, 2015). For students, self-efficacy is essential as it enables them to believe in their potential to succeed in tasks, particularly after being exposed to effective teaching methods by their educators. This quality is crucial for students to actively engage in their academic pursuits and accomplish their objectives. Schunk (2012) emphasizes that self-efficacy is more about self-assurance than merely feeling obligated to complete a task. It is characterized by factors such as magnitude, strength, and generalizability. By implementing strategies that facilitate meaningful feedback on learning and scaffold remediation, instructors can enhance students' skills and confidence. Therefore, employing interactive learning methods encourages student participation and fosters creative thinking. To maximize learning outcomes, teachers should adopt interactive, student-centered strategies that ignite students' interest in Biology.

1 Background to the study

One approach that promotes interaction is the peer-tutoring strategy. In science classes, more proficient students are paired with less proficient ones to engage in structured reading, discussion, and information exchange (Rohrbeck et al., 2003). Golding et al. (2006) noted that peer tutoring is an instructional strategy in which a teacher helps students educate one another. This method emphasizes using peers to solve problems and has the potential to foster creativity, experimentation, problem-solving skills, and the ability to grasp complex ideas. Peer tutoring, as noted by Nathern and Liz (2010), may help educators meet the needs of students across a wide range of abilities and subject areas. Miller & Miller (1995) assert that tutoring among students is an effective and economical way to raise everyone's grades, not just those of the lowest performers. Motivating both the tutor and the student in this way may have beneficial social and educational effects. Students' understanding of scientific concepts may be improved with the help of peer tutoring under the watchful eye of a teacher. The researchers sought to investigate whether peer tutoring in secondary school Biology classes improved students' grades and confidence in their abilities.
Another strategy that can increase students' interest and align with the demands of 21st-century Biology teaching is the Experiential Instructional Strategy. Active participation, real-world application, direct experience, and introspective reflection characterize experiential learning. According to Dewey (1963), educational development requires incorporating experience components into the teaching process. Also argues that when educators focus solely on content, pupils miss the opportunity to develop their unique perspectives. Dewey (1963) asserts that no general standard judges an experience's potential educational value; instead, the quality of the encounter is paramount in progressive education. To be called progressive, education must emphasize "fruitful and creative" experiences that enhance future learning opportunities. Experiential instructional strategy involves learning through participation in meaningful, real-world events or activities. According to Okafor (2014), knowledge, skills, and talents can be gained through observation and simulation. Experiential education aims to help students develop new knowledge, abilities, and perspectives through direct exposure to real-world situations and subsequent reflection (Schwartz, 2012). Despite claims that experiential learning provides exposure to real-world circumstances within the classroom, there is a lack of empirical inquiry addressing its usefulness in Biology education in conventional classroom settings (Okafor, 2014). Researchers, such as Nwafor (2011), Okoli and Abonyi (2014), Adeyemi and Awolere (2016), and Bada and Akinboboola (2017), have found

that using experiential learning strategies to teach scientific concepts improves students' performance. However, no studies have offered a counterargument. However, no study has been to affirm the effectiveness of these strategies beyond performance to other psychological constructs of learning. Therefore, the current study is being undertaken to affirm the efficacy of experiential learning strategy improves student performance and self efficacy.

The two strategies, Peer Tutoring and Experiential Instructional, are confirmed in several studies and different subject areas to improve performance. However, there is a lack of research on the effectiveness of experiential learning and peer tutoring in improving students' performance in Biology classes at the secondary level. The usefulness of these educational approaches has not been thoroughly studied in the context of secondary school Biology education. Moreover, as these two strategies have been judged effective, it is essential to determine which of these strategies better improves learning outcomes. Additionally, these two strategies are rooted in different educational philosophies. Peer tutoring aligns with the social constructivist school of thought, where learners construct meaning through social interactions, while experiential learning aligns with the cognitive constructivist school of thought, where learning is based on developing meanings from individual experiences and understanding. It is essential to ascertain which learning approach supports students' better outcomes. Hence, this study aims to investigate these strategies' effectiveness in secondary school Biology education.

1.1 Objectives of the study

The specific objectives of the study are to:

- determine the effectiveness of peer-tutoring and experiential instructional strategies on Biology students’ academic performance in secondary schools; and
- examine the effectiveness of peer-tutoring and experiential instructional strategies on Biology students’ self-efficacy in the study area.

1.2 Research hypotheses

Based on the objectives of this study, the following research hypotheses were raised:

1. There is no significant difference in the effectiveness of peer-tutoring and experiential instructional strategies on Biology students’ academic performance in secondary schools; and
2. There is no significant difference in the effectiveness of peer-tutoring and experiential instructional strategies on Biology students’ self-efficacy in the study area.

2 Methodology

The study adopted a non-equivalent pre-test, post-test, control group quasi-experimental design. In this experimental design, the effects of the independent (Peer-tutoring and Experiential instructional strategies) variables on the dependent variables (student performance and Self-efficacy) were examined. The respondents used for the study were taught in two experimental groups and one control group in their intact classes. A moderating variable called Gender was involved in the study. The format for the research design is shown below:

Experimental group A	O_1	X_1	O_2
Experimental group B	O_3	X_2	O_4
Control group	O_5	X_3	O_6

Where O_1, O_3 and O_5 represent the pre-test for groups A, B and C; O_2, O_4 and O_6 represent the post-test for groups A, B and C respectively.

X_1 - Treatment (Peer-tutoring Instructional Strategy)
X_2 - Treatment (Experiential Instructional Strategy)
X_3 - Treatment (Conventional Strategy)

The variables in this study consist of the independent variables which are Peer-tutoring Instructional Strategy, Experiential Instructional Strategy and conventional teaching strategy. The dependent variables are the student performance and self-efficacy in Biology. The research design is considered appropriate because it will validate the effects of the independent variables on dependent variables Biology students in the study area.

The population for the study comprised all senior secondary school students offering Biology in a selected study area.

The sample for the study was 95 Senior Secondary school II Biology students selected through the multistage sampling procedure. From the three senatorial districts in the state, one senatorial district was selected using the simple sampling technique. Also, three local government areas were selected from the selected senatorial district using the purposive sampling technique. One secondary school was selected from each local government area through the simple random sampling technique. From the selected schools, two schools were used for the experimental groups while one school was used for the control group. The first was exposed to the Peer-tutoring Instructional Strategy, while the second experimental group was exposed to the Experiential Instructional Strategy. The control group was exposed to the conventional Teaching Method.

Stimulus instruments used for the study involved the Instructional packages used for the peer tutoring, experiential and conventional instructional strategies while two research response Instruments were used for the collection of data for this study; they are Biology Achievement Test (BAT) and Biology Self Efficacy Questionnaire (BSEQ). The Biology Achievement Test (BAT) consisted of two sections which are sections A and B. Section A contained the personal data of the students, while section B consisted of 30 multiple-choice items which were drawn from three topics. Food storage and Preservation, microorganism around us and Aquatic Habitats were used to determine the effect of the treatment (Peer-tutoring and Experiential Instructional Strategies) on dependent variable (students' performance). The instrument was used to collect data on the pre-test and post-test peer tutoring and experiential performance of the students. The Biology Self Efficacy Questionnaire (BSEQ) is a self-assessment tool that has been specifically developed to evaluate students' self-efficacy in relation to the field of Biology. The BSEQ comprised of two distinct sections. The primary objective of Section A is to gather personal data from the participants, including their school's name, class, and gender. On the other hand, Section B comprises 20 items that aim to assess the students' perceived self-efficacy in accomplishing various academic tasks. The segment will utilise a four-point Likert Scale encompassing the categories of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The tool was derived from the works of Gaumer Erickson and Noonan, (2018) as well as Schwarzer and Jerusalem, (1995). Questions 1-12 were derived from the work of Gaumer Erickson and Noonan whereas questions 13-20 were sourced from the research of Schwarzer and Jerusalem.

2.1 Validity and reliability of the research instrument

The instruments were validated by two Biology Education experts, and an expert in Test and Measurement Item's for the purpose of face and content validation. Subsequently, the research instruments were amended as per the recommendations and feedback provided by the supervisor and specialists.
The instruments underwent field testing through their administration to a sample of 30 individuals who were not involved in the study, and who attended a secondary school located outside of the study area. The instrument's scores underwent item analysis to ascertain the difficulty and discriminating indices of each item. Subsequently, items that fell outside the range of scores were eliminated. The data obtained from the pilot testing was subjected to reliability test. The reliability of the research instrument was determined by using Kuder Richardson 21 for BAT and Cronbach Alpha for BSEQ.

2.1.1 Reliability of BAT

In order to assess the dependability of the instruments, a sample of thirty (30) participants was selected from a secondary school that was not involved in the study. The difficulty indices and discrimination obtained ranged from $0.27<p<0.76$ and $0.6<D<0.87$ respectively. Based on this result, 10 items were dropped, after which the reliability test was done again. The Kuder-Richardson

(KR-21) reliability test was calculated as 0.86 using the KR 21 reliability coefficient formula.

2.1.2 Reliability of BSEQ

The data collected from pilot study were subjected to reliability test. The reliability of the BSEQ was estimated using the Cronbach's alpha coefficient and spearman rank correlation. A reliability measure of 0.63 was established using Cronbach's alpha coefficient and reliability measure of 0.69 was established using spearman rank correlation.

Before initiating fieldwork, the researcher sought collaboration from school administrators to seamlessly integrate the research program into the school schedule without causing disruption. This proactive approach ensured that the goals and potential benefits of the research were clearly communicated, fostering cooperation from participants throughout the investigation.

A period of six weeks was allocated for data collection. During this time, the researcher and trained assistants directly administered research instruments to students to gather data.

Subsequently, the researcher visited selected schools to implement and test various teaching tactics on students. Group one received the Peer-tutoring Instructional Strategy (PTIS), group two received the Experiential Instructional Strategy (EIS), and group three served as the control group, receiving the Conventional Instructional Strategy (CIS).

The study followed three distinct steps: pre-treatment, treatment, and post-test. Prior to any intervention, students in all groups underwent a pre-test assessment using the Biology Achievement Test (BAT) to establish baseline performance levels. Following the pre-test, the treatment phase commenced and lasted for two weeks according to the school calendar.

During the treatment phase, group one received PTIS, group two received EIS, and group three continued with CIS. Lessons for both treatment and control groups were conducted during regular school hours. Each group convened three times a week for 40-minute sessions per day over the course of two weeks.

Following the treatment phase, the post-test stage ensued. All students in each group underwent a post-test using the BAT to evaluate their biology performance after the intervention. After completing the post-test, research instruments were collected, marked, recorded, and coded for subsequent analysis.

To analyze the data, descriptive and inferential statistics were employed. Hypotheses were tested using one-way Analysis of Covariance (ANCOVA) with a significance level of $P < 0.05$. Post-hoc analysis using Bonferroni correction was utilized to ascertain the effect of independent variables on learning outcomes. Additionally, two-way Analysis of Variance (ANOVA) was employed to determine if there were significant differences in group mean scores.

3 Results

Research Hypothesis One: There is no significant difference in the effectiveness of peer-tutoring and experiential instructional strategies on Biology students' academic performance in secondary schools.

To test this hypothesis, the post-test of Biology test of the PTIS, EIS and CIS were compared using the one-way ANCOVA after the treatment had been administered to the students. The pre-test of the students was adopted as the covariate. The result of the analysis is presented in Table 1.

Table 1

One-way ANCOVA of scores on BAT for PTIS, EIS and CIS - Dependent Variable: BAT

Source	Type III Sum of Square	df	Mean Square	F	P	Partial Eta Squared
Corrected Model	640.493[a]	3	213.498	26.634	0.000	0.468
Intercept	2345.703	1	2345.703	292.624	0.000	0.763
PREBAT	6.629	1	6.629	0.827	0.366	0.009
Instructional strategy	635.652	2	317.826	39.648	0.000	0.466
Error	729.465	91	8.016			
Total	51533.000	95				
Corrected Total	1369.958	94				

a R Squared = 0.468 (Adjusted R Squared = 0.450)

Table 1 shows the result of one-way ANCOVA of post-test score of the Biology Achievement Test of the students after they have been taught PTIS, EIS and CIS. The table shows that there was significant difference at $p<0.05$ in the post-test scores of the Biology test after they have been exposed to the three instructional strategies [$F=39.65$; $p=0.00$], partial eta squared value of 0.466 shows that the strategies accounted for 46.6% variation in the scores in the Biology achievement of students hence showing that the strategy has a strong difference in the academic performance of those exposed to PTIS, EIS and CIS accounted for by the strategies. Hence the null hypothesis was rejected.

Bonferroni Pairwise comparison of the post-test was taken, the result is presented in Table 2 below.

Table 2

Bonferroni pairwise comparison of the Post-test scores of the students in BAT

(I) Instructional Strategy	(J) Instructional Strategy	Mean Difference (I-J)	Std. Error	P	95% Confidence Interval Difference	
					Lower Bound	Upper Bound
Conventional	Peer Tutoring	-3.592*	.711	.000	-5.327	-1.858
	Experiential	-6.330	.714	.000	-8.071	-4.589
Peer Tutoring	Conventional	3.592*	.711	.000	1.858	5.327
	Experiential	-2.738*	.719	.001	-4.492	-.984
Experiential	Conventional	6.330*	.714	.000	4.589	8.071
	Peer Tutoring	2.738	.719	.001	.984	4.492

Based on estimated marginal means
* The mean difference is significant at the .05 level.
b Adjustment for multiple comparisons

Table 2 shows that the mean difference between CIS and PTIS is -3.592 while between CIS and EIS is -6.330, and also between PTIS and EIS is -2.738. This implies that EIS had more effect on the Biology test than the other two, followed by PTIS and CIS had the least effect.
Research Hypothesis Two: There is no significant difference in the effectiveness of peer-tutoring and experiential instructional strategies on Biology students' self-efficacy in secondary schools.
To test the hypothesis two, the Self-efficacy of the students was tested before the treatment were analysed using one-way ANCOVA. The Post-test was tested as against the pre-test as the covariate after the treatment had been administered to the students to test for the effects of PTIS, EIS and CIS on the students on their self-efficacy. The results are presented in Table 3.

Table 3

One-way ANCOVA of post-test scores of the self-efficacy in Biology of using PTIS, EIS and CIS

Source	Type III Sum of Square	df	Mean Square	F	P	Partial Eta Squared
Corrected Model	5485.354[a]	3	1828.451	16,670	0.000	0.355
Intercept	18774.602	1	18774.602	171.163	0.000	0.653
Preself	190.801	1	190.801	1.739	0.191	0.019
Instructional strategy	5435.630	2	2717.819	24.778	0.000	0.353
Error	9981.636	91	109.688			
Total	350780.000	95				
Corrected Total	15466.989	94				

a. R Squared = 0.355 (Adjusted R Squared = 0.333)

Table 3 shows the result of the one-way ANCOVA of Post-test scores of the self-efficacy in Biology after they have been exposed to PTIS, EIS and CIS. The table shows that there was significant difference at $p<0.05$ in the post-test scores of the self-efficacy of the students after they have been exposed to the three instructional strategies [F=24.778, p=0.000]. Partial eta squared value of 0.353 shows that the strategies accounted for 35.3% variation in the self-efficacy of students hence showing that the strategy has a small difference between academic performance of those exposed to PTIS, EIS and CIS accounted for by the strategies. Hence the null hypothesis was rejected.
Furthermore, the Post-Hoc comparison of Bonferroni was employed to determine the direction of the effect of the Instructional strategies on the self-efficacy of the students, the result is presented in the Table 4.

Table 4

Result of Bonferroni post-hoc test for multiple comparison of self-efficacy post-test of PTIS, EIS and CIS

(I) Instructional Strategy	*(J) Instructional Strategy*	*Mean Difference (I-J)*	*Std. Error*	*P*	*95% Confidence Interval difference*	
					Lower Bound	*Upper Bound*
Conventional	Peer Tutoring	-12.276*	2.800	.000	-19.105	5.448
	Experiential	-19.088*	2.726	.000	-25.738	-12.438
Peer Tutoring	Conventional	12.276*	2.800	.000	5.448	19.105
	Experiential	-6.812*	2.657	.036	-.331	13.293
Experiential	Conventional	19.088*	2.726	.000	12.438	25.738
	Peer Tutoring	6.812	2.657	.036	.331	13.293

Based on estimated marginal means
* The mean difference is significant at the .05 level.
b Adjustment for multiple comparisons: Bonferroni

Table 4 shows that the mean difference between CIS and PTIS was -12.276, between CIS and EIS is -19.088 and between PTIS and EIS was -6.812. This simply implies that EIS has more effect on the self-efficacy of the students.

4 Discussion

The discussion of findings was done based on the results of the data that were collected in line with the objectives of the study the general objective of the study was to determine the effects of peer tutoring and Experiential Instructional Strategies on Senior Secondary School Biology Students' learning outcomes.
Result from hypothesis one showed that there was a significant difference between the post-test scores of the Biology Achievement Test after they have

been exposed to the three instructional strategies. This study supports and sustains earlier findings of similar experimental studies in the use of experiential teaching approaches (Ajiboye and Ajitoni, 2008; Okoli and Abonyi, 2014). Abonyi and Okoli (2014) experimented with Biology students and observed that the experiential teaching approach is superior to the Peer tutoring instructional strategy and conventional instructional strategy in fostering students' performance in Biology. In the same vein also Ibe and Abonyi (2014) linked experiential model to the constructivists approach. Their study revealed that the constructivist approach enhances students' interest in science. They argued that when interest is facilitated, achievement becomes obvious.

From the result of the hypothesis two which states that there is no significant difference in the effects of PTIS, EIS and CIS on the self-efficacy of the senior secondary school students. The result shows that there is significant difference between the self-efficacy of the students after they have been exposed to the three instructional strategies. This result is in agreement with the assertion of Suprapto, et al (2017) who said that teachers should explore various instructional strategies in order to develop and improve the self-efficacy of students in Biology. The result is also in tandem with the findings of Ku & Chen (2010), which shows that the use of instructional strategies different from the conventional teaching strategy will improve the self-efficacy of the students in Biology.

This shows that Biology teaching may be enhanced via active engagement of learners, as well as practical experience. This supports that the teaching and learning of science should be practical and activity oriented in a way that engages the cognition of the learners. Coker and Porter (2015) characterised it as a learning method that involves active participation and reflection. Students acquire knowledge through practical activities, such as laboratory experiments, field exercises, and studio performances. Knowledge creation occurs via transforming experiences, based on the belief that learning is a comprehensive process that encompasses all of one's life experiences (Jennings & Wargnier, 2010). This instructional style promotes experiential learning by actively engaging learners in the teaching and learning process. Also, it gives credence to the efficacy of experiential learning in developing the self efficacy of the learners as they are able to transform their experiences to better learning, hence, promoting more knowledge acquisition. This gives credence to the assertion of Koutnikova (2017) that the application of appropriate methods to foster curiosity and develop ideas is essential. Leraners utilise their inherent experiences and ideas, enhancing their concentration and independently discovering new information. They compare this information with their existing understanding in an effort to resolve any potential conflicts. In science education, it is essential for children to cultivate their thinking skills, engage in argumentation, and actively deduce and formulate concepts. Drawing from personal experience, a crucial aspect of scientific discovery begins at a child's birth. It is essential for a learner to cultivate knowledge through exploration, verification, and an ongoing pursuit of scientific assumptions and arguments and this becomes possible via the use of appropriate instructional strategies.

Conclusions

The study concluded that the two instructional strategies had effects on improving the learning outcome of the students in Biology however, the study concluded that Experiential Instructional Strategy has more effect on the learning outcome of the students than the Peer tutoring and the Conventional Instructional Strategies.

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

i. It is recommended that educators incorporate peer tutoring and Experiential Instructional Strategies into their Biology curriculum.
ii. Biology creativity is an important aspect of learning Biology and should therefore be included in the teaching and learning process and be tested in the national examinations. Experiential as an instructional strategy has proved to enhance Biology creativity more therefore teachers should be encouraged to use this method.

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