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ASSESSMENT OF DIFFICULT MATHEMATICS CONCEPTS AS PERCEIVED BY PRIMARY SCHOOL TEACHERS IN ENUGU STATE, NIGERIA

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ABSTRACT

This study assessed the difficult Mathematics concepts as perceived by primary school teachers in Enugu State, Nigeria. A descriptive survey research design was adopted for the study. Three research questions and two hypotheses guided the study. The population of the study was one thousand six hundred and thirty two (1,632) primary school teachers and a sample of 313 primary school teachers were selected through multi-stage sampling. Mathematics Difficulty Level Inventory (MDLI) was the instrument used for the collection of data. The instrument was face and content validated by experts and also trial tested. The reliability of MDLI items was determined using Cronbach alpha reliability test which yielded reliability coefficient of 0.87 considered high enough to be used for the study. The findings of the study revealed that primary school teachers in Enugu state perceived 19 out of 30 mathematics concepts to be difficult; there was significant difference in the frequencies of difficult mathematics concepts across gender line and school ownership. Based on these findings, the researcher recommended amongst others that workshops, seminars and conferences should be organized for primary school teachers on basic mathematics concepts; relevant authorities should ensure the recruitment of qualified primary school teachers especially in public schools.

KEYWORDS

Assessment, Mathematics concepts, Primary school teachers, Gender, School ownership.



INTRODUCTION

Education as a development agent, is valued by all nations of the world because it has brought total liberation to man. It has transformed man from ignorance and misery to knowledge and happiness. It has made man useful to himself, his generation and beyond. As rightly observed by Umoh (2021), education helps the individual to develop physically, mentally, morally, spiritually, and emotionally by providing suitable environment, teaching him new knowledge, attitudes and skills that will enable him to be useful to himself and his society. The central goal of education is not just learning to read and write but to develop the abilities to think and reason because reasoning is the heart of education. Nigerian education system is broadly divided into primary, secondary and tertiary education.

Primary education which is the focus of this study refers to education given to children aged 6 to 11 plus and this level of education is the key to the success or failure of the whole system since the rest of the education system is built upon it (Federal Republic of Nigeria, 2014). This statement confirms the fact that the primary level of education is most crucial to the success of other levels, hence the need for the stakeholders to do everything possible to lay a solid foundation for its sustainability. Education at this level strengthens the learner's feet to climb the educational ladder to the zenith of academic attainment if a good foundation is laid. At this level, the pupils are exposed to the basic foundations of different subjects of study.

Among primary school subjects enshrined in the Nigeria primary curriculum, mathematics has been at the centre of application (Akinsola, 2018). There is no doubt that mathematics has extensive application in life and related fields. According to observations "mathematics is a gate-way to science". Mathematics is a language. It is the language without which science, commerce, industry, the internet and the entire global economic infrastructure is struck dump. It is the only "truly" universal language, and it is an essential part of our personal and working life. Mathematics is not only a language and a subject, it is also critical in fostering logical, rigorous thinking, as such, its influence is immense (Odomosu, 2020). The focal point in inculcating the knowledge of mathematics to these primary school pupils is the teacher.

A teacher is generally regarded as someone who has sufficient amount of training in a teaching subject area and more importantly a good background in education. Okafor and Anaduaka (2016) said that no matter how good a course curriculum is, if we do not have well trained, qualified and motivated teachers, we may not achieve the desired goals. No matter how intelligent the pupils may be, their understanding levels still depend on who is teaching them. Mathematics education understood in its simplest form and most concrete sense concerns the activity or practice of teaching Mathematics. Looking at the aims of teaching Mathematics, it is important to note that aims, goals, purposes, rationales, do not exist in vacuum. They belong to people, whether individuals or social groups. A mathematics teacher must therefore acquire good mathematics concept knowledge during training since no one can give what he/she does not have. This is very important for both primary and secondary mathematics teachers.

Mathematics concepts are vast, interrelated and possess interconnected elements. The interrelationship of mathematical concepts can be identified in the use of elementary operations of division, ratios, percentage, addition, subtraction, translation of word problems and use of symbols across mathematics discourse while the interconnected elements according to Adeyemi (2020) are discovery and analysis of pattern, logical reasoning applied to systems and recognition and

explanation of the underlying links between these systems. This suggestion exposes the requisite knowledge that underlies difficulty or non-difficulty of mathematics as a subject. Teachers of low logical reasoning and analytical prowess would, therefore, find certain concepts difficult. Agwagah (2017) further opined that these teachers would have visual or dyslexic-type of difficulty which would inhibit their perception of pattern. In contrast, teachers of high reasoning ability and high intelligence may show competence in handling some concepts in mathematics but may also view some concepts as difficult.

Difficult Mathematics concept therefore, is not completely the inability of a teacher to obtain a poor disposition in a collection of mathematics problems but what constitutes a 'persistent hitch' and makes procedural approach to cognition of a mathematics concept a hideous task all the time. In identifying students' difficulties with mathematics concepts, Ugwuara (2020) stated that primary school teachers generally have intrinsic difficulty in mathematical reasoning, mathematical ideas and understanding basic mathematical concepts. That way such a teacher would be able to direct the students more competently and confidently becomes questionable. The conceptual knowledge in mathematics requires adherence to an algorithm that leads the solver through a correct process to a correct answer. During training, teachers should be allowed to actively participate in each step of a problem solving algorithm for formalization and effective practice. Some difficulties can be attributed to inappropriate representation and handling of problems, such as fractions, ratio, extrapolation and erroneous algorithm (Ezeanyi, 2021). A display of subject incompetence by a mathematics teacher causes the students to lose confidence first in the teacher and then in the subject.

The difficulty level of mathematics concepts as perceived by primary school teachers based on gender was assessed because the issue of gender influence on mathematics is not yet a concluded research. According to Popoola (2018), gender in science is the classification of the role of male and female in science, technology, engineering and Mathematics (STEM). Significant gender difference in favour of males as reported by researchers like Odili (2016) and Odogwu (2021) had shown that males achieve higher in Mathematics than females. They have also observed that this has often led to the acute shortage of the number of females that gain access to scientific studies and technological training at the tertiary institutions. However, Ezeanyi (2021) and Shaughnessy and Boerst (2018) found that female students perform better than their male counterparts in Mathematics. Thus the issue of gender-related differences in Mathematics is still a controversy and need to be further investigated in various school locations (urban and rural settlements). The difficult mathematics concepts were also investigated based on school ownership.

School ownership is in terms of establishment and management of the school. In Nigeria, school ownership is either private or public. A private school is defined as one rightly owned and cared for by an individual, group of people, or public organization such as higher institutions, army, police or road safety. A public school is defined as one owned and cared for by a government, normally through its agency and charged with the responsibility of administration and supervision of educational system. The debate on public versus private education has gained increasing importance in recent years throughout the world (Azuka, 2019). Similarly, Odomosu (2020) stated that the preference for private school education becomes more widespread in Nigeria, the debate on the relative merits of public and private education has gained increasing relevance and importance. Like other countries, the perception in Nigeria is that private schools offer a better education, an

environment more conducive to learning, additional resources, and better policies and management practices.

Ezeanyi (2021) reported that students in private secondary schools achieved higher in Mathematics than those in public schools. This is at variance with the report of Agwagah (2017) who found that students from public senior secondary schools have higher test scores in their sectional results than those from private senior secondary schools. Awofala and Awolala (2016) investigated school ownership, facilities and academic performance of students in senior secondary schools in Ondo State, Nigeria and reported that there is no significant difference in academic performance of students in the two types of secondary schools based on ownership. Lassa (2020) argued that private schools are not only resourced and funded but also have parents and guardians whose socio-economic class is higher than their counterpart in public schools, and are more involved in their children's education welfare. However, Lassa agreed that public schools have more professionally trained and qualified teachers than the private schools. Based on all these discrepancies, the present study assessed the difficult mathematics concepts as perceived by primary school teachers from public and private senior secondary schools.

Statement of the problem

The general low performance of pupils in Mathematics in Nigerian primary schools could be traced to the crop of teachers who are of different subject specializations and as a result of this, ill-prepared to impart adequate knowledge of Mathematics to their pupils. The poor methods of teaching some topics in Mathematics have made pupils to perceive such topics to be difficult. In Enugu state for example, research and statistical information from examination bodies like BECE indicated a fluctuating academic performance of primary school pupils that have sat for common entrance examinations into secondary schools. A statistics of entries and results for mathematics in the state; indicated an average pass of about 45%. Specifically, some researchers identified the factors responsible and clustered them into student-related, teacher-related and systemic factors. Some of the teacher-related factors include misconceptions and shallow content knowledge and ability of teachers among others. As a result, the researcher deemed it fit to investigate the difficult mathematics concepts as perceived by primary school teachers in Enugu State.

Purpose of the Study

The purpose of this study was to assess the difficult mathematics concept as perceived by primary school teachers in Enugu State, Nigeria.

Specifically, the study sought to:

1. Assess the difficult mathematics concepts as perceived by primary school teachers in Enugu State.
2. Find out the difficult mathematics concepts as perceived by primary school male and female teachers in Enugu State.
3. Ascertain the difficult mathematics concepts as perceived by primary school teachers from public and private schools in Enugu State.

Research Questions

The following research questions guided the study.

1. What are the difficult mathematics concepts as perceived by primary school teachers in Enugu State?
2. What are the frequencies of the difficult mathematics concepts as perceived by primary school male and female teachers in Enugu State?
4. What are the frequencies of the difficult mathematics concepts as perceived by primary school teachers from public and private schools in Enugu State?

Hypotheses

Two null hypotheses were tested in this study at 0.05 alpha levels.

1. There is no significant difference in the frequencies of the difficult mathematics concepts as perceived by male and female primary school teachers in Enugu state.
2. There is no significant difference in the frequencies of the difficult mathematics concepts as perceived by primary school teachers from private and public schools in Enugu state.

Research Methods

This study adopted a descriptive survey research design. The population consisted of one thousand six hundred and thirty two (1,632) primary school teachers in Oji River Local Government Area of Enugu State, Nigeria. The sample for the study was three hundred and thirteen (313) primary school teachers sampled through multi-stage sampling. From the state, purposive sampling technique was used to select one Local Government Area out of Seventeen (17). From the Local Government Area; purposive sampling technique was also used to select all the male primary school teachers since they are few in number and gender is a variable in the study, the total number was sixty-six (66). Simple random sampling technique was used to select six (6) primary schools (public and private). All the primary school female teachers were used totaling two hundred and forty seven (247). There were 167 private school primary school teachers and 146 from their public counterparts.

Instrumentation

Mathematics Difficulty Level Inventory (MDLI) was the instrument used to assess the difficult mathematics concepts as perceived by primary school teachers in Enugu State. The instrument was a 30-item structured questionnaire. The questionnaire items were arranged in line with the three research questions to address each of the specific purposes of the study. The instrument was face and content validated by experts and also trial tested. The reliability of MDLI items was determined by administering them to 20 primary school teachers outside Oji River Local Government Area. Their scripts were graded by five independent raters. Scores obtained were correlated and analyzed using Cronbach alpha reliability test. This yielded reliability coefficient of 0.87 which was considered high enough to be used for the study.

Survey Procedure

The researcher recruited and trained research assistants who were used to administer the instruments to the respondents. The respondents were asked to indicate the items that match their belief. After collecting the questionnaires, the different mathematics concepts were identified in each item from

each respondent based on their difficulty level as perceived. The frequencies of these difficult mathematics concepts were determined and grouped according to gender and school ownership. The data collected was analyzed using descriptive and inferential statistics. The research questions were answered using frequency counts and percentages while Independent-samples Mann Whitney U test statistics was used to test the hypotheses at 0.05 alpha levels. In taking decision, if the probability value is less than or equal to significant value of 0.05 ($P \leq 0.05$), the null hypothesis was rejected but if otherwise $P > 0.05$, the null hypothesis was accepted.

Research Question 1: What are the difficult mathematics concepts as perceived by primary school teachers in Enugu State?

Data related to the research question are presented on Table 1

Table 1: Frequency distribution of difficult mathematics concepts as perceived by primary school teachers in Enugu State

S/N	Concept	Difficult	Percentage Difficult	Not Difficult	Percentage Not Difficult
1	Counting numbers	123	39.3	190	60.7
2	Approximations	165	52.7	148	47.3
3	Fractions and Decimals	172	55.0	141	45.0
4	Number patterns	185	59.1	128	40.9
5	Plane shapes	191	61.0	122	39.0
6	Solid shapes	293	93.6	20	6.4
7	Quantities and Units	106	33.9	207	66.1
8	Bearing and Distances	301	96.2	12	3.8
9	Angles in a triangle	251	80.2	62	19.8
10	Coordinates in two quadrants	282	90.1	31	9.9
11	Probability	234	74.8	79	25.2
12	Statistics	132	42.2	181	57.8
13	3-D shapes	288	92.0	25	8.0
14	Circles	163	52.1	150	47.9
15	Binary numbers	144	46.0	169	54.0
16	L.C.M. and H.C.F.	82	26.2	231	73.8
17	Ratios and Percentages	102	32.6	211	67.4
18	Squares and Square roots	119	38.0	194	62.0
19	Open sentences	122	39.0	191	61.0
20	Simple Interest	180	57.5	133	42.5
21	Commission and Discount	283	90.4	30	9.6
22	Pythagoras Rules	209	66.8	104	33.2
23	Capacity	191	61.0	122	39.0
24	Weights	101	32.3	212	67.7
25	Time	99	31.6	214	68.4
26	Polygons	172	55.0	141	45.0
27	Simple equations	111	35.5	202	64.5
28	Simple constructions	251	80.2	62	19.8
29	Word problems	183	58.5	130	41.5
30	Computer Devices	161	51.4	152	48.6
	Total	5396	57.5	3994	42.5

From the result of the MDLI administered to the teachers, the difficult mathematics concepts were identified and presented on Table 1. The difficult mathematics concepts were identified based on the nature of the questions posed to the teachers. Thirty (30) mathematics concepts were assessed based on the primary school mathematics curriculum in Nigeria. Out of the 30 concepts, 19 of them were perceived to be difficult by the primary school teachers, representing 63.3% of the teachers. This

indicated that primary school mathematics concepts were generally perceived to be difficult by these teachers.

Research Question 2: What are the frequencies of the difficult mathematics concepts as perceived by primary school male and female teachers in Enugu State?

Data related to the research question are presented on Table 2

Table 2: Percentage distribution of the difficult mathematics concepts as perceived by primary school male and female teachers in Enugu State

S/N	Concept	Male = 396				Female = 1482			
		Diff	% Diff	Not Diff	% Not Diff	Diff	% Diff	Not Diff	%Not Diff
1	Numeration	117	29.5	279	70.5	521	35.2	961	64.8
2	Operations	251	63.4	145	36.6	798	53.8	684	46.2
3	Algebra	163	41.2	233	58.8	1003	67.5	479	32.5
4	Geometry	312	78.9	84	21.1	1237	83.5	245	16.5
5	Statistics	187	47.2	209	52.8	914	61.7	568	38.3
	Total	1030	52.0	950	48.0	4464	60.3	2937	39.7

The result on Table 2 shows that after the assessment of difficult mathematics concepts as perceived by primary school teachers, male teachers perceived two out of the five concepts to be difficult (Basic operations and Geometry) while their female counterparts perceived four of those concepts to be difficult (Basic operations, Algebra, Geometry and Everyday Statistics). Generally, the male teachers had a total frequency count of 1030 on perceived difficult mathematics concepts out of 1980 representing 52.0% of the sample while the female teachers had a frequency count of 4473 out of 7410 representing 60.4% of the sample. This indicated that the female primary school teachers find Mathematics concepts more difficult than their male counterparts.

Research Question 3: What are the frequencies of the difficult mathematics concepts as perceived by primary school teachers from public and private schools in Enugu State?

Data related to the research question are presented on Table 3

Table 3: Percentage distribution of the difficult mathematics concepts as perceived by primary school teachers from public and private schools in Enugu State

S/N	Concept	Private = 167				Public =146			
		Diff	% Diff	Not Diff	% Not Diff	Diff	% Diff	Not Diff	%Not Diff
1	Numeration	486	48.5	516	51.5	482	55.0	394	45.0
2	Operations	519	51.8	483	48.2	507	57.9	369	42.1
3	Algebra	264	26.3	738	73.7	618	70.5	258	29.5
4	Geometry	732	73.1	270	26.9	743	84.8	133	15.2
5	Statistics	667	66.6	335	33.4	626	71.5	250	28.5
	Total	2668	53.3	2342	46.7	2976	67.9	1404	32.1

Table 3 shows that after the assessment of difficult mathematics concepts as perceived by primary school teachers from private and public, private school teachers perceived three out of the five concepts to be difficult (Basic operations, Geometry and Everyday Statistics) while their public school counterparts perceived all the five mathematics concepts to be difficult. Generally, the primary school teachers from private schools had a total frequency count of 2668 on mathematics concepts difficulty

out of 5010 representing 53.3% of the sample while their public school counterparts had a frequency count of 2376 out of 3780 representing 62.9% of their sample. This indicated that the primary school teachers from public schools find mathematics concepts more difficult than their private school counterparts.

Hypothesis 1: There is no significant difference in the frequencies of the difficult mathematics concepts as perceived by male and female primary school teachers in Enugu state.

The Independent-sample Mann Whitney U test statistics was computed as shown in Table 4.

Table 4: Summary of Independent – Samples Mann Whitney U Test of frequencies of the difficult mathematics concepts as perceived by male and female primary school teachers in Enugu state.

Gender	N	Mean ranking	U	Sig.
Male	66	186.03	1723.600	0.041
Female	247	272.19		

The result in Table 4 indicated that the mean rankings for male and female primary school teachers were 186.03 and 272.19 respectively which yielded a U value of 1723.600 and a p value of 0.041. The p value obtained was less than the level of significance set at $P \leq 0.05$. The null hypothesis one is therefore rejected. This indicated that there is significant difference in the frequencies of the difficult mathematics concepts as perceived by male and female primary school teachers in the state, implying that female teachers perceived mathematics concepts to be more difficult than their male counterparts since their mean ranking is higher.

Hypothesis 2: There is no significant difference in the frequencies of the difficult mathematics concepts as perceived by primary school teachers from private and public schools in Enugu state.

The Independent-sample Mann Whitney U test statistics was computed as shown in Table 5.

Table 5: Summary of Independent – Samples Mann Whitney U Test of frequencies of the difficult mathematics concepts as perceived by primary school teachers from private and public schools in Enugu state.

Onwership	N	Mean ranking	U	Sig
Public	146	189.82	15231.300	0.014
Private	167	127.16		

The result in Table 5 indicated that the mean rankings for primary school teachers from public and private schools were 189.82 and 127.16 respectively yielding a U value of 15231.300. The p value of 0.014 was obtained which is less than the level of significance set at $P \leq 0.05$. The null hypothesis two was therefore rejected. This indicated that there is significant difference in the frequencies of the difficult mathematics concepts as perceived by primary school teachers from private and public schools in the state, implying that teachers from public schools perceived mathematics concepts to be more difficult than their counterparts in private schools since their mean ranking is higher.

Discussion of the Findings

The findings of this study showed that nineteen (19) out of the thirty (30) different mathematics concepts were identified to be difficult as perceived by primary school teachers in Enugu state with different frequencies. The frequencies of the mathematics concepts were indication of the level of difficulty as perceived by the teachers. The total frequency of mathematics concepts as perceived by the teachers shown from the findings was 1878. The different mathematics concepts identified is in agreement with the views of Stinson (2019), Okigbo and Ezeanyi (2020), Agwagah (2017) who stated that mathematics concepts are generally perceived to be difficult. The finding is in agreement with the views of Lassa (2020); Phelps and Howell (2016) that mathematics concepts range along a spectrum from those relatively difficult to those more conceptually difficult. The identified mathematics concepts were classified into Number and Numeration, Basic operations, Algebraic numbers, Geometry and Statistic.

The results on Tables 2 and 4 for answering research question two and testing hypothesis one suggest interesting results. The result indicated that mathematics concepts were perceived to be difficult by female primary school teachers at 60.4% than their male counterpart who had 52.0%. The result of the gender related influence on the frequencies of mathematics concepts between male and female teachers indicated a significant difference as shown on table 4 for testing null hypothesis one. The findings were in agreement with findings by Yara (2019) that male teachers are better disposed to mathematics concepts than their female counterparts. Contrary to the present study were the findings by Ezeanyi (2021) that female teachers are better disposed to mathematics concepts than their male counterparts while findings by Odomosu (2020) showed a non significant difference in the disposition of male and female teachers in mathematics concepts. The gender disparity in the present study may be predicated on the fact that female primary schools teachers are faced with so many family duties as a result hamper their level of explorations in mathematics.

The findings of this study as shown on table tables 3 and 5 for answering research question three and for testing null hypothesis two respectively revealed that public primary school teachers perceived mathematics concepts to be more difficult than those from private schools. There was significant difference in the frequencies of difficult mathematics concepts as perceived by primary school teachers from public and private schools in the state. These finding concur with the finding by Umoh (2021) that there was significant difference in the disposition of public and private school teachers in mathematics concepts in favour of private school teachers who are better disposed. Ezeanyi and Okigbo (2021) found that teachers from private schools are not better disposed to mathematics concepts than their counterparts in public schools. The discrimination in this study between public and private schools should be explicated by the reason that private schools owned by individuals or a religious group employ better and more qualified teachers since the academic performance of their students will keep them in business while their public counterparts may not have such.

CONCLUSION

In this study, it was concluded that most mathematics concepts are perceived to be difficult by primary school teachers. Gender and School location played important role in the assessment of difficult mathematics concepts as there was significant difference in the frequencies of the difficult mathematics concepts as perceived by primary school teachers across gender and school location.

Recommendations

From the findings of this study, the following recommendations were made:

1. Government should organize workshops, seminars and conferences for primary school teachers in mathematics to enhance their understanding of mathematics concepts.
2. Government should provide the necessary incentives to female primary school teachers in order to close the gap between both genders.
3. Relevant authorities should ensure the recruitment of qualified primary school teachers in public schools to bring them to the level of their private counterparts.

REFERENCES

- Adeyemi, T.O. (2020). The influence of class-size on the quality of output in secondary schools in Ekiti state, Nigeria. *American-Eurasian Journal of Scientific Research*, 3(1), 7-14.
- Agwagah, U.N.V. (2017). Improving the teaching of mathematics language on errors committed by senior secondary school students in bearing problems in Omuo-Ekiti, Nigeria. *Abacus, the Journal of the Mathematical Association of Nigeria*, 38(1), 50-56
- Akinsola, M.K. (2018). Relationship of some psychological variables in predicting problem solving ability of inservice mathematics teachers. *The Montana Mathematics Enthusiasts*, 5(1) 79-100.
- Awofala, A. O. A. and Awolola, S. A. (2016), Curriculum Value Orientations and Reform in the 9-year Basic Education Mathematics Curriculum. In O. S. Abonyi (Ed.) *Reforms in STEM Education*. Proceedings of the 52nd Annual Conference of Science Teachers Association of Nigeria. pp.297-305.
- Azuka, B.F. (2019). *Curriculum planning and development from the formative stages*. NMC Lecture Notes for the Retraining of Primary school teachers on the implementation of new UBE Curriculum and Continuous Assessment in Schools. Abuja: Marvelous Mike press.
- Ezeanyi, B. C. (2021). *Identification and Remediation of common process errors of senior secondary school students in mathematics in Anambra State*. (Unpublished Ph.D. Thesis), Nnamdi Azikiwe University, Awka
- Ezeanyi, B.C. & Okigbo, E.C. (2021). Common Process Errors in Geometry Committed by Students from Private and Public Secondary Schools in Anambra State, Nigeria. *International Journal of Humanities and Social Studies*. 9(7), 48-56
- Federal Republic of Nigeria, FRN,(2014). *National Curriculum for Primary Schools*. Volume 5: Science. Ibadan: Heinemann Educational Books (Nigeria) Limited.
- Lassa, P.N. (2020). *The teaching of mathematics for Nigerian secondary schools*. Jos: Fab Anieh Nigeria Limited.
- Odili, G.A. (2016). *Mathematics in Nigeria Secondary schools- A teaching perspective*. Port- Harcourt: Anachuna Educational books.
- Odogwu, H. N. (2021). The mathematics teachers factor in achievement of the goals of the Universal Basic Education (UBE). *ABACUS: The journal of mathematics association of Nigeria*. 27 (1) 29-79.
- Odumosu, M. O., (2020). "Effect of two learning strategies on pupils' problem solving skills in mathematics for sustainable development" Conference 10 proceedings of School of Science, 2010, 219-224.
- Okigbo, E.C., & Ezeanyi, B.C. (2020). Game-based learning strategy as a measure of improving senior secondary school students' academic achievement in geometry in Anambra state. In E.C. Okigbo, N.R. Nnorom & E. Onwukwe (Eds), *Innovations in science, technology and mathematics education in Nigeria: classroom practices*. Festschrift in honor of Profs E.O. Akuezulo and S.O.C. Okeke: Science Education Department, Nnamdi Azikiwe University, Awka, Nigeria.
- Okigbo, E.C. & Ezeanyi, B.C. (2021). Identification of Common Process Errors of Senior Secondary School Students in Mathematics in Anambra State." *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 11(4), (2021): pp. 01-06.
- Okafor, C. F., & Anaduaka, U.S. (2016). "Nigeria school children and mathematics phobia: How the mathematics teacher can help"? *American journal of Educational Research*, 1(7), 247-25.
- Phelps, G. & Howell, H. (2016). *Assessing mathematical knowledge for teaching: The role of teaching context*. The Mathematics Enthusiast, 13(1), 52-70.

- Popoola, A. A. (2018). Focus conversational metto and students' Mathematics achievement in secondary schools. *Pakistan Journal of Social Sciences*. 5(8): 820—826.
- Stinson, D. W. (2019). Mathematics as gatekeeper: Theoretical perspectives that aim towards empowering all children with a key to the gate. *The Mathematics Educator*. 14(1): 8-18.
- Shaughnessy, M., & Boerst, T. A. (2018). Uncovering the skills that preservice teachers bring to teacher education: the practice of eliciting a student's thinking. *Journal of Teacher Education*, 69(1), 40–55.
- Ugwuarua, A.F.S., (2020): The role of Mathematics Education in Scientific and Technological Acquisition for Instructional and Corporate Self-Reliance. *Journal of Development Education*, 3(1) 127-133.
- Umoh, G. G. (2021). Path to Quantitative Education: A Standard Book for Students, *Teachers and Educational Administrators*. Uyo: Inela Ventures and Publishers.
- Yara, P.O., (2019). Relationship between teachers' attitude and students' academic achievement in mathematics in some selected senior secondary schools in South-Western Nigeria. Retrieved December 15, 2011, from <http://www.medwelljournals.com>.