MATHEMATICS SCAFFOLDS LEARNING STRATEGY AND PRIMARY SCHOOL PUPILS' KNOWLEDGE OF BASIC NUMERATION IN UYO METROPOLIS OF AKWA-IBOM STATE

Okri, J. A. (Ph.D)
Okrijohn04@gmail.com
+234-8067525992

Esuong, U. U. (Ph.D)
uwanseesuong@gmail.com
+234-8063274768

Emeka Standhope, l
standhope@unical.edu.ng
+234-8036819007

Department of Mathematics and Computer Science Education
University of Calabar,
Calabar-Nigeria

Abstract

The study investigated effect of mathematics scaffolding learning strategy on primary school pupils' knowledge of Basic Numeration in Uyo Metropolis of Akwa-Ibom State. Two objectives and two hypotheses were formulated and tested at 0.05 level of significance. The study adopted quasi-experimental design. Stratified sampling technique was used to select a sample of 385 primary 6 pupils from the population of 12,467. The experimental class was exposed to mathematics scaffolding learning strategy on primary school pupils' knowledge of Basic Numeration while the control class was exposed to normal mathematics class otherwise called conventional method. Mathematics Achievement Test (MAT) was the instrument used to collect data. Analysis was done using mean standard deviation and independent t-test. The result showed that; there was a significant mean difference between pupils who were taught mathematics using mathematics scaffolding learning strategy. Also, there was no significant difference in the mean performance score between urban and rural pupils when taught mathematics using the scaffolding learning strategy. Based on these findings, it was recommended that teachers should adopt mathematics scaffolding learning strategy to teach primary school pupils.

Keywords: Scaffolding, Mathematics, Knowledge, Numeration and gender

Introduction

Education is the bedrock of national development because good education has the potentials of changing the quality of life of people. Through education we gain knowledge of the world we live in and transform it. This transformation can be facilitated through science and technology which can be seen in different aspects of our lives such as medicine, electricity, aviation, infrastructure, automobile and others. The importance of science and technological education can never be overemphasized. The Federal government of Nigeria in recognition of this importance has invested massively in science education by building science laboratories and equipping them. Mathematics as a science subject is one of the basic ingredients of technology and the knowledge of Mathematics is also needed for pupils to successfully study professional courses such as nursing, medicine, engineering, accounting and pharmacy. Mathematics contributes to the study of other

natural sciences such as Geology, physics, and chemistry, it therefore occupies a place of pride in Nigerian science school curriculum because of its importance. It is therefore very important that pupils studying Mathematics should understand the basic Mathematics concepts to enable them live a meaningful life and to contribute effectively to national development (Katelyn, Tyler, Shanice & Molly, 2016, Olofu etal 2019; Inyang, 2022).

Mathematics is a body of knowledge needed for the accomplishment of a technological nation. According Okri, Adie, Obi and Opoh (2023), mathematics, as a science, may be defined as knowledge gained through hierarchical, deductive, axiomatic, correct, formal, and abstract reasoning while it may also be seen as a tool for creating methods of thinking for everyday life and explaining the phenomena of coping with technological and scientific development. As a result, it is obvious that the implementation procedure of mathematical learning at all level of education necessitates an attention in wide-ranging manner. The focus attention could not be separated from the three interrelated components of teachers, students, and materials/content.

Mathematics is particularly concerned with reasoning that leads to problem solving, procedures, and ideas (Yakub & Prof, 2019). Many factors impact on the success of mathematics teaching and learning. Thus, while teaching Mathematics, one should employ teaching methods, strategies and instructional resources that are more productive in eliciting acceptable responses from the complex activity (Ahumaraeze & Ekwueme, 2019). The nature and quality of instructional materials, teacher pedagogical abilities, subject presentation, student motivation and learning environment are all key factors to consider when attempting to ensure quality in teaching and learning of Mathematics (Kankpang et al, 2022).

Mathematics is an essential subject for teachers, students and the society. With it, fosters individual scholarly qualities, such as discovery, thought, reasoning, originality, induction, interpretation and creativity. Despite the importance of mathematics to academic advancement of students, there are still many challenges which have resulted in unstable performance in senior secondary school certificate examination (Iroko, 2022 & Meremikwu, 2022).

According to Ginga, Muhammed and Usman (2019), low students' performance in mathematics is due to a lack of teaching materials, usage of appropriate teaching approach, mathematics phobia, and inadequate teaching facilities which comprise instructional materials and equipment for effective teaching. Okri, Orim and Opoh (2021) highlighted three potential elements causing mathematics underachievement; the teachers' component which is made up of classroom management, subject matter mastery, communication skills, personality and instructional techniques. The second aspect is the students' factor which comprises time management, study habits, attitude and enthusiasm in mathematics. Environmental elements such as educational setting, parents, morals, attitude and peer group make up the third category. Teachers should be able to teach mathematics with different instructional strategies to arouse students' interest in the subject and hence enhanced academic performance (Adie et al, 2022). In light of this, teaching strategies that highlight practical approaches of teaching and learning that adapts critical thinking in the active learning environment are required in mathematics. One of such strategies is scaffolding strategy (Bessong et al, 2018).

Scaffolding is a term that refers to a technique or a set of approaches employed during a learning process in order to maximize achievement, understanding and output (Aditi, 2017, Ibu, et al 2019) with the goal of achieving educational objectives. It is a temporary, organized, and gradual support provided by the teacher to students in order to help them achieve a higher level of comprehension and skill development that they would not be able to achieve on their own. Scaffolding aids students in completing various tasks. Scaffolding has three key characteristics: it is a collaborative and effective interaction between the learners and the teacher; it works in the learner's Zone of Proximal Development (ZPD); and it is a temporary support that is gradually eliminated once the goal is reached (Bessong, et al 2018 & Olofu, et al, 2021).

The teaching technique of instructional scaffolding emphasizes the teaching of new abilities by involving students in collaborative projects that would be excessively difficult for them to do on their own (Joda, 2019). Faheem, Aqsa, Memoona, Shakeel and Sobia (2022) research focuses on the scaffolding instructional technique in improving students' understanding level in the subject of mathematics. The study was experimental in nature and thereby experiment was conducted at Government School Daraban Kalan, District Dera Ismail Khan, Khyber PakhtunKhwa. Two groups are formed of 10th grade students on the basis on pre-test score. Twenty-five (25) students were randomly assigned to control group whereas 25 assigned randomly to experimental group. Control group were taught to conventional style of teaching while treatment group was taught by using scaffolding instructional approach. Pretest and Posttest was developed from 10th grade mathematics syllabus (Olofu et al 2019). The result of the study reveals that students secured high marks in experimental group as compared to control group. The study concluded that scaffolding instructional strategy enhances the students learning in academic achievement.

Nwoke (2020) conducted a study on the impact of instructional scaffolding approach on secondary school students' achievement in Mathematics. The study was carried out in Owerri Municipal Council of Imo State. The study was a quasi-experimental research type adopting the pre-test post -test non -equivalent control design in carrying out the study. A sample of 237senior secondary school II (SS II) students consisting of 81 males and 156 females was used for the study. The instrument for data collection was a researcher made 30 items objective test questions titled "Mathematics Achievement Test (MAT)". The instrument had reliability coefficient of 0.85 determined using Kuder Richardson 20 formula (KR20). The experiment group was taught mathematics using instructional scaffolding approach while the control group was taught using traditional approach. The data generated was analyzed using mean and standard deviation to answer research questions while Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The result of the study revealed that instructional scaffolding is effective in enhancing secondary school students' achievement in mathematics and minimized gender bias.

Furthermore, gender has become a contemporary variable for mathematics educators and researchers because of its influence on mathematics teaching, learning, interest and achievement. Based on this, many researchers at both local and international levels have documented gender differences in geometry achievement of secondary school students as inconclusive (Iji, Abakpa & Fekemo, 2013). Researchers had different view on the influence of gender on students' achievement as gender issues have long been a topic of educational research, particularly in the area of Mathematics which has generated a lot of conflicting and inconclusive results. Result of some studies such as (Oloda, 2017, Olofu et al 2018) showed significant differences in the achievement of female and male students in Mathematics, others show contrary results such as (Olasehinde & Ololaye, 2014) said that there was no significant difference in the achievement of students based on gender. Anibuze (2017) in their separate study reported that female performed better than male students. These conflicting results call for continuous investigation especially with teaching strategies like Scaffolding and Round-robin strategies to bring equity in gender achievement in mathematics (Olofu etal 2021).

In the same vein, Ukwueze, Abugu and Odo (2020) conducted a study on effect of Scaffolding Instructional Techniques (SIT) on academic achievement among junior secondary school (JSS) mathematics students in Obollo-Afor Education Zone of Enugu State. The study was guided by two research questions and two null hypotheses. The design of the study was quasi-experimental research design; specifically non-equivalent control group. The population of the study comprised of 7,842 JSS 1 students in the 48 public secondary schools in Obollo-Afor Education Zone of Enugu state. The sample size of the study was 178 JSS 1 students from four (4) sampled schools drawn using proportionate stratified sampling technique. Mathematics

Achievement Test (MAT) was the instrument used for the study. The instrument was validated by three experts in Department of Science Education (one from measurement and evaluation unit and two from mathematics education unit), University of Nigeria Nsukka. The instrument was trial tested on a sample of 20 JSS 1 students from the same zone outside the sampled schools and the reliability index was 0.79 using Kuder Richardson 20 formula. The data collected analyzed Mean and standard deviation to answer the research questions and Analysis of Covariance (ANCOVA) to test the null hypotheses at 0.05 level of significant. The results of the study revealed that the students taught mathematics using Scaffolding Instructional Techniques (SIT) achieved higher than the group taught without Scaffolding Instructional Techniques (SIT). There was no significant difference in the mean achievement score of male and female students in mathematics as result of Scaffolding Instructional Techniques (SIT).

Gabi, Danjuma and Azige (2024) conducted a study on effect of scaffolding instructional strategy on secondary school students' academic achievement in Circle-Geometry in Keffi, Nasarawa State, Nigeria. The population included 1,027 students' (612 male and 415 female), with the sample size of 47 students' (24 male and 23 female) selected randomly. Quasi-experimental design, specifically a pre-test, post-test, nonequivalence control group design, was employed. The study was guided by two research questions and two null hypotheses. The Circle Geometry Achievement Test (CGAT) served as the data collection instrument, which was validated by three experts and found reliable with a reliability index of 0.82 using Kuder-Richardson formula 21 (KR21). The instrument was validated by three experts and found reliable with a reliability index 0.82 using K-R21. Descriptive statistics (mean and standard deviation) were used to answer the research questions, while Analysis of Covariance (ANCOVA) was employed to test the null hypotheses at a 0.05 level of significance. Results indicated that students' taught circle-geometry using the scaffolding instructional strategy achieved better than those taught using conventional method. Additionally, there was no significant difference in achievement scores between male and female students exposed to the scaffolding instructional strategy (Effiong et al 2018).

Poor pedagogical approach which the teachers utilize in teaching Mathematics concepts has been attributed to these problems among other reasons. Okri, Adie, Obi and Opoh (2023) noted that teacher-centered traditional approaches have persisted in Mathematics classrooms which run contrary to modem science days teaching. The traditional approaches are predominantly transmissive, make the learning of mathematical concepts irrelevant and relatively difficult. However, over the years, performance of pupils has not been very impressive from the National Examination Council (NECO) in the sciences especially in Mathematics. Despite the importance of Mathematics as a subject, empirical studies have shown that pupils still perform poorly in the subject (NECO, 2020, 2021, 2022, 2023 and 2024) as seen in Table 1

Table 1: National Examination Council Pupils' Results in Mathematics in Basic Education Certificate Examination (BECE) from 2020 to 2024

Year	Total No. of Candidates that Sat	No. of Candidates with C6 and Above	% of Candidates with C6 and Above	Percentage Fail
2020	130041898.11	645633	49.64	50.36
2021	150519998.20	579432	38.49	61.51
2022	164615097.53	587044	35.66	64.34
20203	169818800.00	564138	33.22	66.78
2024	169243500.00	529425	31.28	68.72

Source: Basic Education Certificate Examination (BECE); NECO, 2025, Minna

Table 1 shows that, almost 60 percent of pupils that sat for Basic Education Certificate Examination in Mathematics from 2020-2024 could not have the minimum requirements that qualified them to get admission into. The reports on table 1 revealed low academic achievement in Mathematics in Basic Education Certificate Examination (BECE). This poor achievement of pupils in Mathematics in external examinations leaves one in doubt about the effectiveness of instructional approaches employed by Mathematics teachers for the teaching and learning of Mathematics (Esuong & Effiong, 2023).

Statement of the problem

Many students find it hard to understand mathematics and often fail to succeed through their learning. This could be because they do not build an adequate understanding of essential mathematics ideas. Reports from the WAEC Chief Examiners (Mathematics) from May/June 2020 to May/June 2024 SSCE show the weaknesses of students in Mathematics particularly Numbers and numeration (see table 1).

Numbers and numeration as a link between themes in mathematics is one of the subjects in which students struggle the most. Understanding Numbers and numeration and appropriately applying it to everyday problems benefits both individuals and nations. Despite the importance of Numbers and numeration in the evolution of science and current efforts in mathematics education, students continue to struggle with the subject. Meanwhile, due to students' low Numbers and numeration performance, Numbers and numeration literacy learning and teaching in schools seems to necessitate a variety of interactive tasks, approaches, and instructional strategies.

The ways students are taught greatly affect their performance and one of the factors responsible for students' underperformance in Mathematics is associated with the method of instruction. Therefore, a study towards adopting an alternative method of teaching is necessary in order to proffer solution to underperformance of students in Mathematics.

In recent years however, evidences abound showing that teaching students with an effective instructional strategy could significantly improve their performance (Aditi, 2017; Okri et al, 2023; Essuong & Effiong, 2023). Review of related research showed that little have been done on using Scaffolding instructional strategy to teach Mathematical concept in Uyo Metropolis. It is in view of this that the researchers decided to investigate mathematics scaffolds learning strategy and primary school pupils' knowledge of basic numeration in Uyo Metropolis of Akwa-Ibom State.

Purpose of the Study

The purpose of this study was to examine mathematics scaffolds learning strategy and primary school pupils' knowledge of basic numeration in Uyo Metropolis of Akwa-Ibom State.
Specifically, the study sought to:

1. Investigate the effect of Scaffolding instructional strategy on the achievement of SSII pupils
2. Determine the mean achievement scores of male and female students taught mathematics using instructional scaffolding approach

Research Questions

The study was guided by the following research questions:

1. What are the mean achievement scores of pupils taught numbers and numeration using Scaffolding instructional strategy and those taught using conventional methods?
2. What is the difference between the mean achievement scores of male and female students taught mathematics using instructional scaffolding approach?

Statement of Hypotheses

In this study, the following hypotheses were formulated and tested at 0.05 level of significant.

Ho_1: There is no significance difference in the mean achievement scores of pupils taught numbers and numeration using Scaffolding Instructional strategy and those taught using conventional methods in Uyo Metropolis.

Ho_2: There is no significant interaction effect between gender and instructional scaffolding approach in Uyo Metropolis.

Methodology

The research design adopted for this study was on-equivalent control group quasi-experimental design. A quasi-experimental design is convenient when intact classes are used in an experiment rather than randomization. The design was found to be appropriate because the administrators in educational institutions do not allow dismantling of the intact classes to allow for random assignment. The study used the intact classes in their natural classroom state as they were without random assignment and compared the scores of pupils that receives treatment and that which does not receive the treatment. The population of the study comprised all primary 6 pupils in all public primary schools in the Uyo Local Government Area of Akwa Ibom State. The population size was 2,467 primary 6 pupils n 2023/2024 academic session. The study adopted stratified random sampling technique in selecting 385 pupils (199 urban and186 rural) from four public primary schools in Uyo LGA-AKS. The instrument used for data collection was Mathematics Achievement Test (MAT). The Mathematics Achievement Test (MAT) comprised a 30-item multiple choice objective test with four options. The instrument was subjected to face and content validity. Kuder Richardson formula 20 reliability method was used to determine the internal consistency which gave a coefficient of 0.76 after a pilot study was conducted. The data collected and collated were analyzed using independent t-test and tested at .05 alpha level.

Results

The result of the study is presented hypothesis-by-hypothesis and tested at .05 level of significance.

Hypothesis one: There is no significant difference in the mean academic performance of pupils taught mathematics using the mathematics scaffolding strategy and those taught with the conventional method in Uyo Metropolis.

Table 1: Independent t-test analysis of pupils in experimental and control academic performance in mathematics (N = 385)

Groups	N	Mean	SD	t-value	p-level
Experimental group	163	10.93	5.26	3.08*	.000
Control group	222	10.04	4.84		

*Significant at .05 level; p< .05

The result in table 1 revealed that the e mean score of the experimental group (N 163) was 10.93 with standard deviation of 5.26 slightly greater than the mean score of the control group 10.04 with a standard deviation of 4.84 by the control group students. The mean difference between the two groups revealed statistically significant difference between the experimental and control group (t_{385}) = 3.08, p<.05. The decision rule is that if the tabulated result of data is higher that the critical value of p-value, the null hypothesis has to be rejected, and if the reverse is the case, upheld the hypothesis. Since the p-value was less than the

significant value at 0.05, the null hypothesis was rejected showing that there exists significant difference in the mean academic performance of pupils taught mathematics using the mathematics scaffolding strategy and those taught with the conventional method in Uyo Metropolis.

Hypothesis 2: There is no significant interaction effect between gender and instructional scaffolding strategy in Uyo Metropolis.

Table 2: Independent t-test analysis of interaction effect between gender and instructional scaffolding strategy in Uyo Metropolis. (N = 385)

Gender	N	Mean	SD	t-value	p-level
Male	199	12.15	3.55		
				0.25*	.802
Female	186	11.28	3.01		

*Significant at .05 level; p> .05

The result in table 2 revealed that the mean score obtains by the 199 male pupils as regards their academic performance in mathematics was 12.15 with a standard deviation of 3.55 is minimally greater than the mean score of 11.28 with a standard deviation of 3.01obtained by the female pupils. The decision rule is that if the tabulated result of data is higher that the critical value of p-value, the null hypothesis has to be rejected, and if the reverse is the case, upheld the hypothesis. The independent t-test analysis revealed no statistically significant difference between the male and female pupils when taught mathematics using the scaffolding strategy since the $t_{385} = 0.25$, p> .05 with a very small effect size. This indicated that the effect of the treatment was equally effective to both the male and female pupils without any observable differences.

Discussion of findings

The finding from hypothesis one revealed there exists significant difference in the mean academic performance of pupils taught mathematics using the mathematics scaffolding strategy and those taught with the conventional method in the study area. This finding is in consonant with the finding of Faheem, Aqsa, Memoona, Shakeel and Sobia (2022) whose result revealed that students secured high marks in experimental group as compared to control group. The study concluded that scaffolding instructional strategy enhances the students learning in academic achievement. Similarly, the result also agrees with the earlier result of Nwoke (2020) who conducted a study on impact of instructional scaffolding approach on secondary school students' achievement in Mathematics. The result of the study revealed that instructional scaffolding is effective in enhancing secondary school students' achievement in mathematics and minimized gender bias.

The finding from hypothesis two revealed that revealed no statistically significant difference exist between the male and female pupils when taught mathematics using the scaffolding strategy in the study area. This finding is in consonant with the finding of Ukwueze, Abugu and Odo (2020) who conducted a study to investigate the effect of Scaffolding Instructional Techniques (SIT) on academic achievement among junior secondary school (JSS) mathematics students in Obollo-Afor Education Zone of Enugu State. The results of the study revealed that there was no significant difference in the mean achievement score of male and female students in mathematics as result of Scaffolding Instructional Techniques (SIT).

Also, the result is in line with Gabi, Danjuma and Azige (2024) who conducted a study to investigate the Effect of Scaffolding Instructional Strategy on Secondary School Students' Academic Achievement in Circle-Geometry in Keffi, Nasarawa State, Nigeria. Results indicated that there was no significant difference in achievement scores between male and female students exposed to the scaffolding instructional strategy.

Conclusion

The impact of scaffolding strategy on students' Mathematics performance was explored in this study. The study's findings revealed that there was significant difference in the achievement of students taught mathematics using scaffolding strategy and those taught with conventional teaching method, there was no significant difference in the students' gender toward mathematics taught using scaffolding strategy and those taught with conventional teaching method. In addition to playing an important part in the achievement of teaching and learning mathematics, numbers and numeration also provides a connection between mathematical topics. Its relevance cannot be over emphasized for everyday activities.

This study had proven that scaffolding strategy have tendency of developing learners' meta-cognition when properly used by the teachers to demystify the perceived difficult Mathematical concepts. Therefore, it could be concluded that rather than the conventional teaching method scaffolding strategy can assist learners to learn conveniently, be properly engaged during the lesson, promote deeper learning, reduce stress and increase their satisfaction in basic schools as a mode of learning.

Recommendations

The following recommendations are made in light of the problems highlighted and based on the findings of this study:

1. Educators and teachers of mathematics in primary schools should look at using scaffolding strategy as a form of instructional strategy in the classroom
2. Primary school mathematics teachers should be encouraged to use more activity-based instructional strategy like scaffolding strategy which has the potential to improve students' Mathematics performance.
3. Seminars and workshops for Mathematics teachers should therefore be held on a regular basis with the goal of equipping them with the skills and techniques necessary to effectively apply scaffolding, strategy in the teaching and learning of Mathematics.
4. Scaffolding strategy should be emphasized and encouraged in the teaching and learning of mathematics in primary schools by curriculum planners and policy-making.

References

Adie E. B, Inah L. I, Ibu P. N, Anditung P. A, Igyo C. O. (2022). Effect of Concept Mapping strategy on the academic achievement of post basic students in mathematics in Obudu Education Area of Cross River State, Nigeria *Interdisciplinary Journal of Science Education* 2695-2054, 151-158, https://www.ij-sed.com

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 (3), 228-235*

Ahumaraeze, O. U. &Ekweme, C. O. (2019). Effect of constructivist-based instructional strategy on senior secondary school students' academic performance in Mathematics in Rivers State, Nigeria. *Abacus (Mathematics Education Series).* 44(1), 219-230

Anibueze, C. O. (2017). Effect of mathematics scrabble game on junior secondary school students' achievement and interest. A Master Dissertation of the Department of Science and Technology, Enugu State University of Science and Technology (ESUT), Enugu.

Bessong, C. D., Oboqua, E. D. & Bessong, N. O. (2018). Rural Development Agency Activities and Socio-Economic Life of Rural Dwellers in Akamkpa and Odukpani Local Government Areas of Cross River State, Nigeria. *Special Needs Education, Journal of the Department of Special Education,* University of Calabar. *4,* 17-28.

Bessong, C. D., Bessong, N. O. &Oboqua, E. D. (2018).United Nations Development Programmes and Economic Empowerment of Rural Women in Northern Cross River State, Nigeria. *International Journal of Contemporary Social Science Education*, University of Calabar. *1*(1) 193-201.

Effiong, L. V. & Olofu, P. A. (2018). Principals' perspective on effective planning for revitalizing the standard of secondary school education in Northern Cross River State, Nigeria. *Abuja International Journal of Education and Management Sciences.* 5(1): 180-190.

Esuong, U. U., & Effiong, I.A (2023). Enhancing the teaching of basic concepts in circle geometry using E-learning approach; a quasi-experimental study. *International Journal of Research Publication and Reviews* (IJRPR). 4(12), 416 – 422.

Faheem, K., Aqsa, A., Memoona, G., Shakeel, H., & Sobia, Y. (2022). Effect of Scaffolding Teaching Method on Students' Academic Achievement in Mathematics. Journal of social Sciences and Management Studies; https://doi.org/10.56556/jssms.v1i2.81

Gabi, S. S., Danjuma, C., & Azige, G. D. (2024). Effect of Scaffolding Instructional Strategy on Secondary School Students' Achievement in Circle-Geometry in Keffi, Nasarawa State, Nigeria. *Journal of Science Technology and Education,* 12(4), 522-534.

Ginga, U.A, Muhammed, B, & Usman N. (2019) Effect of reciprocal teaching strategy on students' performance in word problem leading to simultaneous equations for creativity in basic secondary and tertiary education in Yobe state. *Abacus (Mathematics Education Series)* 44(1), 250 – 259.

Ibu, P, N, Adie, E. B, Andortan, J. A. (2019). Home environmental variables and mathematics study habits among Secondary School three (JSS3) Students in Calabar Education Zone of Cross River State, Nigeria. *Prestige Journal of Education 2 (2), 189-197 e-ISSN: 2645-3223*, 2019.

Iji, C. O., Abakpa, B. O., & Fekemo, B. (2013). Factors that enhance senior secondary school female students' attitude towards mathematics. A step towards technological development. *Journal of Mathematical Association of Nigeria (MAN),*17 (1), 225-234.

Iroko, G.A (2022): Relative effects of concept mapping, scaffolding and blended learning strategies on students' performance in Algebra. Unpublished thesis submitted to the department of Science and Technology Education of Lagos State University, Ojo.

Inyang, I.O. (2022). Tax revenue and fiscal development: A pragmatic framework for economic governance in Cross River State, Nigeria. *Multidisciplinary Journal of Research and Development Perspectives, 11(2), 71-79.*

Joda, F M. (2019). Effects of Instructional Scaffolding Strategy on Senior Secondary Biology Students' Academic Achievement and Retention in Taraba State, Nigeria. In: *Education Quarterly Reviews*. 2(2), 269-275.

Kankpang, AK; Inyang, I.O.; Uklala, AP & Ibembem, FA (2022). Detection and prevention of ghost workers in Nigeria: The use of internal control mechanism. *Journal of Economics and Finance,* 6(2), 48-56.

Meremikwu, A.N, Ibok E. E, Adie E. B, Inah L, I, Okri J. A, Catherine N. T., (2022).Classroom routine activities as predictors of students' academic achievement in mathematics in Calabar Metropolis of Cross River State, Nigeria *Interdisciplinary Journal of Science Education*, 2695-2054, 60-70, https://www.ij-sed.com

Nwoke, B. I. (2020). Impact of Instructional Scaffolding Approach on Secondary School Students Achievement in Mathematics. *Malikussaleh Journal of Mathematics Learning (MJML),* 3(2), pp.46-50.

Okri, J. A., Adie, E. B., Obi, J.J. & Opoh, D.A. (2023). Effect of Puzzle and Scramble Games on Secondary School Students' Mathematics Academic Performance in Cross River State**,**

Nigeria. *International Journal of Continuing and Non-Formal Education (IJCNFE)*, 11(1), 63-77.

Okri, J. A., Orim, R. A. & Opoh, D. A. (2021). Teachers Classroom Creativity and Students' Effective Learning of Mathematics in Senior Secondary School (SSII) in Ikom Education Zone, Cross River State. Nigeria. *International Journal of Cotemporary Social Science Education (IJCSSE)*, 3 (2), 47-54.

Olada, F. S. (2017). Gender, environment and parent' socio-economic status as determination of students' performance in mathematics periodic tests and terminal examination in Ondo State secondary schools. *The Journal of Mathematical Association of Nigeria (MAN)*, 21(1), 145-159.

Olasehinde, K. J., & Olatoye, R. A. (2014). Academic outcome of public and private high students. Retrieved from www.statch.gc.ca.homepublications.11foo19,n0367

Olofu, P. A. & Hur-Yagba, C. N. (2019). Availability of functional and sustainable guidance and counselling services for effective service delivery in public secondary schools in Gwagwalada Area Council, Abuja. *Academic Journal of Research and Development*. 12(1), 94-102.

Olofu, P. A., Opara, J.C., Ihekoronye, E.O. & Hur-Yagba, C. N. (2018). Attitudes and secondary school teachers' job performance in the Federal Capital Territory, Abuja. *International journal of the Forum for African Women Educationalists*. 6 (1): 115-120.

Olofu, P. A. & Patrick, E. (2019).Teenage pregnancy: Implications for education of the girl child in the 21st century in Nigeria. *International Journal of Continuing Education and Development Studies* (IJCEDE), 5 (1):164-176.

Olofu, M. A. & Olofu, P. A. (2021). Edmodo as an online instructional delivery technique for sustaining teaching and learning activities in covid-19 era in public universities in North-central, Nigeria. *Journal of Digital Learning and Education*. 1(2): 54-61.

Olofu Ukwueze, T. C., Abugu, G. N. & Odo, I. O. (2020). Effect Of Scaffolding Instructional Techniques (SIT) on Academic Achievement among Junior Secondary School Mathematics Students in Obollo-Afor Education Zone of Enugu State Nigeria. *Abacus (Mathematics Education Series), 45(1), 89-100.*

Yakub L, & Prof, C. B. (2019) Impact of Jigsaw II co-operative learning strategy on academic performance in mensuration among secondary school students in Kano, Nigeria Abacus (*Mathematics Education Series*) 44(1). 19 – 27.