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Available at:
https://journal.nahnuinisiatif.com/index.php/ARJI
Volume 6 Nomor 4 Tahun 2024
DOI : 10.61227
E-ISSN : 2775-0787
P-ISSN : 2774-9290

Action Research Journal Indonesi

221 – 235

Effect of Think-Pair-Share Instructional Strategy on Secondary School Students' Academic Achievement in Chemistry

Article posted :
2024-11-02
Articles received :
2024-12-02
Articles published :
2024-12-04

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Keywords:
Achievement, Chemistry, Instructional Strategy, Lecture Method, Think-Pair-Share

Abstract: This study investigated the effect of think-pair-share instructional strategy on secondary school students' academic achievement in Chemistry. It covered the topics; acids, bases and acid-base reactions. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. The quasi-experimental design was adopted. The population of the study was 5,714 senior secondary school year one (SS1) Chemistry students in Awka Education zone in Anambra State. A sample of 192 SS 1 Chemistry students obtained using stratified and simple random sampling techniques was involved in the study. The instrument for data collection was Chemistry Achievement Test (CAT) validated by experts. The reliability of the instrument was established using Kuder-Richardson Formula 20 for CAT which yielded coefficient of internal consistency of 0.81. Data were collected by administering the instruments. The data obtained were analyzed using mean and standard deviation to answer the research questions; and analysis of covariance (ANCOVA) to test the hypotheses. The findings of the study revealed that there was significant difference in the mean academic achievement scores of the students taught Chemistry using think-pair-share instructional strategy and those taught using lecture method in favour of think-pair share instructional strategy. Moreso, there was no significant difference in the mean achievement scores of male and female students taught Chemistry using think-pair-share instructional strategy. Based on the findings, recommendations were made that seminars should be organized to orient Chemistry teachers on how to effectively use TPS instructional strategy in the teaching

and learning of Chemistry. The study contributed to knowledge such that it has empirically proved and established that use of TPS improves students' academic achievement in Chemistry surpassing lecture method. The study also revealed empirically that use of TPS in teaching Chemistry enhances male and female students' academic achievement.

Available at : https://journal.nahnuinisiatif.com/index.php/ARJI/article/view
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INTRODUCTION

Science is the study of the natural world using scientific method. It is acquired by systematic investigation of natural environment. Application of the scientific knowledge to the environment gave rise to technology. Science and technology are the bed rock for national development. Science and technology have led to all massive growth (Ibe,2021). Such growths and development are in the areas of electricity, transport, medicine, agriculture and all man's inventions are products of science and technology.

The importance of science and technology to national development in the life of any country cannot over-emphasized because knowledge and skills in science and technology are very vital for the sustained development of any society (Ogbaga,2023). The future of every society will be determined by citizens who are able to understand and help shape the complex influence of science and technology in the world.

Massive growth in science and technology outburst is posing great pressure on science education system (Ogbaga,2023). Advancement of any nations economic and social development depend to a large extent on the level of her scientific and technological knowledge. All advanced countries have a strong scientific education foundation. A close look at the developed countries of the 21st century reveals that, just as they do in the case of science and technology, they transfer their practices in the field of education (Eze & Obiekwe, 2018).

In Nigeria, the level of scientific and development depicts the level of our economic and social development. Ezeliora, et. al. (2021) opined that a well developed and implemented science and technology education programme of a country will not only produce knowledgeable and skilled manpower for the technology workforce but also usher in sustainable socio-economic growth and political stability in that country. Therefore, there is need to improve and raise the standard of achievement of our students in Chemistry education.

Chemistry is one of the fundamental sciences taught in secondary schools, encompassing the study of the properties, composition, and structures of matter, as well as the changes that matter undergoes and their implications for human welfare and society. It serves as the foundation for scientific and technological advancements, influencing nearly every aspect of daily life, from health and agriculture to food, shelter, clothing, and education (Okebanama & Umate, 2023). Given its pivotal role, the teaching and learning of Chemistry in schools deserve significant attention. Unfortunately, students' achievement in Chemistry, particularly in the Senior Secondary School Certificate Examination, has been disappointing. This is evident in the fluctuating results from the WAEC examinations over the years. The statistical data from WAEC chief examiner (2019-2023) revealed that between 2019, 2020, 2021, 2022 and 2023 out of 706873, 706224, 710024, 719786 and 717859 Chemistry students that registered and sat for the Senior School Certificate Examinations (SSCE) only a total of 298751, 301348, 293145, 293001 and 292872 representing 42.2%, 42.67%, 41.29%, 40.70% and 40.80% respectively passed Chemistry at credit grade and above while a total of 408122, 404876,

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E-ISSN : 2775-0787

416879, 426785 and 424987 representing 57.74%, 57.33%, 58.71% 59.90% and 59.20% respectively failed the subject (see appendix A, Page 137).

From the above statistical Chemistry achievement results (2019-2023), it was observed that the WAEC statistics of Chemistry students in these years has not shown a consistent upward trend. The WAEC Chief Examiners identified several critical weaknesses among students in their understanding of acids, bases, and acid-base reactions. These weaknesses highlight a pressing need for improved educational strategies in the subject. One of the most significant issues identified is the poor knowledge of acids, bases and acid-base reactions (Ibe, 2021). Many students demonstrated a fundamental lack of understanding of key concepts, which adversely affected their overall performance. This deficiency is further compounded by students' inability to accurately report results from acid-base titration experiments, a vital skill in Chemistry that requires both practical ability and theoretical understanding. The consistent failure to write correct chemical equations related to acid-base reactions has also been a major concern, reflecting a deeper lack of comprehension of essential chemical processes. The cumulative effect of these weaknesses indicates a dire need for improvement in the teaching and learning of Chemistry, particularly regarding acids, bases, and acid-base reactions.

In a secondary school context, understanding the Chemistry of acids, bases and acid-base reaction is critical for several reasons. It enhances academic achievement, interest and retention. WAEC Chief examiners' individual reports from 2019-2023 observed that Chemistry students experienced weakness mostly in these areas of Chemistry due to poor knowledge of the concepts, unable to report results of acid-base titration experiments, unable to make calculations on molar concentration, mass concentration, exhibited poor communication skills and trivial names instead of formulae. The continued evidences of these concepts identified by WAEC Chief Examiners Reports for several years gave rise to the choice of these topics, which led to the overall poor academic achievement in Chemistry.

Academic achievement entails successful academic progress attained through effort and skill. It is the level of accomplishment or proficiency one has in an open academic area as opposed to one potential (Ogbaga, 2023). Academic achievement is an educational goal that is achieved by an educational leader or institution over a period of time (Usang, 2021). Usang further stated that academic achievement as the outcome of the training imported to students by the teacher in school situation. In relation to the above study, academic achievement can be regarded as an observable and measurable behaviour of students in Chemistry: Thus, academic achievement is obtained through the administration of achievement test, which could be either a teacher-made test or standardized achievement test.

Academic achievement of student is a very important parameter of knowing how well the teacher teaches the subject matter to the students. Despite the importance of academic achievement, students' achievement in Chemistry has shown significant

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variability over the years, particularly in high-stakes assessments like in WAEC (Usang & Okoli, 2021). This low academic achievement raises concerns about the effectiveness of traditional instructional methods. A notable gap exists in exploring innovative teaching strategies that can enhance students' academic achievement, interest and retention of Chemistry topics, such as acids, bases, and acid-base reactions. The persistent challenges faced by students call for the adoption of effective instructional strategies that can enhance academic achievement will help students not only achieve better in external examinations like WAEC but also develop a more robust understanding of Chemistry through using an appropriate instructional strategy in teaching and learning of Chemistry.

Instructional strategy is a set of principles and methods used by teachers to enable student learning. These strategies are determined partly on subject matter to be taught and partly by the nature of the learner. For a particular instructional strategy to be appropriate and efficient it has to take into account the learner, the nature of the subject matter, and the type of learning it is supposed to bring about (Okebanama & Umate, 2023). Chemistry as a science subject is activity based. There are two types of instructional strategy namely conventional and innovative instructional strategies (Okebanama & Umate, 2023). Conventional instructional strategy refers to the instruction using chalk and board for teachers; pen and paper for students. In conventional instructional strategy students are not engaged in critical thinking and this leads to rote learning with little transfer of knowledge. In conventional instructional strategy, students are very passive. The conventional instructional strategy is often used by Chemistry teachers in teaching Chemistry includes; lecture method, demonstration and direct instruction (Rasha, 2018). For the cause of this study lecture instructional strategy or method will be considered.

Lecture method (LM) of instruction is a teacher –centered and information centered approach in which the teacher speaks and students listen. Benefits of lecture method (LM) includes time saving, scalability, every student gets the same thing, good for big group learning, provides additional content and clear plan. Despite these benefits, the teaching method was found to stress more on the transmission of knowledge in a manner that emphasizes memorization hence they have been characterized by some educators as a poor method of teaching Chemistry and science subjects. (Igboanugo 2018; Ibe ,2021; Eze & Obikwe,2018; Ahmed-Hamdan,2018). Another method of instruction is innovative instructional strategies. Innovative instructional strategies on the hand are new and creative ways of teaching. Innovative instructional strategy includes co-operative learning approach, brainstorming and think-pair-share (TPS) amongst others (Ahmed-Hamdan, 2018; Imam, 2018). For the purpose of this study think pair share instructional strategy is considered.

Think-pair-share (TPS) instructional strategy is a cooperative learning strategy that encourages students to work together to solve problems and answer questions on an assigned topic. Think-pair- share as the name indicates involves the students thinking about challenging academic tasks given by the teacher individually, with other students by exchanging ideas and sharing the ideas with the larger class (Eze & Obiekwe, 2018). In

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the think-pair-share strategy, every student is an active learner and teacher. In think-pair-share, the teacher produces a chart of students' seating arrangement. Using the chart, students are made to pair in the class to facilitate greater interaction. During the interaction among pairs, students are expected to bring to the pair learning what they think is the solution to the problem, for which the teacher have given them time to think before pairing (Okebanama & Umate, 2023).

The student pairs are to examine each other's solution to the problem, criticize or add to the solution or learn from it. Students in their pair may choose to solve the problem together with the ideas they have previously thought in their mind. This collaboration to solve a problem result in a possible or at least tentative solution to the problem, which the students may now share with the entire class. The teacher appoints students at random looking at the chart to ensure that all the students are involved and that the intelligent ones do not dominate the activities (Igboanugo, 2018). After the sharing, the teacher summarizes the lesson in the order of what students are supposed to learn. In other words, think-pair-share take place in three stages; individuals think silently about a question or task presented by the teacher; individuals pair up and exchange ideas; pairs share their views with the whole class. These processes of learning generate better understanding on the part of students. Some researchers believed that think pair share as one of the innovative instructional strategies could facilitate learning and teaching of Chemistry subject (Eze & Obikwe; 2018). Imam (2018) asserted that think- pair-share (TPS) could be a great means to boost academic achievement of secondary school students in science subjects including Chemistry. It is believed that students need to be guided properly through appropriate innovative teaching methods like think-pair-share instructional strategy in order to facilitate students' understanding of difficult Chemistry' concepts; acid, base, acid-base reactions as discussed by WAEC Chief Examiners reports. Thus, this study investigates the effect of think-pair-share instructional strategy on secondary school Chemistry students' achievement influenced by gender.

Gender is defined as the state of being male or female. Gender is a biological sex of an individual that has assumed an important determinant factor in science and technology education (Ilo, 2019). Some researchers have shown contradictory evidence on students' academic achievement in science due to gender. Different methods of instruction are either gender sensitive or gender bias. Ogbaga (2023) identified sex-role stereotyping and masculine image of science as the origin of the differences between male and female achievement in science education. Okafor and Nzomiwu (2021) reports that females performed better than male students when taught Mathematics using cooperative learning. Ogunyebi (2018) averred that think-pair-share effective teaching improve the achievement of male and female integrated science students more especially the female students. These mixed findings deem it fit to determine whether think-pair-share instructional strategy will provide an inclusive method to facilitate male and female Chemistry students' achievement in acid, base and acid-base reaction. These areas are

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DOI : 10.61227
P-ISSN : 2774-9290
E-ISSN : 2775-0787

considered very important in Chemistry teaching and learning and feature prominently in WAEC examination questions.

Purpose of the Study:

The purpose of the study is to investigate the effect of think-pair-share strategy instructional strategy on secondary school students' achievement in Chemistry. Specifically, the study seeks to determine:

1. the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy and those taught with lecture method.
2. the mean achievement scores of male and female students taught Chemistry with think-pair-share instructional strategy.

Research Questions

The following research questions guided the study:

1. What are the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy and those taught using lecture method?
2. What are the mean achievement scores of male and female students taught Chemistry with think- pair- share instructional strategy?

Research Hypotheses

The following hypotheses guided the study and are tested at 0.05 level of significance:

1. There is no significant difference in the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy and those taught with lecture method.
2. There is no significant difference in the mean achievement scores of male and female students taught Chemistry with think-pair-share instructional strategy.

METODE

The study employed a quasi-experimental design, specifically the pretest-posttest non-equivalent control group design. The area of the study was Awka Education zone in Anambra state. The population of the study was 5,714 (3,173 females and 2541 males) senior secondary one (SS1) Chemistry students in the forty-nine (49) government-owned co-educational secondary schools in Awka Education Zone of Anambra State. The sample for the study was 192 senior secondary school year one Chemistry students. The sample was obtained using stratified and simple random sampling techniques. Four coeducational schools were selected. From the four schools selected, the schools were randomly assigned to experimental and control groups. Two of the schools were assigned to experimental group consisting of 48 males and 54 females' students who were taught Chemistry concept using TPS and the other two were assigned to the control group consisting of 49 males and 41 females' students who were taught Chemistry concepts using LM. The instrument for the study was Chemistry Achievement Test (CAT). CAT which was made of 50 questions on the concepts of acid, bases and acid-base reactions.

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The test was organized based on table of specification, representing the different levels of knowledge. The CAT consisted of fifty (50) multiple choice items with four options (A-D). Only one option is the correct answer for each test item. Correct response carried 2 marks each, giving a total of 100 marks score. Also, lesson plans were prepared on the concepts of acid, bases and acid-base reactions for the treatment group using think-pair-share instructional strategy. The control group lesson plan was on lecture method of teaching. The instrument was validated by experts in the Departments of Science Education and Educational Foundations. The reliability of the CAT was established using Kudder-Richardson 20 (KR-20). CAT was administered once to thirty SS1 Chemistry students in a school outside the area of study and the data generated was used to compute the internal consistency which yielded 0.81. The experimental procedure was conducted in two phases. First phase was training of research assistants and the second phase was treatment phase. The experiment lasted for six weeks. The research assistants were the Chemistry teachers from the sampled schools. The training of research assistants took two contact periods with the researcher in each of the groups. During the contacts the research assistants were briefed on the research problems. A training was done for the experimental groups on the use of TPS and how to expose students to its three strategic phases. The research assistants for control group were also trained on how to use lecture method (LM) to teach the Chemistry concepts to the group. The treatment was conducted first by administering the pretest using CAT. No feedback on students' performance or revision was given. The students were oriented on the concept of think-pair-share. The teacher modeled for the students how to select their pair partner according to the serial numbering of the students in the classroom seated arrangement. For the entire treatment period, the serial arrangement were prepared on a chart and placed in the classroom so that students may know who their pairs are for the whole of the treatment exercise. After the brief orientation, the teacher introduced the students to the topic of the first week and challenge them with questions on the objectives of the instruction. The teacher then gave the students a general overview of what they are expected to bring back for their class presentation. To make the lesson organized, the students were given the topic of the lesson a week before the lesson. During each challenge, the student selected a different pair partner. The student would share their answer to the questions with their pairs and formulate answer for each questions. Students presented their answers in an organized manner and prepare to answer the questions in the general class after their presentation. To ensure active participation from all the students, the

teacher chose at random, the students to answer the questions for each given lesson. At the end of the lesson, the teacher summarized the correct points of the lessons while correcting students on wrong answers given for the questions poised as a challenging task for the students. After the treatment, the same instruments used in the pretest were administered as posttest. The data obtained were analyzed using mean and standard deviation to answer the research questions; and analysis of covariance (ANCOVA) to test the hypotheses. The decision rule is that when P value was less than or

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equal to 0.05, the null hypotheses were rejected and whenever P value is greater than 0.05, the null hypotheses were not be rejected.

RESULTS AND DISCUSSION

Research Question 1

What is the difference in the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy (TPS) and those taught using lecture method (LM)?

Table 1. Mean and Standard Deviation of Achievement Scores of Students Taught Chemistry with TPS and those Taught Using Lecture Method

Group		Pre-test		Post-test			Mean Gain Difference
	N	Mean	SD	Mean	SD	Mean Gain	
TPS	102	41.14	9.22	73.55	4.24	32.41	10.12
LM	90	40.82	4.82	63.11	5.10	22.29	

The result in Table 1 showed that the pre-test and post-test mean achievement scores of students taught Chemistry with think-pair-share instructional strategy (TPS) were 41.14 and 73.55 respectively while the standard deviation scores were 9.22 and 4.24 respectively. On the other hand, the pre-test and post-test of those taught using lecture method (LM) were 40.82 and 63.11 respectively while the standard deviation scores were 4.82 and 5.10. The standard deviation score for the pre-test in experimental group (TPS) was higher than that of the post-test. This suggested more variability in the pre-test scores of the students than the post-test scores in TPS group. Hence, more of the scores were near the mean in the pre-test than in the post-test of Chemistry students in TPS group. Moreover, the standard deviation score for the pre-test in control group (LM) is lower than that of the post-test. This suggested less variability in the pre-test scores of the students than the post-test scores in LM group. So, more of the scores are near the mean in the post-test than in the pre-test of students in LM group.

The mean gain achievement score for Chemistry students taught with TPS was 32.41 while that of LM was 22.29. This represented a mean difference of 10.12 in favour of students taught Chemistry with think-pair-share instructional strategy (TPS). This implied that students taught with TPS achieved better in Chemistry concepts studied than those taught using LM.

Research Question 2

What is the difference in the mean achievement scores of male and female students taught Chemistry with think- pair- share instructional strategy?

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Table 2. Mean and Standard Deviation of Achievement Scores of Male and Female Students Taught Chemistry with TPS

		Pre-test		Post- test			
Gender	N	Mean	SD	Mean	SD	Mean Gain	Gain Difference
Male	48	42.38	8.15	73.92	4.19	31.54	1.64
Female	54	40.04	10.02	73.22	4.30	33.18	

The result in Table 2 showed that the pre-test and post-test mean achievement scores of male students taught Chemistry with TPS were 42.38 and 73.92 respectively while the standard deviation scores were 8.15 and 4.19 respectively. On the other hand, the pre-test and post-test mean achievement scores of female students taught Chemistry with TPS were 40.04 and 73.22 respectively while the standard deviation scores were 10.02 and 4.30. The standard deviation score for the pre-test among male students taught Chemistry using TPS was higher than that of the post-test. This suggested more variability in the pre-test scores of the students than the post-test scores in male students. Hence, more of the scores were near the mean in the pre-test than in the post-test of male students using TPS. Moreover, the standard deviation score for the pre-test among the female students taught Chemistry using TPS was higher than that of the post-test. This suggested more variability in the pre-test scores of the female students than the post-test scores. So, more of the scores were near the mean in the pre-test than in the post-test of female students using TPS. The mean gain score for male Chemistry students taught with TPS was 31.54 while that of their female counterpart was 33.18. This represented a mean difference of 1.64 in favour of female students taught Chemistry using TPS. This implied that female students had a slight higher mean achievement score than their male counterpart when taught with TPS

Hypothesis 1

There is no significant difference in the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy and those taught with lecture method.

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Table 3. Analysis of Covariance (ANCOVA) of Chemistry Students' Mean Achievement Scores between Groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	5414.856[a]	4	1353.714	64.537	0.000	
Intercept	24003.430	1	24003.430	1144.345	0.000	
Pretest	181.318	1	181.318	8.644	0.004	
Groups	5108.736	1	5108.736	243.555	0.000	S
Gender	2.295	1	2.295	0.109	0.741	NS
Groups * Gender	17.533	1	17.533	0.836	0.362	NS
Error	3922.456	187	20.976			
Total	914364.000	192				
Corrected Total	9337.313	191				

S= Significant, NS = Not Significant

The result in Table 3 showed that there was a significant difference in the mean achievement scores of students taught Chemistry with TPS and those taught with LM, F (1, 187) = 243.555, p = 0.000. Since the obtained p-value was less than the stipulated 0.05 level of significance, the null hypothesis which stated that there was no significant difference in the mean achievement scores of students taught Chemistry with think-pair-share instructional strategy and those taught with lecture method was rejected. This implied that the mean achievement score of students taught with TPS was significantly higher than the mean achievement score of those taught with LM.

Hypothesis 2

There is no significant difference in the mean achievement scores of male and female students taught Chemistry with think-pair-share instructional strategy.

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Table 3. Analysis of Covariance (ANCOVA) of Mean Achievement Scores of Male and Female Students Taught Chemistry with TPS

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Corrected Model	81.167[a]	2	40.584	2.317	0.104	
Intercept	23144.353	1	23144.353	1321.324	0.000	
Pretest	68.912	1	68.912	3.934	0.050	
Gender	5.840	1	5.840	0.333	0.565	NS
Error	1734.088	99	17.516			
Total	553580.000	102				
Corrected Total	1815.255	101				

NS = Not Significant

The result in Table 3 showed that there was no significant difference in the mean achievement scores of male and female students taught Chemistry using TPS, F (1, 99) = 0.333, p = 0.565. Since the obtained p-value was higher than the stipulated 0.05 level of significance, the null hypothesis which stated that there was no significant difference in the mean achievement scores of male and female students taught Chemistry with think-pair-share instructional strategy was upheld. This implied that the use of TPS significantly improved the mean achievement scores of both male and female students in Chemistry.

Discussion

The findings of the study showed that students taught Chemistry using think-pair-share instructional strategy achieved more than those taught Chemistry using lecture method. This was in line with Eze and Obiekwe (2018) who confirmed in their study that students achieved more in the use of think-pair-share instructional strategy irrespective of their ability level than those students who were taught using conventional lecture method. The observed result was because think-pair-share instructional strategy afforded the students opportunity to interact extensively over the material. Thus, students who could not understand some aspect of the material on their own, asked and inquired from their peers during the pairing. Also, students shared with the larger class in the likeness of a teacher thereby concretizing what they have learnt. Students' ability to understand the material during the thinking time also helped them to develop skills of scientific thought and may have increased their scientific literacy. More so, the finding of the study was in consonance with Adeoye and Alyande (2024) who indicated that TPS instructional strategy reduces the abstract nature of the Chemistry as a science-based subject and elucidates the concepts and facilitated proper understanding of Chemistry concepts. Students also have opportunities to learn from their pairs, therefore, gaining

confidence in answering Chemistry tasks, hence, the increase in achievement. Naturally, when such student-centered instructional strategy was used to enrich learning experiences, students were expected to achieve high. Furthermore, the study disclosed that there is a significant difference in the mean achievement scores of students taught Chemistry using TPS instructional strategy and those taught using lecture method in favour of those taught using TPS instructional strategy. This supported Okebanama and Umate (2023) who revealed the effectiveness of TPS instructional strategy over conventional teaching method on students' academic achievement in Chemistry. The finding lent support to the study of Usang & Okoli (2021) who reported that TPS instructional strategy was more effective in enhancing students' achievement in Chemistry when compared to the conventional teaching method. In support of this point, Ogunyebi (2018) asserted that TPS created positive classroom climate that encourages the students to be interactive and active, providing students with the opportunity to share ideas and gave answers to every question posed by the teacher. By the virtue of this study, this study had joined the group of knowledge that stated a significant difference in the mean achievement scores of students taught Chemistry using TPS instructional strategy and those taught using lecture method in favour of those taught using TPS instructional strategy.

The findings of the study showed that female students slightly achieved better than male students taught Chemistry using TPS instructional strategy. The finding is not supported by Ogunyebi, (2018) who observed that the mean scores for male students in achievement were higher than that of the female students for the group taught Chemistry using TPS instructional strategy but in line with Eze and Obiekwe (2018) who confirmed that female students achieved more than their male counterpart in the use of TPS instructional strategy in Chemistry in secondary school. The outcome of the study that female students achieved better than male students taught Chemistry using TPS instructional strategy could be attributed to factors such as enhanced engagement, self-esteem, and self-confidence fostered by cooperative learning environments. These settings facilitate collaboration and support, which could be particularly beneficial for female students, leading to a more positive learning experience in the secondary school Chemistry concepts studied.

More so, the finding of the study showed no significant difference in the mean achievement scores of male and female students taught Chemistry using TPS instructional strategy. This was in consonance with Usang, (2021) who reported no significant difference in the mean achievement scores of male and female students taught Chemistry using TPS instructional strategy. The no significant difference in the mean achievement scores of male and female students taught Chemistry using TPS instructional strategy could be as a result that learning strategy engaged students effectively, leading to similar levels of achievement regardless of gender. Additionally, it might be as a result of educational environment in the sample schools used in the study, including teacher effectiveness, relevance of the curriculum, and student support systems might play a significant role in sustaining achievement across genders. It was also possible that

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P-ISSN : 2774-9290
E-ISSN : 2775-0787

individual learning preferences and past experiences with Chemistry could mitigate significant differences in achievement scores. As a result of this finding, this study had joined the group of knowledge that observed no significant difference in the mean achievement scores of male and female students taught Chemistry using TPS instructional strategy.

CONCLUSION

The conclusion drawn from the findings of the study revealed that think-pair-share instructional strategy is an effective strategy for the teaching and learning of Chemistry concept. The strategy also makes the learning of Chemistry more engaging for students. It can also be concluded that when Chemistry teachers adopted think pair-share teaching strategy, student to student interaction increases making students to take responsibility for their learning.

BIBLIOGRAPHY

Adeoye, I.F. & Alayande, E. (2024). Effect of timed think-pair-share and circle chat on students' academic achievement in basic chemistry concepts. International Journal of Novel Research in Education and Learning, 11(5), 77-87.

Ahmed-Hamdan, R. K. (2018). The effect of think -pair- share strategy on the achievement of third grade student in sciences in the educational district of Irbid. Journal of Educational and Practice, 8(9), 88-95.

Eze, G.N & Obiekwe, P.C. (2018). Think-pair-share instructional strategy: a variety tool for enhancing students' achievement in secondary school chemistry. African Journal of Science, Technology and Mathematics Education, 4(1), 64-71.

Ezeliora, B.A, Ibe, F.N & Obikezie, M.C. (2021). Comparative effects of teaching with improvised instructional materials and standard instructional materials on secondary school students' academic achievement in Chemistry. International Journal of Research in Education and Sustainable Development, 1(8), 27-40.

Ibe, F. N, Obikezie, M. C. & Chikendu, R. E. (2021). Effects of improvised instructional materials on Chemistry students' academic retention in secondary school. International Journal of Research in Education and Sustainable Development, 1(5), 19-31.

Igboanugo, B. I (2018). Interactive effects of science-technology-society instructional approach, teacher experience, gender and school location on students' achievement and interest in chemistry. [Unpublished Ph.D. Dissertation] University of Nigeria.

Imam M. (2018). Improving students' reading skills through knowledge strategy. [Unpublished Ph.D. Dissertation] Ar-Raniry State Islamic University.

Ogbaga O. A. (2023). Effects of brainstorming and think-pair-share strategies on secondary school students' academic achievement and retention in biology. [An Unpublished PhD Dissertation]. Nnamdi Azikiwe University.

Available at : https://journal.nahnuinisiatif.com/index.php/ARJI/article/view
DOI : 10.61227
P-ISSN : 2774-9290
E-ISSN : 2775-0787

Ogunyebi, T. H. (2018). Enhancing science performance through think-pair-share strategies among college of education students in integrated science. International Journal of Education and Evaluation, 7(5), 24-35.

Okafor, C.F. & Nzomiwu, C.C. (2021). Effect of think-pair-share instructional strategy on secondary school students' academic achievement in Algebra. Chukwuemeka Odumegwu Ojukwu University Journal of Science Education & Allied Discipline, 3(1), 21-32

Okebanama, C. I &Umate, B.A. (2023). Assessing the effectiveness of think-pair-share and know-want-to-know-learn instructional strategies on students' academic achievement in Chemistry. Proceedings of the 63rd Annual Conference Science Teachers Association of Nigeria. 217-229.

Ribhi, K. A. H. (2017). The effect of think-pair-share strategy on the achievement of third grade students in sciences in the educational district of Irbid. Journal of Education and Practice, 8(9), 88-95.

Usang, F. P. (2021). Effect of think-pair-share instructional strategy on secondary school students' academic achievement and interest in Chemistry. [An Unpublished M.Sc Thesis]. Nnamdi Azikiwe University.

Usang, F.P & Okoli, J.N. (2021). Effect of think-pair-share teaching strategy on secondary school students' achievement in Chemistry in Cross River state. IOSR Journal of Research & Method in Education, 11(2), 42-48.

West African Examination Council (2015), (2016), (2017), (2018), (2019), (2020), (2021), (2022). Chief Examiners' Reports. Amao Press Ltd..

Available at : https://journal.nahnuinisiatif.com/index.php/ARJI/article/view
DOI : 10.61227
P-ISSN : 2774-9290
E-ISSN : 2775-0787