Benin Journal of Educational Studies
Volume 29, Issue 1&2, July and December; 2023
Official Publication of Institute of Education, University of Benin, Nigeria.
https://beninjes.com/index.php/index

Difficult Topics in Mathematics as Perceived by Senior Secondary School One Student in Benin Metropolis, Edo State

[1]Imasuen Kennedy (Ph.D.) and [2]Omoni Igho Sylvester
[1] Institute of Education, University of Benin, Nigeria
[2]Phelim Schools, Benin City.
Email: ***kennedy.Imasuen@uniben.edu[1]***
Tel:+2348109670163

Abstract: *The study investigated the perceived difficult topics in Senior Secondary Schools (SSI) Mathematics by students in Benin Metropolis, Edo State. Four research questions guided the study. The study adopted a descriptive survey research design. The population consisted of senior secondary school one students (SSI) students in Benin City, Edo State. [1]The sample size consisted of 250 students selected from 16 public and 30 private senior secondary school one (SSI) students in Benin City using the multi-stage sampling technique. The questionnaire was the instrument for data collection. The validity of the instrument was ascertained by three experts in the field of Mathematics, and Measurement and Evaluation, at the Institute of Education, University of Benin. The reliability of the instrument was ascertained using the Cronbach alpha reliability statistic and gave an alpha value of 0.89. The data collected were analysed using mean and standard deviation, and the independent sample t-test, at a 0.05 level of significance. The findings revealed that simple equations and variation, quadratic equations, geometrical construction, trigonometry, formal geometry, mensuration, and logical reasoning were perceived by the students as very difficult, modular arithmetic was difficult while number base system, indices, and statistics and data presentations were less difficult. In addition, a significant difference exists in the perception of difficult mathematics topics by gender, school location and schools. It was recommended among others that workshops should be organized for the teachers of mathematics to train them on how to effectively teach the identified difficult mathematics topics in the senior secondary one school curriculum.*

Keywords: *Mathematics, difficulty, perception, senior secondary schools*

Introduction

Mathematics is regarded as one of the most important subjects in the school curriculum. The foundation of scientific and technological knowledge contributes significantly towards a nation's socio-economic development. This has made mathematics a compulsory subject at both primary and secondary school levels (Oladele, 2004). Mathematics plays a vital role in the everyday life of many people. Thus, for a person to function well within his

How to Cite

Imasuen, K., & Omoni-Igho. S. (2024). *Difficult Topics in Mathematics as Perceived by Senior Secondary School One Students in Benin Metropolis, Edo State. Benin Journal of Educational Studies*, *29*(1&2), 20–29. https://beninjes.com/index.php/bjes/article/view/118

immediate environment, knowledge of rudimentary mathematics is necessary (Akanni, 2015). Mathematics is the bedrock and a tool for the scientific, technological and economic advancement of any country (Chand et al., 2013). It is one of the most important subjects in the school curriculum which acts as a bridge for all knowledge (Chand et al., 2021).

Mathematics is a way of thinking; using abstract thinking to solve problems, depending on one's common sense and logic Nawaseb (2012). Borovik, (2017) stated that the reason for teaching mathematics in primary school is that a Child's brain is rapidly developing and gets rewired — this is more obvious in the case of language acquisition. Derek cited in Widadah and Juniati (2023), has opined that the rationale for the introduction of mathematics is for utilitarian aims. We teach mathematics because it is useful for everyone to meet the demands of everyday living. Personnel require mathematical skills in various disciplines because mathematics has its application in a wide range of informal settings, including sewing, fishing, construction work, shopping, purchasing, carpet laying, video games, cabs and buses, farming activities, sports, and entertainment. This has made the survival of any human being in this competitive world almost impossible without the knowledge and application of mathematics.

Despite the highly decorated and recognized importance of mathematics, poor achievement and lack of interest in the subject among students remain an issue of concern in schools, colleges, and universities in both developing and developed countries (Naiker et al., 2020). It seems to become one of the most challenging subjects in schools. In the 21st century, mathematics students often face several challenges when entering mathematics classrooms. These challenges include fluency and reliability in numerical and algebraic manipulation, which impacts their ability to solve mathematical problems efficiently; problem-solving skills, and negative attitude (Chand et al., 2021). Federal Government of Nigeria (FGN, 2013) states that the broad aim of secondary school education is preparation for useful living within society and for higher education. However, the attainment of this aim is becoming a mirage because of the complexities created by the perception of mathematics as a difficult subject. This has led to the poor performance in mathematics over the years.

Morgan et al. in Chatzaki et al. (2024) see the difficulty in learning mathematics as gaps in mathematics proficiency and low memory processing skills. On their part, Karagiannakis et al. (2014), describe difficulty in learning mathematics as various obstacles that lead to difficulty in processing numbers. Difficulty in learning mathematics relates to deficits in developing mathematical skills or difficulty in learning or arithmetical relationships. It also refers to any limitations that hinder students' mathematical learning from a psychological point of view. This difficulty hinders the cognitive learning processes necessary for understanding mathematics. These deficits are believed to affect students' ability in their academic performance in mathematics. Students with difficulties in learning mathematics, complete their work at a slow pace, representing mathematical concepts and perform lower than their peers (Jiten et al., 2013 cited in Widadah & Juniati, 2023). Some of the various reasons identified for students' difficulties in mathematics learning include a poor foundation, unwillingness to learn, teachers' incompetence and the language of instruction. Others are fear resulting from past experiences and the myth of mathematics being a difficult subject. To overcome these difficulties, effective teaching techniques must be used at a slower pace to allow students to learn.

Students' perceptions can be described as student's beliefs and emotions regarding their knowledge of mathematics and includes how they view the subject and their competence in learning mathematics. It also includes how they view the subject and the way they respond to the learning process of the subject. Perception is the primary form of cognitive awareness about the person, place, thing and event through the sensory organs

around the person. All conceptual knowledge is based on or derived from the primary form of awareness. Perception is the quality of being away, the ability to see, hear, or become aware of something through the senses, and how something is regarded. According to Ferreira and Santoso cited in Bichi et al. (2018), students' perception has behavioural consequences on the learning approaches they adopt which in turn influences their learning outcomes. Perception is classified as positive and negative. Positive perception is associated with the deep learning approach (Chand, 2022). Whereas, negative perception is associated with surface learning (Chand, 2022). The deep approach has resulted in higher academic performance and the surface approach resulted in lower performance.

One of the things that make students perceive mathematics as difficult is mathematical anxiety. Mathematical anxiety which is prominent in the classroom hinders students from effectively learning mathematics (Imasuen, 2016). This is also prominent in teachers. It is a feeling of tension, apprehension or fear that interferes with mathematics performance. Studies have shown that teachers contribute mostly to mathematics anxiety (Beilock et al., cited in Sagarrduy et al. (2024). Many students also develop mathematics anxiety because of the topics in mathematics (Choi et al., 2020). Mutodi and Ngirande, (2014) found the students' perceptions significantly influence their mathematics performance. Adegun and Adegun (2013) observed in their study that both teachers and students, qualified and unqualified, experienced and less experienced teachers have the same view of difficult areas in the teaching and learning of mathematics. Charles-Ogan and George (2015) pointed out that a significant difference existed between private and public, school students in the connectedness of teachers, however, gender was found to have no significant difference.

According to Sax et al. (2015), gender difference exists in mathematical concepts which translates to difficulty in mathematics. The reason for the gender difference according to Sax et al. (2015) stems from the fact that mathematics is seen as a "male field" while careers relating to humanities such as teaching, are often considered to be feminine domain. Thus, doing mathematics is consistent with a male self-image and inconsistent with a female self-image (Farooq & Shah, cited in Bichi, 2018).

Some studies have shown that students' perception is the nexus of any student's performance in any subject (Muttodi & Ngirande,2014). This implies that if a student has a positive perception of a subject, there is a likelihood of having good performance in that subject. Adeniyi and Akinoso (2020) found the students had difficulties handling some concepts in mathematics, especially the application of different concepts in mathematics. Akanni (2015) found that there were no significant gender differences in their perception of Mathematics topics. Bichi et al. (2018) in their study observed that students perceived 13 topics (65%) difficult to comprehend. The study also showed that students' gender had a significant influence on their perception of difficult topics in mathematics and the nature of students' schools had no significant influence on their perception of difficulty in mathematics.

Mathematics is very important in problem-solving. It is applied in the day-to-day living of every man. To a large extent, a man could barely do without mathematics. With this perceived importance of the subject matter, it is expected that it should be taught to the learners in the right manner.

Anjali (2020) opined that mathematics was one of the most likeable subjects in the school but as it stands, there is a decline in the interest of learners in mathematics. Learners have developed a notion that mathematics is difficult, hence, the decline in the zeal and motivation to learn. What could be the reason? Could it be the topic or content being taught? Could it be that there's been an inclusion of content that had not been introduced earlier?

Therefore, the study investigates the perceived difficult mathematics topics among senior secondary school one (SSI) students in Benin Metropolis. In furtherance of this, the following research questions guided the study

1. What topics in Mathematics are perceived as difficult by Senior Secondary School one students (SSI) in Benin Metropolis?
2. What is the difference in the perception of male and female students of the difficult senior secondary school mathematics topics as stated in the curriculum?
3. What is the difference in the perceived mathematics topics stated in the curriculum of senior secondary students based on the location of the school?
4. What is the difference in the perception of private and public senior secondary school students of the difficult mathematics topics as stated in the curriculum?

Methods

The study adopted a descriptive survey and the population consisted of Senior Secondary School one students in public and private schools in Benin Metropolis, Edo State. The sample size consisted of 250 students selected from 16 public and 30 private senior secondary school one (SSI) students in Benin Metropolis using the multi-stage sampling techniques. A researcher-developed questionnaire was the instrument used for the collection of the data. It contains two sections, A and B. Section A was used to elicit demographic data such as school location, ownership of school, gender and so on from the respondents. Section B contains the 12 topics in senior secondary school mathematics. The modified four-point Likert scale of very difficult (VD), difficult (D), less difficult (LD), and not difficult (ND) was used. They were assigned weights 4, 3, 2, and 1. The validity of the instrument was ascertained by three experts in the field of Mathematics, and Measurement and Evaluation, at the Institute of Education, University of Benin. The reliability of the instrument was ascertained using the Cronbach alpha reliability statistic and gave an alpha value of 0.89. The data collected were analysed using mean and standard deviation, for research question one. The benchmark for acceptance was that any mean value between 1 and 1.49 was regarded as not difficult, between 1.50 and 2.49 was seen as less difficult, between 2.50 and 3.49 was difficult, and between 3,50 and 4.00 was seen as very difficult. The independent sample t-test was employed for research questions two to four, at a 0.05 level of significance.

Results

Table 1: The Topics in the Senior School Mathematics Syllabus Students Perceived as Difficult in Benin Metropolis

Topics	Mean	Standard deviation	Remarks
Numbers Base System	2.17	0.81	Less difficult
Modular Arithmetic	3.42	0.92	Difficult
Indices and Logarithms	2.25	1.02	Less difficult
Sets	2.25	0.81	Less difficult
Simple Equations and Variation	3.63	0.70	Very difficult
Quadratic Equations	3.69	0.95	Very difficult
Geometrical Construction	3.65	1.02	Very difficult
Trigonometry	3.56	0.63	Very difficult
Formal Geometry	3.91	0.58	Very difficult

Mensuration	3.53	0.75	Very difficult
Statistics and Data Presentations	2.27	1.00	Less difficult
Logical Reasoning	3.56	0.68	Very difficult

Table 1 shows the students were of the view that Simple Equations and Variation, Quadratic Equations, geometric construction, Trigonometry, Formal Geometry, Mensuration Arithmetic and Logical Reasoning were very difficult topics. However, they perceived Modular Arithmetic as difficult while Base Systems, Indices and Logarithms, Statistics and Data Presentations were less difficult.

Table 2: Independent Sample T-test of the Difference in the Perception of Male and Female Students of the Difficult Senior Secondary School Mathematics Topics

Topics	Sex	N	Mean	Standard deviation	t-value	p-value	Remarks
Numbers Base System	Male	93	1.85	0.94	2.25	0.026	Significant
	Female	168	1.50	0.73			
Modular Arithmetic	Male	91	2.35	0.95	1.44	0.154	Not significant
	Female	155	2.09	0.89			
Indices and Logarithms	Male	93	2.02	0.96	3.56	0.001	Significant
	Female	164	1.50	0.61			
Sets	Male	95	1.74	0.73	0.51	0.640	Not significant
	Female	173	1.66	0.86			
Simple Equations and Variation	Male	93	2.15	1.04	1.34	0.182	Not significant
	Female	170	1.88	1.01			
Quadratic Equations	Male	89	2.26	1.02	0.33	0.742	Not significant
	Female	170	2.19	1.01			
	Male	134	2.19	1.07	-0.43	0.667	Not significant
Geometrical Construction	Female	95	2.19	1.02			
	Male	170	2.18	1.11	0.97	0.194	Not significant
Trigonometry	Female	91	2.15	1.00			
	Male	155	1.96	1.00	-0.09	0.925	Not significant
Formal Geometry	Female	93	1.76	1.02			
	Male	161	1.77	0.99	-1.87	0.064	Not significant
Mensuration	Female	91	2.35	0.92			
	Male	170	2.73	1.11	-0.25	0.805	Not significant
Statistics and Data Presentations	Female	89	2.82	1.00			
	Male	170	2.87	0.92	1.92	0.058	Not significant

Logical Reasoning	Female	86	2.84	1.03

Table 2 shows a significant difference in the perception of male and female students of the difficult mathematics topics, in number bases and logarithms, in favour of the males ($p<0.05$). However, there was no significant difference in the other topics identified ($p>0.05$).

Table 3: Independent Sample T-test of the Difference in the Perception of Urban and Rural Students of the Difficult Senior Secondary School Mathematics Topics

Topics	Location	N	Mean	Standard deviation	t-value	p-value	Remarks
Numbers Base System	Urban	166	1.49	0.75	-2.33	0.021	Significant
	Rural	95	1.86	0.90			
Modular Arithmetic	Urban	164	2.10	0.92	-1.41	0.161	Not significant
	Rural	82	2.36	0.90			
Indices and Logarithms	Urban	164	1.68	0.82	-0.17	0.864	Not significant
	Rural	93	1.71	0.75			
Sets	Urban	166	1.62	0.72	-1.19	0.235	Not significant
	Rural	102	1.80	0.94			
Simple Equations and Variation	Urban	164	2.11	1.02	1.86	0.065	Not significant
	Rural	100	1.75	1.01			
Quadratic Equations	Urban	164	2.21	0.98	-0.03	0.977	Not significant
	Rural	95	2.21	1.22			
	Urban	166	2.05	0.97	-1.45	0.157	Not significant
Geometrical Construction	Rural	86	2.34	1.02			
	Urban	159	1.96	0.89	-0.91	0.363	Not significant
Trigonometry	Rural	86	2.13	1.04			
	Urban	166	2.53	1.02	0.293	0.770	Not significant
Formal Geometry	Rural	95	2.48	1.04			
	Urban	161	2.56	1.04	-1.64	0.104	Not significant
Mensuration	Rural	66	2.93	0.96			
	Urban	166	2.18	0.99	-0.15	0.879	Not significant
Statistics and Data Presentations	Rural	75	2.21	1.22			
	Urban	161	2.10	1.61	-0.79	0.430	Not significant
Logical Reasoning	Rural	70	2.35	1.23			

Table 3 shows a significant difference in the perception of urban and rural students of the difficult mathematics topics, in number bases, in favour of the rural school students ($p<0.05$). However, there was no significant difference in the other topics identified ($p>0.05$).

Table 4: Independent Sample T-test of the Difference in the Perception of Private and Public Students of the Difficult Senior Secondary School Mathematics Topics

Topics	Schools	N	Mean	Standard deviation	t-value	p-value	Remarks
Numbers Base System	Public	145	1.84	0.83	-2.59	0.011	Significant
	Private	116	1.45	0.78			
Modular Arithmetic	Public	141	2.41	0.91	-2.26	0.026	Significant
	Private	105	2.02	0.90			
Indices and Logarithms	Public	143	1.65	0.81	-0.60	0.553	Not significant
	Private	114	1.74	0.78			
Sets	Public	145	1.58	0.73	-1.56	0.122	Not significant
	Private	123	1.81	0.89			
Simple Equations and Variation	Public	143	2.11	1.03	1.58	0.117	Not significant
	Private	120	1.81	1.00			
Quadratic Equations	Public	145	2.14	0.99	-0.79	0.432	Not significant
	Private	114	2.30	1.17			
Geometrical Construction	Public	145	2.02	1.02	-1.72	0.089	Not significant
	Private	107	2.34	0.94			
Trigonometry	Public	141	1.87	0.91	-1.90	0.060	Not significant
	Private	105	2.22	0.96			
Formal Geometry	Public	145	2.52	1.05	0.03	0.976	Not significant
	Private	116	2.51	0.99			
Mensuration	Public	141	2.56	1.11	-1.32	0.190	Not significant
	Private	86	2.84	0.86			
Statistics and Data Presentations	Public	145	2.02	1.00	-2.11	0.038	Not significant
	Private	95	2.45	1.11			
Logical Reasoning	Public	141	2.06	1.29	-0.94	0.350	Not significant
	Private	91	2.35	1.15			

Table 4 shows a significant difference in the perception of private and public students of the difficult mathematics topics, in number bases, and indices and logarithms in favour of the public schools ($p<0.05$). However, there was no significant difference in the other topics identified ($p>0.05$).

Discussion of Findings

The study shows that simple equations and variation, quadratic equations, geometrical construction, trigonometry, formal geometry, mensuration, and logical reasoning were perceived by students as very difficult. However, they

perceived modular arithmetic as difficult while number base systems, indices, and statistics and data presentations were less difficult. This finding corroborated with Adegun and Adegun (2013). It was also in tandem with Erin (2020) who opined that geometry was among the very difficult topics in mathematics. It further corroborated the study by Bichi et al. (2018) and Adeniyi and Akinoso (2020).

The study further revealed that a significant difference exists in the perception of male and female students of the difficult mathematics topics, in number bases and logarithms, in favour of the males. However, there was no significant difference in the other topics identified in the senior secondary curriculum. This suggests that students' perception of difficult topics in mathematics is influenced by gender. This finding is consistent with the findings of Mutodi and Ngirande (2014), Beilock et al. cited Sagarrduy et al. (2024), Sax et al. (2015) and Bichi et al. (2018) which says that students' gender had a significant influence on their perception of difficult topics in mathematics. It also aligns with Farooq & Shah, cited in Bichi, 2018 who found gender differences in favour of male students' perception of mathematics difficult topics.

In addition, the study revealed that a significant difference exists in the perception of urban and rural students of the difficult mathematics topics, in number bases, in favour of the rural school students. However, there was no significant difference in the other topics identified in the senior secondary curriculum. This was in agreement with Ahmed et al. (2023) who found that there is a substantial mean difference in academic achievement in mathematics between students from rural and urban schools.

Furthermore, the study shows that a significant difference exists in the perception of private and public students of the difficult mathematics topics, in number bases, and indices and logarithms in favour of the public schools. However, there was no significant difference in the other topics identified in the senior secondary curriculum. This was in tandem with Charles-Ogan and George (2015) who posited that a significant difference existed between public and private school students' perception of difficult topics. However, it did not align with Bischi et al. (2018) who found that school ownership had no significant influence on their perception of difficulty in mathematics.

Conclusion

Based on the findings of the study, it was concluded that simple equations and variation, quadratic equations, geometrical construction, trigonometry, formal geometry, mensuration, and logical reasoning were perceived by students as very difficult; modular arithmetic was difficult while number base system, indices, and statistics and data presentations were less difficult. In addition, a significant difference exists in the perception of difficult mathematics topics by gender, school location and ownership of schools.

Recommendations

Based on the findings of the study, it was recommended that

- Workshops should be organized for the teachers of mathematics to train them on how to effectively teach the identified difficult mathematics topics in the senior secondary school curriculum.
- More emphasis should be placed on how to make the female student, develop likeliness for mathematics to avoid mathematics anxiety.
- Public and private teachers of mathematics should be taught by the government how to apply technology in the act of teaching mathematics.
- Qualified and properly trained teachers should be employed and sent to various schools irrespective of their school location so that they can effectively teach the students.

References

Adegun, I. K., & Adegun, B. O. (2013). Students and teachers' views of difficult areas in mathematics syllabus: Basic requirement for science and engineering. *Journal of Education and Practice*, 4(12), 235-243.

Adeniyi, C. O., & Akinoso, S. O. (2023). Difficult concepts in Nigerian senior secondary school mathematics curriculum as perceived by students. *Ilorin Journal of Education*, 40(1), 114–124.

Ahmed, E. A., Karim, M. R., & Banerjee, M. (2023). Rural-urban disparity in students' academic achievement in mathematics in BTR, Assam in the 21st century. *GeSec Magazine São Paulo, SP, Brazil*, 14(10), 16454-16472.

Akanni, O. (2015). An investigation of the difficult topics in the senior secondary school mathematics curriculum as perceived by student teachers. *American Journal of Educational Research*, 3(7), 25-46.

Anjali, R. (2020). 5 reasons why I love mathematics. Retrieved from https://blogs-kcl-ac-uk.translate.goog/nms/2020/01/23/5-reasons-why-i-love-mathematics%E2%80%AF/?_x_tr_sl=en&_x_tr_tl=ha&_x_tr_hl=ha&_x_tr_pto=sc

Bichi, A. A., Ibrahim, R. H., & Ibrahim, F. B. (2018). European teachers' technological pedagogical content knowledge (TPCK) and educational use of web technologies. *European Journal of Psychology and Educational Research,* 1(2), 53-59.

Borovik, A. (2017). What is the rationale for teaching mathematics in primary school? In Simplicity: Ideals of practice in mathematics and the arts (pp. 241-265).

Chand, S. P. (2022). Teacher perception, practices, and attitudes towards approaches to learning. *Journal of Positive School Psychology*, 6(6), 10004-10015.

Charles-Ogan, G., & George, R. N. (2015). Investigation of difficult concepts in senior secondary mathematics curriculum as perceived by students. *International Journal of Academic Research and Reflections*, 3(6), 67-74.

Chatzaki, M.-A., Skillen, J., Ricken, G., & Seitz-Stein, K. (2024). Exploring the potential of a game-based preschool assessment of mathematical competencies. *Frontiers in Education*, 9, 1337716.

Choi, S. S., Taber, J. M., Thompson, C. A., & Sidney, P. G. (2020). Math anxiety, but not induced stress, is associated with objective numeracy. *Journal of Experimental Psychology: Applied*, 26(4), 604–619.

Farooq, M. S., & Shah, S. Z. U. (2008). Students' attitude towards mathematics. *Pakistan Economic and Social Review*, 46(1), 75-83.

Federal Government of Nigeria (FGN). (2013). National policy on education. Lagos: NERDC.

Gongden, J. J., Gongden, E. J., & Lohdip, Y. N. (2011). Assessment of the difficult areas of the senior secondary two chemistry syllabus of the Nigerian science curriculum. *African Journal of Chemical Education*, 1(1), 48-58.

Karagiannakis, G., Baccaglini-Frank, A., & Papadatos, Y. (2014). Mathematical learning difficulties subtype classification. *Frontiers in Human Neuroscience*, 8(57), 1-5.

Mutodi, P., & Ngirande, H. (2014). The influence of students' perceptions on mathematics performance: A case of a selected high school in South Africa. *Mediterranean Journal of Social Sciences*, 5(3), 431-445.

Naiker, M., Sharma, B., Wakeling, L., Johnson, J. B., Mani, J., Kumar, B., Naidu, A., & Khan, M. G. M. (2020). Attitudes towards science among senior secondary students. *Waikato Journal of Education*, 25(1), 57-72.

Nawaseb, (2012). Should mathematics be compulsory at school? Retrieved from https://researchage.net/post/Should-mathematics-be-compulsory-at-schools

Oladele, O. (2004). Improving the teaching and learning of mathematics in secondary schools. Oyo State Mathematics Conference Paper.

Sax, L. J., Kanny, M. A., Riggers-Piehl, T. A., Whang, H., & Paulson, L. N. (2015). "But I'm not good at math": The changing salience of mathematical self-concept in shaping women's and men's STEM aspirations. *Research in Higher Education*, 56(8), 813-842.

Widadah, S., & Juniati, D. (2023). Analyzing students' abilities as prospective teachers of mathematics in constructing proofs. *Journal of Mathematics Education*, 8(2), 93-106.