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Effects of The Jigsaw Ii and Scaffolding Strategies On Secondary School Students' Performance in Biology in Ekiti State, Nigeria

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Abstract

This study investigated the effects of Jigsaw II, scaffolding strategies, and the conventional teaching method on the academic performance of Senior Secondary School Two (SSS II) students in Biology in Ekiti State, Nigeria. Adopting a quasi-experimental pre-test, post-test, control group design, the research involved two experimental groups and one control group. A multistage sampling procedure was employed to select 187 students from six public secondary schools across three Local Government Areas. The instructional strategies for Jigsaw II and scaffolding were implemented over six weeks, with trained Biology teachers acting as research assistants. Students' performance was assessed using the Performance Test in Biology (PTB), which was validated by experts and comprised standardised multiple-choice questions. Data analysis revealed no significant difference in pre-test mean scores across the groups, confirming their initial homogeneity. However, post-test results indicated significant improvements in the performance of students exposed to Jigsaw II and scaffolding strategies compared to those taught using the conventional method. Specifically, the Jigsaw II group achieved the highest mean improvement (20.32), followed closely by the scaffolding group (20.10). Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) confirmed statistically significant differences in post-test scores among the groups ($p < 0.05$). Scheffe post-hoc tests further highlighted the superiority of Jigsaw II, with no significant difference between Jigsaw II and scaffolding strategies but a marked advantage over the conventional method. These findings underscore the efficacy of Jigsaw II and scaffolding strategies in enhancing students' academic performance in Biology. The study recommends the integration of these active learning strategies into the Biology curriculum to foster improved student outcomes and engagement in secondary schools.

Keywords: Jigsaw II, Scaffolding, Students, Performance, Biology,

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Introduction

Science education can be considered an essential instrument for the scientific and technological progress of any nation. This principle is codified in the National Policy on Education by the Federal Republic of Nigeria (FRN, 2014), which asserts that: "science education should, among other objectives, prepare students to thrive in the contemporary era of science and technology for socio-economic and political advancement." The policy underscores that science education serves as an effective means for instilling essential scientific knowledge, skills, and competencies. Jegede (2023) in his inaugural speech described scientific education as the examination of the interconnection between science as a field and the application of educational ideas to its comprehension, instruction, and learning. A primary purpose of science education is to cultivate students' interest in scientific disciplines, including Biology. Biology is fundamental to numerous scientific disciplines and its instruction warrants significant consideration. The study of biology enhances the appreciation and enjoyment of nature and life. Biology is the scientific discipline that examines living organisms, focussing on their structure, behaviour, distribution, origin, and interactions with their surroundings.

Notwithstanding the significance of Biology, the performance of Nigerian students in both internal and external secondary school examinations remains discouraging (Opara, 2016). Statistics from WASSCE results over the past six years in Ekiti State (2017-2023) indicate that student performance in Biology exhibits persistent fluctuations and lacks stability. Results indicated that a greater proportion of students achieved credit level in 2017, 2018, and 2019, with rates of 59.09%, 61.00%, and 56%, respectively, while a lesser proportion attained distinction level, with rates of 19.85%, 22.00%, and 15.00%, respectively. Nevertheless, the failure rates were minimally low at 7.59%, 9.00%, and 10%, respectively, albeit in an increasing sequence. Data were unavailable in 2020. In 2021, student performance was remarkable, with a 71% pass rate at the distinction level; however, it significantly declined to 43.83% in 2022. The distinction level performance significantly declined to 16.33% in 2023 from 43.83% in 2022. Nevertheless, there was a sharp improvement in the performance at the credit level in 2023 with 54.43% as against 19.00% and 18.92% in the years 2021 and 2022 respectively. However, the year 2022 recorded the highest number of failure rate in all the years under review (2017-2023). Thus, the results indicated a fluctuating performance of candidates in Biology at Ekiti-State.

It has been noted that one of the elements affecting students' performance in Biology is the teaching methods or strategies employed by the instructor. This goes a long way to highlight the value of instructional tactics in teaching and learning situations. Jegede (2023) and Omotayo (2023), in their inaugural lectures, delineated numerous pedagogical strategies for the instruction and comprehension of science subjects, including team teaching, think-pair-share, remote laboratories, jigsaw II, scaffolding, projects, concept mapping, computer-assisted instruction, games, role-playing, sport-based learning, science quizzes, science at home, discovery rewards, science clubs, science stations, and crossover learning, among others. A primary issue contributing to pupils' underachievement in Biology examinations is the reliance on traditional teaching methods in secondary school Biology education. This traditional pedagogical approach is characterised by a focus on knowledge transmission that prioritises memorisation, and it has been criticised as an ineffective method for teaching Biology and other scientific disciplines due to its unidirectional flow of information from teacher to student (Robert, 2011).

The conventional method, or lecture method, is characterised by the educator possessing comprehensive knowledge of the curriculum content and conveying it to the students in the classroom (Afurobi, et al, 2015). This teaching method gives room for the teacher to be the overall custodian of knowledge in a particular field of study without having consideration for the prior knowledge of the learners, thereby making them passive members of the class, who only listen and take instructions word for word from the teacher. This method is not outrightly bad itself but in most cases, learners are completely left out as they are only noted to be taking notes because the teacher is seen as being superficial and knows everything, which makes the process more teacher-centered than learner-centered (Durosaro & Adegoke, 2011). The quest to curtail the shortcomings of the conventional method used in teaching and learning Biology led to the discovery of other innovative strategies such as; jigsaw II, blended learning, scaffolding, game and simulations, spaced-learning, problem-based learning, field trips, team teaching, among others Jegede (2023) and Omotayo (2023). These creative tactics are regarded useful strategies that might increase students' attitudes to and students' performance in Biology however this study concentrates on jigsaw II and scaffolding strategies. Jigsaw II is an educational approach in which small groups, each with students of different skill levels, employ a range of learning activities to increase their knowledge of a topic (Ariyana, 2013). The Jigsaw II approach is an efficient way for pupils to learn course information. The technique encourages kids to listen and be involved in a group environment. Just like a jigsaw puzzle, each member of the group performs a crucial function in their group. What makes this technique so effective is that group members work together as a team to attain a common goal. Students cannot achieve success without collective collaboration (Chan, 2014).

In this technique, each student belongs to two groups: a jigsaw or home group and an expert group. In the jigsaw or home group, pupils are allocated distinct segments of the topic to be studied. Every member of the home group is instructed to concentrate on reading a certain section of the text. After completing the reading, students who have examined the same section of the material convene to create an expert group for the purpose of discussing their designated segment. Subsequent to the discussion, group members return to their original groups to impart the knowledge acquired in their expert groups to other members. Upon understanding all sub-topics presented by each expert, individual group members do a brief quiz. The individual score is juxtaposed with the base score to ascertain the individual improvement score, from which the group's average improvement score is derived. The group with the highest average progress score receives recognised through a group prize. A group that attains a certain average improvement score may be eligible for a collective prize. Consequently, each member acquires knowledge and assists peers in their learning, as the achievement of one person equates to the success of the entire group. Consequently, the jigsaw II cooperative learning technique fosters a culture of collaboration and collective engagement among students.

The scaffolding learning technique entails the instructor providing initial assistance to learners to augment their existing knowledge and facilitate the acquisition of new skills (Wu, Weng, & She, 2016). The assistance provided by the teacher aids in advancing learners' capabilities by integrating their prior knowledge with new concepts, particularly focussing on challenging tasks that the learners have not encountered prior to the lesson.

In the scaffolding learning approach, the teacher's help is transitory, intended to enable learners to independently tackle the perceived challenging task. The instructor progressively reduces assistance as deemed appropriate, particularly upon recognising that the student can now do the activity and has grasped the conveyed material (Aditi, 2017). The primary objective of the technique is to cultivate a self-sufficient learner capable of independently resolving difficulties without supervision. During the teaching-learning process, the educator may provide assistance to students through examples, clues, prompts, hints, partial answers, think-aloud modelling, and direct instruction (Robinson & Daniel, 2017). This may assist the instructor in acknowledging the diverse learning differences among students, so facilitating an inclusive process where each learner is regarded as significant and integral to the overall experience.

The method is designed to actively involve learners in class activities, rather than allowing them to be passive participants who only listen to the teacher's instructions and grow disengaged from the process. The scaffolding learning strategy enables learners to leverage existing knowledge regarding a specific problem and develop a new comprehension of it; it also accommodates slower learners, as the teacher can gauge their learning pace and provide feedback that encourages further learning and fosters a sense of belonging (Omiko, 2015).

Bilesanmi-Awoderu and Oludipe (2012) investigated the efficacy of cooperative learning practices on the academic performance of Nigerian junior secondary students in Basic Science. The researchers used a therapy involving two tiers of cooperative learning tactics (learning together and jigsaw) alongside the standard lecture approach, which served as the control group. The study's findings indicated that students utilising the two cooperative learning methodologies achieved superior mean scores in both immediate and delayed academic performance compared to those in the typical lecture group. The collaborative learning and jigsaw teaching tactics shown to be more successful in improving students' academic performance and retention in Basic Science compared to the lecture approach.

Nonetheless, Sherman (2016) and Shaaban (2016) discovered no substantial disparity in the performance of students instructed in physics by the Jigsaw approach compared to those taught via traditional classroom and discussion techniques, respectively. Consequently, the results regarding the implementation of Jigsaw cooperative learning remain ambiguous; this study investigated the impact of computer-supported Jigsaw on student performance. Gambari, Olumorin, and Yusuf (2013) investigated the impact of a jigsaw cooperative learning technique on the performance of Senior Secondary School students in physics in Niger State, Nigeria. Results demonstrated that students subjected to the jigsaw cooperative learning technique outperformed those instructed by Individualised Computer Instruction (ICI) and the lecture group.

Wu, Weng, and She (2016) performed a study to examine the impact of systematic reasoning ability, background knowledge, and various scaffolding approaches on students' science knowledge and scientific investigation outcomes. The students engaged in an online scientific inquiry program that included creating scientific questions and formulating evidence-based conclusions, supported either directly or indirectly. The results indicated that students' knowledge and scientific analysis can predict enhancements in scientific inquiry competency. Similarly, Amobi and Uche (2022) examined the impact of instructional scaffolding on students' accomplishment in Biology, revealing that the instructional scaffolding teaching technique greatly improved students' understanding of Biology subjects. Only scientific analysis significantly impacts learner comprehension. The rigour of scientific reasoning and the type of scaffolding markedly affected the students' scientific inquiry skills. Previous reasoning abilities notably affected their recognition of variables and the establishment of endpoints in both post- and retention assessments. Students that employed the online agenda experienced consistent scaffolding, which facilitated their hypothesis formation and conclusion extraction more effectively than non-direct scaffolding. Consistent scaffolding was especially beneficial for learners with elevated prior reasoning skills. Students with advanced reasoning skills who employed consistent scaffolding were better equipped to formulate hypotheses and draw inferences.

The main purpose of the study was to examine the effects of the jigsaw II strategy, scaffolding strategy, and conventional method on senior secondary school students' performance in Biology in Ekiti State, Nigeria.

Research Hypotheses

1. There is no significant difference in the performance mean scores of students in jigsaw II, scaffolding strategies, and conventional method in Biology before treatment.
2. There is no significant difference in the performance mean scores of students exposed to jigsaw II, scaffolding strategies, and conventional method after treatment.
3. There is no significant difference in the performance mean scores of students exposed to jigsaw II, scaffolding strategies, and conventional method in Biology before and after treatment.

Research Methods

This study employed a quasi-experimental pre-test, post-test, control group design, comprising two experimental groups and one control group. The quasi-experimental design was deemed suitable for evaluating the impact of two instructional strategies—Jigsaw II and scaffolding strategies—on students' learning outcomes in Biology. A pre-test was conducted to establish the homogeneity of the groups, while the post-test was used after the treatment phase to measure the learning outcomes in terms of academic performance. The design paradigm is illustrated as follows:

E1: - O1 X1 O2
E2: - O3 X2 O4
C: - O5 C O6

Here, E1 represents the experimental group employing the Jigsaw II instructional strategy, E2 refers to the group employing scaffolding instructional strategy, and C indicates the control group taught using the conventional method. O1, O3, and O5 represent pre-test observations, while O2, O4, and O6 indicate post-test observations. X1 and X2 refer to the treatments (instructional strategies) used for the experimental groups, while Xc refers to the conventional method used for the control group.

The population for the study comprised 12,585 Senior Secondary School Two (SSS II) students across 210 public secondary schools in the sixteen Local Government Areas of Ekiti State, Nigeria (Ekiti State Ministry of Education, 2023). The SSS II students were considered appropriate for this study as they had been exposed to foundational biological concepts, enabling independent study with minimal supervision. Additionally, as they were not preparing for any external examinations, their availability for the study was more assured.

A sample of 187 SSS II students from public secondary schools was selected through a multistage sampling procedure. First, one senatorial district was randomly selected from the three senatorial districts in Ekiti State. Second, three local government areas were chosen within the selected district through simple random sampling. Third, two public secondary schools were selected from each of the three local government areas using a stratified random sampling technique. Subsequently, the schools were assigned randomly to two experimental groups and one control group, with intact classes used for the study. Finally, the Biology teachers in the selected schools were trained as research assistants to implement the instructional strategies.

The Performance Test in Biology (PTB) assessed students' performance in Biology and consisted of two sections: Section A gathered demographic information, and Section B featured 40 multiple-choice questions derived from WAEC past questions aligned with the SSS II syllabus. The instrument was validated by experts in Biology education, tests, and measurement. Content validity was ensured by aligning the instruments with the traits they were designed to measure. The reliability of the PTB was assumed based on its use of standardised WAEC questions.

The experimental procedure occurred in three phases. The pre-treatment phase involved visiting schools, training teachers on the instructional strategies, and administering a pre-test to establish group homogeneity. The treatment phase spanned six weeks. In the Jigsaw II group, students worked in diverse groups to study assigned tasks independently, brainstormed in expert groups, and later reconvened to teach their home groups. Whole-class discussions and evaluations concluded each session. The scaffolding group involved students working collaboratively, guided by a more knowledgeable member, with gradual withdrawal of support from the research assistant. The control group followed conventional teaching methods. The post-treatment phase involved re-administering the PTB to measure the effects of the instructional strategies.

The instructional packages for the experimental groups included detailed lesson plans for Jigsaw II and scaffolding strategies. The control group followed standard lesson plans for conventional teaching. Data were analysed using descriptive and inferential statistics. Research questions were answered using means, standard deviations, and bar charts. Hypotheses were tested at a 0.05 significance level, with Analysis of Variance (ANOVA) used for hypotheses 1–2 and Analysis of Covariance (ANCOVA) for hypothesis 3.

Results

Table 1: Mean and standard deviation of pre-test and post-test scores of students in experimental and control groups

Strategies	**Test**	**N**	**Mean**	**S.D**	**Mean Diff.**
Jigsaw II	Pre Test	57	10.42	2.00	**20.32**
	Post Test		30.74	3.12	
Scaffolding	Pre Test	61	10.34	1.89	**20.10**
	Post Test		30.44	3.36	
Conventional	Pre Test	69	10.42	1.83	**10.19**
	Post Test		20.61	2.96	
Total		**187**			

Table 1 revealed that pre-test performance mean scores of students exposed to jigsaw II and scaffolding strategies were 10.42 and 10.34 respectively while the conventional method was found to be 10.42 with their corresponding standard deviations as 2.00, 1.89, and 1.83 respectively in Biology. The post-test performance scores of students exposed to jigsaw II, scaffolding strategies and conventional method were found to be 30.74, 30.44, and 20.61 respectively with their corresponding standard deviations as 3.12, 3.336, and 2.96 in Biology. The mean difference in each of the strategy was found to be 20.32 and 20.10 respectively while that of the conventional method was found to be 10.19. It appears that the use of jigsaw II and scaffolding strategies influences students' performance in Biology with the jigsaw II strategy being the most effective in the teaching of Biology closely followed by the scaffolding strategy. This was further depicted in Figure iii.

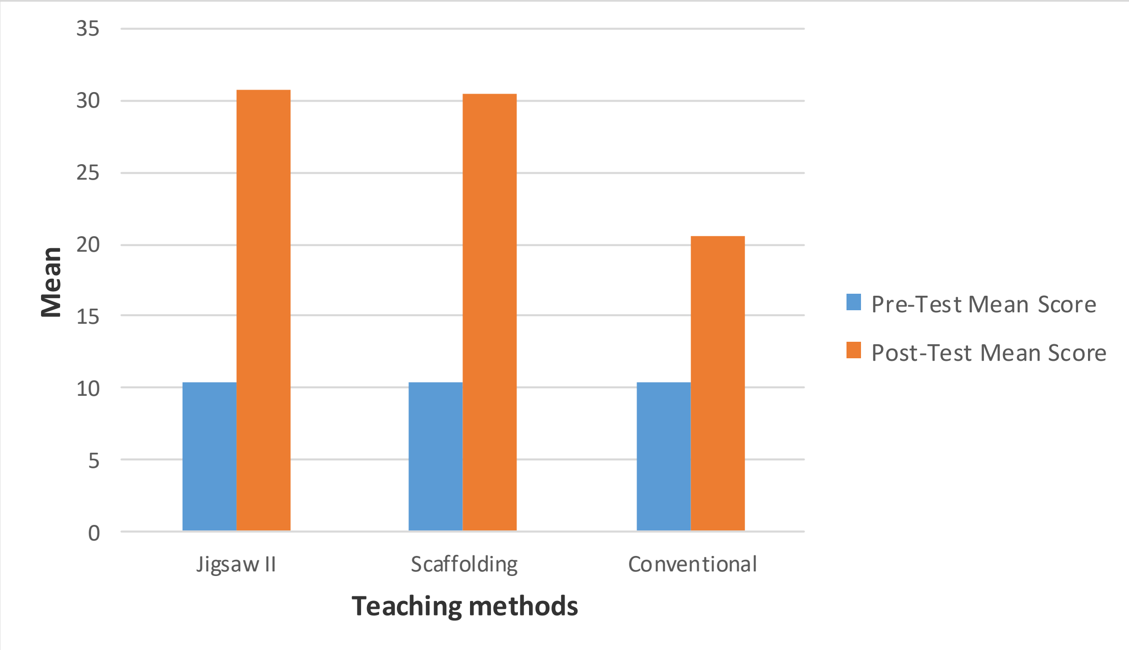

Figure i: Barchart on the performance of students before and after treatments in Biology.

Testing of Hypotheses

Hypothesis 1: There is no significant difference in Biology performance mean scores of students in jigsaw II, scaffolding strategies and conventional method before treatment

Table 2: ANOVA showing the difference in performance of students in experimental and control groups after treatment in Biology.

Groups	Sumf Squares	df	Mean Square	F	Sig.
Between Groups	.240	2	.120		
Within Groups	666.477	184	3.622	0.033	.967
Total	**666.717**	**186**			

P > 0.05

The result presented in table 2 showed that the F-cal value of 0.033 was not significant because the P value (0.967) > 0.05 at 0.05 level of significance. Hence, the null hypothesis was not rejected. This implies that there was no significant difference in Biology performance mean scores of students in jigsaw II and scaffolding strategies and conventional method before treatment. These findings implied that the students in the experimental and control groups were homogeneous at the commencement of the study.

Hypothesis 2: There is no significant difference in the Biology performance mean scores of students exposed to jigsaw II and scaffolding strategies and conventional method after treatment.

Table 3: ANOVA showing the difference in the performance of students in experimental and control groups after treatment in Biology.

Groups	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	4335.731	2	2167.865	219.587*	.000
Within Groups	1816.537	184	9.872		
Total	**6152.267**	**186**			

*P < 0.05

The result presented in table 3 showed that the F-cal value of 219.587 was significant because the P value (0.000) < 0.05 at 0.05 level of significance. Hence, the null hypothesis was rejected. This implies that there was a significant difference in the Biology mean scores of students exposed to jigsaw II, scaffolding strategies and conventional method after treatment. To determine the source of the significant differences observed, Post – hoc (Scheffe) analysis with mean difference was carried out in Table 4.

Table 4: Scheffe Post – hoc multiple range test of the performance of students in experimental and control groups after treatment in Biology.

Groups		N	Mean	A	B	C
				30.74	30.44	20.61
Jigsaw II	**(A)**	57	30.74			
Scaffolding	**(B)**	61	30.44			
Conventional	**(C)**	69	20.61	*	*	

* P < 0.05

In Table 4 significant differences were found between the performance of students in Biology exposed to jigsaw II, scaffolding strategies and conventional in favour of students exposed to jigsaw II. However, there was no significant difference between the performance of students in Biology exposed to the jigsaw II and the scaffolding strategy. It can be deduced through the mean mark in table 4 that students exposed to jigsaw II strategy performed best in Biology.

Hypothesis 3: There is no significant difference in the performance mean scores of students exposed to jigsaw II and scaffolding strategies and conventional method in Biology before and after treatment.

Table 5: Analysis of Covariance for the effect of jigsaw II and scaffolding strategies and conventional method on students' performance in Biology before and after treatments.

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	4340.047[a]	3	1446.682	146.088	.000
Intercept	4713.333	1	4713.333	475.957	.000
Pre-Test	4.316	1	4.316	.436	.510
Groups	4332.723	2	2166.361	218.761*	.000
Error	1812.221	183	9.903		
Total	141505.000	187			
Corrected Total	6152.267	186			

a. R Squared = .705 (Adjusted R Squared = .701)

The result presented in table 5 shows that there was a significant difference in performance mean scores of students exposed to jigsaw II and scaffolding strategies and conventional method in Biology before and after treatments as F_{cal} = 218.761, P= 0.000<0.05. This result led to the rejection of the null hypothesis. This implies that there was a significant difference in the performance mean scores of students exposed to jigsaw II and scaffolding strategies and conventional method before and after treatment in Biology. To find out the more probable effective strategy, Multiple Classification Analysis (MCA) was carried out. The result is shown in Table 6

Table 6: Multiple Classification Analysis (MCA) of students' performance in Biology by treatment

Grand Mean = 26.90					
Variable + Category	**N**	**Unadjusted Dev'n**	**Eta²**	**Adjusted for Independent + Covariate**	**Beta**
Jigsaw II	57	3.84	.84	3.81	.51
Scaffolding	61	3.54		3.50	
Conventional	69	-6.29		-6.33	
Multiple R Multiple R^2					.839 .705

The result in Table 6 shows the Multiple Classification Analysis (MCA) of students' performance in Biology by treatment. It reveals that, with a grand mean of 26.90, students exposed to the jigsaw II strategy had the highest adjusted mean score of 30.74(26.90+3.84), followed by the students exposed to the scaffolding strategy with adjusted mean score of 30.44(26.90+3.54), and conventional method with adjusted mean score of 20.61(26.90+(-6.29)). This means that students exposed to jigsaw II performed better than students exposed to the scaffolding strategy, and conventional method. The treatment explained about 84% (Eta^2 = 0.84) of the observed variance in students' performance in Biology. The treatment strategies accounted for 70.5% (R^2 = 0.705) contribution to the academic performance of the students in Biology.

Discussion

The study's findings indicated no significant difference in the mean Biology scores of students utilising jigsaw II and scaffolding tactics compared to the standard way prior to therapy. The data indicate that the students in both the experimental and control groups were homogenous at the outset of the study. The initial uniformity of the investigation is essential since it creates a baseline. Essentially, this indicates that any performance disparities detected between the groups post-treatment may be more reliably ascribed to the precise teaching technique employed, rather than to pre-existing inequalities among the groups. The meticulous evaluation and construction of baseline comparability enhance the validity of the study's conclusions. This ensures that observed impacts may be ascribed to the employed instructional tactics, yielding more significant insights into their efficacy in enhancing students' attitudes and academic performance.

The study indicated a considerable disparity in the mean Biology performance scores of students subjected to jigsaw II, scaffolding tactics, and the standard approach following the treatment. Students subjected to the jigsaw II method exhibited superior performance compared to those exposed to the scaffolding strategy and traditional approach. This finding aligns with the research conducted by Ahiakwo et al (2023), which examined the impact of the jigsaw learning strategy on Biology students' inclusive learning attitudes and achievements regarding the human respiratory system. The study revealed that students instructed using the jigsaw method outperformed their peers taught the same topic through traditional lecture methods and exhibited more favourable attitudes.

Gambari, Olumorin, and Yusuf (2013) investigated the impact of the jigsaw cooperative learning strategy on the performance of senior secondary school students in physics in Niger State, Nigeria. The results demonstrated that students who engaged with the jigsaw cooperative learning strategy outperformed those instructed through Individualised Computer Instruction (ICI) and traditional lectures. Similarly, Hanze and Berger (2017) determined that children in the Jigsaw classroom exhibited more competence, enhanced social connections with peers, and increased autonomy. This study contradicts the findings of Sherman (2016) and Shaaban (2016), who reported no significant difference in the accomplishment of students taught physics using Jigsaw compared to those instructed by conventional classroom and discussion techniques, respectively.

The study's findings offer a compelling viewpoint on the efficacy of various instructional techniques regarding their influence on students' mean scores in Biology performance. This result demonstrates that the jigsaw II technique positively impacted students' academic achievement in Biology. The jigsaw II technique often entails cooperative learning, when students collaborate in small groups to attain expertise on particular subjects and subsequently instruct their colleagues on those subjects. This method promotes active participation, cooperation, and a more profound comprehension of the topic. The observation that students utilising this strategy attained the best mean scores in Biology indicates that this method significantly enhanced their learning and understanding of the material.

Conversely, it is important to highlight that the scaffolding technique and the traditional method did not produce Biology mean scores as elevated as those attained with the jigsaw II strategy. This conclusion prompts intriguing enquiries regarding the particular educational methodologies employed within these initiatives. Although the scaffolding strategy generally entails systematic assistance and a gradual reduction of that assistance as students gain independence, and the conventional method likely reflects a more traditional approach, it appears that, in this context, the jigsaw II strategy was especially effective in enhancing academic performance.

Conclusion

Based on the findings of this study, it could be concluded that the three groups (jigsaw II, scaffolding strategies, and conventional method) were homogeneous at the commencement of the experiment. The use of jigsaw II enhanced better performance of students in Biology than the scaffolding strategy and conventional method.

Recommendations

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

1. The implementation of innovative strategies, such as Jigsaw II and scaffolding techniques, should be promoted in Biology instruction.

2. The government at all levels, in conjunction with the Ministry of Education, should offer professional development opportunities for educators through seminars, training sessions, and workshops to enhance their understanding of various creative tactics, including Jigsaw II and scaffolding.
3. The government must guarantee that teaching practices and classroom settings are inclusive and supportive of all pupils, irrespective of their gender.

References

Aditi, B. (2017). Effect of instructional scaffolding on high school students' academic achievement and attitude towards science. *International Journal of Science Technology and Management, 6*(2), 228-235.

Afurobi, A., Izuagba, A., Obiefuna, C., & Ifegbo, P. (2015). Effects of the use of lecture method and the world on the performance of students taught curriculum studies. *Journal of Education and Practice, 6*(18), 142-149.

Ahiako, M. J., Adolphus, T., Omeodu, M. D., & Oduh, V. A. (2023). Effects of jigsaw learning strategy on biology students' inclusive learning attitude and achievement in human respiratory system: A small scale study of government secondary schools, Abia, Rivers State. *Rivers State Journal of Science and Mathematics Education, 1*(1), 10-20.

Amobi, U. V., & Uche, E. D. (2022). Effects of instructional scaffolding on students' academic achievement in biology. *Irish Journal of Educational Practice, 5*(5), 35-44.

Ariyana, Z. D. (2013). The investigation of challenges in teaching and learning mathematics through English at secondary schools in Kepulauan Riau, Indonesia (Doctoral dissertation, Universiti Teknologi Malaysia).

Chan, K. (2014). Using Jigsaw II in teacher education programs. *Hong Kong Teachers' Centre Journal, 3*, 91-98.

Durosaro, D. O., & Adegoke, A. A. (2011). *Higher education & globalisation.* Stirling-Horden.

Federal Republic of Nigeria (FRN). (2014). *National policy on education.* NERDC Press.

Gambari, I. A., Olumorin, C. O., & Yusuf, M. O. (2013). Effectiveness of computer-supported Jigsaw II co-operative learning strategy on the performance of SSS students in physics. *Global Media Journal, 1*(11), 1-13.

Hanze, E., & Berger, W. (2017). Restructuring the classroom: Conditions for productive small groups. *Review of Educational Research, 64*(1), 1-35.

Jegede, S. A. (2023). Science education in Nigeria: Asphyxiating but undulating. *81st inaugural lecture at Ekiti State University, Faculty of Education, Ado Ekiti, Ekiti State,* 22-31.

Olofin, S. O. (2020). Effect of Kolawole's problem-solving teaching strategy and teachers' characteristics on the academic performance of secondary school students in mathematics in Nigeria. *African Scholar Journal of Contemporary Education Research, 17*(8), 33-54.

Oludipe, D. I. (2012). Gender difference in Nigerian junior secondary school students' academic achievement in basic science. *Journal of Educational and Social Research, 2*(1), 93-98.

Omiko, A. (2017). Impact of instructional scaffolding on students' achievement in chemistry in secondary schools in Ebonyi State of Nigeria. *International Journal of Education Learning and Development, 3*(7), 74-83.

Omotayo, K. A. (2023). Producing versatility in the teaching-learning process: An effort to revitalize science education. *70th inaugural lecture at Ekiti State University, Faculty of Education, Ado Ekiti, Ekiti State,* 17.

Opara, P. N. (2016). Factors affecting teaching and learning of basic science and technology in primary schools. *Journal of Educational Policy and Entrepreneurial Research, 1*(1), 46-58.

Robert, E. S. (2011). *Educational psychology: Theory and practice* (9th ed.). Pearson International.

Robinson, O. O., & Daniel, O. I. (2017). Effects of instructional scaffolding on academic performance of students in financial accounting in secondary schools in Delta State, Nigeria. *Journal of Education Research and Behavioural Science, 6*(2), 21-28.

Shaaban, K. (2016). An initial study of the effects of cooperative learning on reading comprehension, vocabulary acquisition, and motivation to read. *Reading Psychology, 27*, 377-403.

Sherman, L. W. (2016). A comparative study of cooperative and competitive achievement in two secondary biology classrooms: The group investigation model versus an individually competitive goal structure. *Journal of Research in Science Teaching, 26*, 55-64.

Wu, H. L., Weng, H. L., & She, H. C. (2016). Effects of scaffolds and scientific inquiry. *International Journal of Contemporary Educational Research, 3*(1), 12-24

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