ASSESSMENT OF STUDENTS' PERCEPTION OF DIFFICULTY LEVELS OF SECONDARY SCHOOL MATHEMATICS TOPICS IN NORTH WESTERN STATES OF NIGERIA

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Abstract
This research investigates the difficulty levels of secondary school Mathematics topics from the students stand point. A survey approach was adopted. Likert 5-point questionnaire, developed by the researchers, is used for data collection. The questionnaire was administered to nine hundred and eighty five (985) senior secondary school students spread within the study area. The result revealed that 16% of the topics in secondary school mathematics syllabus are perceived as very difficult, 34% of the topics are perceived as just difficult. Average and less difficult topics have 20.5% each. Only 9% of the topics are perceived as not difficult. With 50% of the topics in the difficulty area and only 9% seen as not difficult, the researchers recommend, among other things, that teachers should devise simpler more student friendly approaches during mathematics instruction so that the 9% very difficult topics can move up to less difficult. Also authors of mathematics textbooks should include examples and illustrations that will change the perception of students as this may have direct effect on their performance. It is also recommended that only teachers with both content and pedagogical knowhow should be engaged to teach mathematics.

Keywords: Difficulty levels, Mathematics, Syllabus, Maths phobia, dyscalculia, Senior Secondary School.

Introduction

Mathematics is and remains a basic requirement in all academic endeavours and human life in general. Unfortunately, it does not enjoy the friendship of many students due to some reasons principally anchored on the apparent difficulty of the subject. This unpopular view is held by many students leading to what is often called maths phobia. To this end, Gifford & Rockliffe, (2012) conducted a review on the nature of learning difficulties in mathematics and, in particular, the nature and prevalence of dyscalculia, a condition that affects the acquisition of arithmetical skills. They concluded that the evidence reviewed suggests that younger children (under the age of 10) often display a combination of problems, including minor physical difficulties, which can create a downward spiral in their confidence with mathematics.

Looking at some of the recent results of the two major examination bodies for senior school certificate examinations namely; West African Examinations Council (WAEC) and National Examination Council (NECO), it does not appear that this fear is founded for instance, the 2023 result of WAEC May/June 2023 examination showed79.81% pass in mathematics. On the other hand, NECO result for mathematics showed a 61.6% pass. For private candidates i.e. December SSCE results for 2023, NECO announced 92.75% pass in mathematics.

The study conducted by Zalmon & George (2020) found out that students perceived 88.20% of the Further Mathematics

curriculum content difficult to learn with learning difficulties in all the FMC themes of pure mathematics, coordinate geometry, statistics, mechanics and operations research indicating poor Further Maths Content implementation. Adeniyi & Akanmu (2020) confirmed that teachers in Lagos State *identified eleven different concepts as difficult concepts in the SSS mathematics curriculum.*

Elsewhere, some researchers have alluded to the fact that the margin of difficulty in mathematical concepts is not as wide as ordinarily being projected. This, of course, is not a popular view. Nasrin (2018) in his research found out that the students are enthusiastic in their learning in mathematics asserting that "They found mathematics interesting and valuable although very few found studying mathematics boring and tough.

In another study by Gena and Serah (2017), it was concluded that students with math difficulty demonstrate growth on mathematics measures, but this growth still leads to lower performance than that of students without math difficulty. Identification of math difficulty is strongly related to math performance in subsequent grades, and this diagnosis is often stable.

Mulligan (2011), opines that the difficulty level in mathematics concepts is only structural and that acquiring structural awareness will make it explicitly possible for identification of developmental features of mathematical structure in young minds.
It can be said that the above figures apparently, does not portend any serious concern but it is necessary to find out from the major stake holder in the acquisition of mathematical knowledge, the students. It is unclear to what extent students' perceptions inform decisions about curriculum contents delivery methods, teaching strategies, all of which are central to the effectiveness of mathematics education.

In light of these gaps in literature and the continued importance of mathematics education, this study seeks to investigate students' perception of the difficulty levels of various secondary school mathematics topics. By identifying the specific topics students find most challenging, uncovering the factors that contribute to these perceptions and examine their impact on academic performance and curriculum decisions. This research aims to contribute valuable insights that can inform and improve secondary school mathematics education practices.

This study is motivated by the belief that a comprehensive understanding of students' perceptions of the difficulty levels of mathematics topics is not only essential for addressing their immediate learning needs but also for shaping the future of mathematics education in schools.

Statement of the Problem

Research reports revealed abysmal performance of senior secondary students in General Mathematics in external examinations with students perceiving some contents of the General Mathematics Curriculum (GMC) difficult to learn (Zalmon & Wonu, 2017; Zalmon & George, 2018). If the same students offering General Mathematics and Further Mathematics had perceived learning difficulties in the GMC content which is a prerequisite to learning the FMC content, it is expected that their perception of content difficulty in the FMC will be higher with a corresponding poor performance in external examinations. Therefore, the investigation delved into finding answer to the question: what is the extent of students' perception of content difficulty in the Senior School Certificate Examinations (SSCE) curriculum of WAEC and NECO syllabus?

Objectives of the study

The objective of this research is to study the difficulty levels of secondary school mathematics topics as contained in the syllabus used in conducting SSCE by the two major examination bodies in Nigeria; namely West African Examinations Council (WAEC) and National Examinations Council (NECO). This will be achieved by;

1. Identifying specific secondary school mathematics topics published by WAEC and NECO in order to determine their difficulty levels.
2. Eliciting from students by use of appropriate tools, their perceptions of such topics.
3. Categorizing the topics, based on the response of the students, using appropriate data analysis tool.
4. Proffering possible suggestions for remedying students' wrong perceptions.

Research Questions

The research will proffer answers to the following questions which will be taken to guide the research.

1. What is the extent of students' perception of the Mathematics content difficulty?
2. Which specific secondary school mathematics topics do students, across different grade levels, perceive as the most difficult?
3. What percentage of all the O-level topics is perceived as very difficult by the students?
4. What solutions can be advanced for better acceptance of mathematics by students?

Methodology

The descriptive survey research design was adopted for the study. The study was conducted in the North West region of Nigeria with seven states namely; Sokoto, Kebbi, Zamfara, Katsina, Kaduna, Kano and Jigawa States. A total of nine hundred and eighty-five (985) senior secondary students spread across three states of Katsina, Kano and Jigawa States were chosen as respondents.

The instrument for data collection is Likert five-point scale questionnaire. Likert scale is a type of scale that is used for survey research of this form. It is used to convert intangible results to figures for instance how people feel and levels of agreement which can be useful in many different situations. Likert scale is a rating scale used to measure opinions attitudes, or behaviours. Section A of the questionnaire was on demographic information of the respondents which includes sex; class, gender, and average age Section B consist of forty-four (44) major topics of mathematics from WAEC /NECO syllabus. The statistical techniques used in analysing the data collected for this research will be Likert Table Mean (LTM) which is 3. The following Likert levels were designated;

1. very difficult (VD),
2. difficult, (D),
3. average (A),
4. less difficult (LD)
5. not Difficult (ND)

Results
Analysis of Results

S/N	ITEM	VD	D	A	LD	ND	LSM	$cal(\overline{X})$	Decision
1	Number base	76	318	565	20	7	3.0	3.4	A
2	Modular arithmetic	292	332	76	56	227	3.0	3.4	A
3	Fractions and Decimals	39	125	154	414	236	3.0	2.3	LD
4	Percentage	30	39	76	141	594	3.0	1.4	ND
5	Approximations	16	36	30	76	827	3.0	1.3	ND
6	Indices	79	121	345	378	30	3.0	2.6	A
7	Logarithms	269	266	384	39	26	3.0	3.7	D
8	Sequence and series	318	414	85	115	53	3.0	3.8	D
9	Sets	85	76	292	433	66	3.0	2.6	A
10	Logical reasoning	128	315	256	174	112	3.0	3.2	A
11	Number systems	79	59	105	315	427	3.0	2.0	LD
12	Surds	56	69	36	59	699	3.0	1.5	LD
13	Matrices and Determinants	279	453	102	99	53	3.0	3.8	D
14	Ratio, Proportions &rates	36	23	53	128	745	3.0	1.5	LD
15	Financial Arithmetic	443	361	76	72	33	3.0	4.1	D
16	Variations	542	378	59	7	0	3.0	4.5	VD
17	Algebraic Expressions	23	30	36	141	755	3.0	1.4	ND
18	Operation on algebraic expression	62	82	59	197	584	3.0	1.8	LD
19	Solution of linear equation	43	62	384	322	161	3.0	2.5	A
20	Change of subject of a formula	76	102	190	213	404	3.0	2.2	LD
21	Quadratic equations	302	437	82	115	49	3.0	3.8	D
22	Graphs of linear and quadratic function	443	361	76	72	33	3.0	4.1	D
23	Linear inequalities	43	39	62	121	719	3.0	1.4	ND
24	Algebraic Fractions	56	131	151	394	253	3.0	2.3	LD
25	Functions and Relations	325	414	85	115	46	3.0	3.9	D

S/N	ITEM	VD	D	A	LD	ND	LSM	$cal(\overline{X})$	Decision
26	Geometry 2D: length, perimeter & area	263	256	401	56	10	3.0	3.7	D
27	Geometry 3D: Volume	525	358	53	30	20	3.0	4.4	D
28	Angles	59	85	56	204	384	3.0	1.8	LD
29	Angles &interception on parallel lines	92	59	105	315	414	3.0	2.1	LD
30	Polygons & polygons theories	296	332	79	53	223	3.0	3.4	A
31	Circle and circle theories	634	302	36	10	3	3.0	4.6	VD
32	Construction and loci	568	335	59	16	7	3.0	4.5	VD
33	Concept of X-y plane	325	414	85	118	43	3.0	4.1	D
34	Coordinate of points on the x-y plane	437	335	131	72	10	3.0	3.9	D
35	Trigonometry: sine, cosine and tangent	105	89	414	296	82	3.0	2.8	A
36	Angle of elevation and depression	509	335	89	39	13	3.0	4.3	D
37	Bearings	650	204	46	39	26	3.0	4.5	VD
38	Differentiation of algebraic functions	538	345	53	36	13	3.0	4.4	D
39	Integration of algebraic function	634	296	33	13	10	3.0	4.6	VD
40	Statistics	322	410	89	131	33	3.0	3.9	D
41	Probability	85	210	318	194	177	3.0	2.8	A
42	Vectors in plane	607	315	43	10	10	3.0	4.5	VD
43	Transformation in the Cartesian plane	532	302	85	49	16	3.0	4.5	VD
44	Great circle	433	338	135	69	10	3.0	4.1	D

Discussion of findings

Table above shows that the respondents perceived 7 out of the 44 topics in the secondary school mathematics curriculum as very Difficult (VD), 15 topics out of 44 topics as difficult (D), 9 topics out of 44 topics as average (A), 9 topics out of 44 topics as less difficult (LD) and 4 topics out of 44 topics in the secondary school mathematics curriculum are perceived as not difficult.

On the whole, it can be seen that 22 out of the 44 topics fall within the difficulty area. This is 50% which is in contrast to the finding of Zalmon & George (2020) that students perceived 88.20% as difficult. One may argue this since Zalmon & George (2020) focused on further

mathematics (FM). However, the difference in content between further mathematics and general mathematics (GM) has been seriously narrowed down in recent years by the inclusion of, hitherto FM topics in GM syllabus. Topics like calculus (specifically elementary differentiation and integration) and modular mathematics are now part of GM contents.

Table 2: Percentage distribution of the difficulty levels of O/level topics

Difficulty level	Number of topics	Percentage
Very Difficult	7	16%
Difficult	15	34%
Average	9	20.5%
Less difficult	9	20.5%
Not difficult	4	9%

Research questions 1: What is the extent of students' perception of the Mathematics content difficulty?

From the results, 50% percent of the SSCE topics fall within the difficult region. This is made up of the 7 topics categorised as "very difficult" i.e. 16% and the 15 topics categorised as "difficult" i.e. 34%.

Research questions 2: Which specific secondary school mathematics topics do students, across different grade levels, perceive as the most difficult?

Seven topics are designated as very difficult. They are Construction and loci Bearing, Integration of algebraic function, Vectors in plane and Transformation in the Cartesian plane, Circle and circle theories, Variations. Two of these topics namely Integration of algebraic function and Vectors were among the recently introduced topics that used to be found in FM.

Research questions 3: What percentage of all the O-level topics is perceived as very difficult by the students?

The seven very difficult topics constitute 16 %.

With the findings of this research, there is need to embark on measures by all stake holders in mathematics education especially teachers, mathematics curriculum designers and more serious authors of mathematics textbook to come together and champion a way forward.

Research questions 4: What solutions can be advanced for better acceptance of mathematics by students?

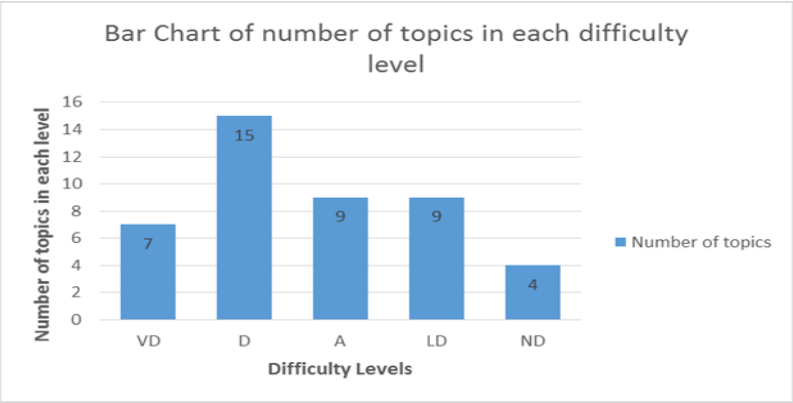

fig.1: Bar Chart: Pictorial Representation of Findings.

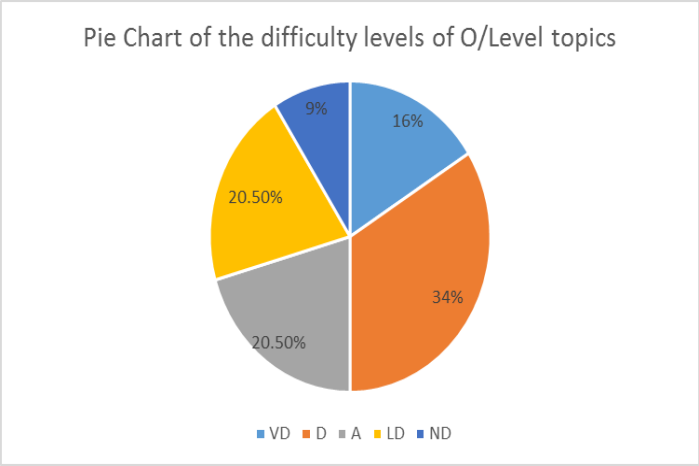

Fig.2 Pie Char

Summary

This research explored students' perceptions of the difficulty level of secondary school mathematics topics. It is motivated by the belief that a comprehensive understanding of students' perception of the difficulty of mathematics topics is not only essential for addressing their immediate learning needs but also for shaping the future of mathematics education in secondary schools. Based on the finding of this research work, it can be deduced that secondary school students perceived 15% of the topics as very difficult, 20.5% of the topics as average, 20.5% of the topics as less difficult, and 9% of the topics as not difficult. And the decision taken by the finding of this research work was based on the interpretation and analysis of the respondents' responses accordingly.

Conclusion

In conclusion, this study has shed light on the intricate web of students' perceptions of the difficulty levels of secondary school mathematics topics. The findings have given valuable insight to the field of mathematics education, emphasizing the importance of inclusive, student-cantered approach. It is evident that addressing students' perceptions and the factors shaping them is integral to improving teaching practices and curriculum development in mathematics education.

Recommendation

For the advancement in learning and teaching of mathematics, science and technology in Nigeria, it is recommended that;

1. Special instructional strategies should be adopted in teaching the identified difficult topics
2. There is every need to include more and simplified illustrations/examples in mathematics textbooks. The idea of students' workbooks should be re-introduced by authors of mathematics books to assist the students at their private studies as well as assist the teachers in planning their lessons.
3. Curriculum developers should develop instruments that would improve students' knowledge by

laying more emphasis on the perceived difficulty areas in mathematics.

4. Ministry of education and stakeholders should ensure that only competent mathematics teachers are employed to teach mathematics at senior secondary school and by extension, all other levels level.
5. Further studies should be conducted on level of difficulty of mathematics topics in other political zones of Nigeria.
6. The Nigerian Educational Research and Development Council (NERDC) should carry out a holistic review of the Mathematics curriculum in view of students' high perception of its content difficulty.

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