

TEACHERS' AND STUDENTS' RATING OF DIFFICULTY LEVELS OF SENIOR SCHOOL GENERAL MATHEMATICS TOPICS IN EKITI-SOUTH SENATORIAL DISTRICT, NIGERIA

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Abstract

The study investigated teachers' and students' rating of difficulty levels of senior school general Mathematics topics in Ekiti-South senatorial district, Nigeria. The study adopted descriptive research design of the survey type. Two research questions and two hypotheses guided the study. The target population for the study was all Mathematics teachers and students in the senior secondary III (SS3) schools within Ekiti-South Senatorial District. A sample of 343 students and 55 SS3 Mathematics teachers were selected using Purposive sampling technique. Two research instruments used, were structured questionnaires constructed by the researchers tagged "Teachers' Rating of Difficulty Levels of Mathematics Topics Questionnaire (TRDLMTQ)" and "Students' Rating of Difficulty Levels of Mathematics Topics Questionnaire (SRDLMTQ)". Cronbach's Alpha was used to determine the reliability of the instruments and reliability index obtained for TRDLMTQ was 0.97 and 0.92 for SRDLMTQ respectively. The data collected were analyzed using frequency count and mean in answering the research questions while Chi-square (X^2) test was used to test the formulated hypotheses at 0.05 level of significance. The findings of the study revealed that, most of the Mathematics topics were either very difficult, difficult, less difficult or not difficult as rated by teachers. The findings also showed that there was a significant difference in the rating of difficulty levels of Mathematics topics based on teachers' qualification and experience. Based on the findings of the study, it was recommended among others that; teachers are advised to bring their wealth of experience in teaching to the level of the students' aptitude to make classroom interactions more interesting so as to arouse the interest of the students to academic excellence. Also, qualified teachers, irrespective of their gender should be employed to teach Mathematics in secondary schools in order to reduce levels of difficulty of Mathematics topics.

Keywords: Teachers, Students, Rating, Difficulty Level, Mathematics

Introduction

Mathematics is a subject needed at all levels of our educational system, which involve calculations and useful in everyday life. As a field of symbolic representation of ideas and relations, its roles in scientific and technological development cannot be underestimated. Adenegan and Akinremi (2014) viewed Mathematics as a basic tool in the development of science based knowledge such as technology, industry and even for sound analytical reasoning in daily living in a modern society such as ours. Thus, Mathematics is seen as core to different fields of study serving as basic entry requirement into various disciplines in tertiary institutions such as engineering, medicine, architecture and commerce which today have direct impact on human existence and nation's economics. To further appreciate the usefulness of Mathematics to national and individual developments, the National Policy on Education (2004) stated clearly that Mathematics is one of the compulsory subject to be studied at the primary, junior and senior secondary levels of education in Nigeria and also made it clear that the broad aims of secondary education are to preparation for useful living within the society and for higher education.

However, inspite of the importance of Mathematics as one of the compulsory subjects at the secondary school level in Nigeria and considering the fact that a minimum of credit pass in Mathematics is a pre-requisite for admission into tertiary institutions in Nigeria, the present level of student's performance especially in Ekiti state at both internal and external examinations seems not satisfactory Sam-Kayode and Salman (2015). Also, the Chief Examiners' Reports (2008-2015) have shown that areas poorly attempted by some candidates in the syllabus where their performance had been reportedly poor has not changed, teachers as well as candidates were encouraged to cover all the topics in the syllabus. It is therefore, necessary to allow the teachers and students indicate what constituted their difficulty in the subject area.

Stuides revealed that many secondary school students especially in Ekiti state considered Mathematics as difficult subject and thus develop phobea and low insterest in Mathematics related subjects. Perhaps this accounts for the poor performance in both internal and external examinations. The National Council for Curriculum Assessment (2005) noted that many students viewed Mathematics as a difficult subject and perceived higher Mathematics as an elite subject that is meant for only the best students. Hence, Okaforand Uche (2013) asserted that students could only find the study of Mathematics more appealing when they perceive the subject matter as interesting, useful and relevant to their daily living.

According to Salman (2015), students' poor achievement is traceable to a number of factors such as students' interest, age, intellectual ability, social economic background, and attitude toward Mathematics, class size and teachers' inadequate understanding of basic concepts in Mathematics and so on. The WAEC Chief Examiners' report (2008-2015) identified some topics in Mathematics, it was further stated that majority of candidates fail to attempt those topics while candidates who attempted questions on those topics were poorly answered. These topics include Set theory, Probability, Geometry- circle theorems and angles on parallel lines, Mensuration, Algebraic graph, Modular arithmetic, Interpretation/solution to word problems, logical reasoning, geometrical construction, Circle Geometry and its applications and Commercial arithmetic. Examiners have identified most of these topics as an aspect of Mathematics that is poorly attempted by students and was tag as students' area of weaknesses as affirmed by the Chief Examiners reports.

In the investigation difficult topics in the senior secondary school Mathematics curriculum as perceived by student teachers, Akanni (2015) found that eight topics were perceived difficult out of thirteen topics selected from WAEC Syllabus. Thus corroborate, Adegun and Adegun(2013) when examined students and teachers view of difficult areas in Mathematics syllabus and discovered that the teachers and the students perceived fourteen (14) topics out of twenty (20) selected topics as difficult topics. This backdrop call for a review of the strategies for the teaching and learning of the subject. Thus, this paper focuses on ratings of difficulty levels of senior school general Mathematics topics in Ekiti South Senatorial District, taking the cognizance of academic qualifications and years of teaching experience of teachers, students 'gender and students' interest as variables.

Statement of the Problem

Despite the usefulness of Mathematics to national development, students' performance in Mathematics at external examinations has remained unsatisfactory Sam-Kayode and Salman (2015). Also, the Chief Examiners' Reports (2008-2015) have shown that areas poorly attempted by some candidates in the syllabus where their performance had been reportedly poor has not changed, teachers as well as candidates were encouraged to cover all the topics in the syllabus. It is therefore, necessary to allow the teachers and students indicate what constituted their difficulty in the subject area.

Effort had been made by educators, for examples; Akanni (2015) investigates difficult topics in Mathematics as perceived by student teachers, the result of the finding shown that eight (8) topics were perceived difficult out of thirteen (13) selected topics. Also, Adegun and Adegun (2013) examined students and teachers view of difficult areas in mathematics syllabus, fourteen (14) topics were perceived difficult out of twenty (20) selected topics. These researchers did not examine all the topics in the new Mathematics curriculum. Therefore, the study focuses on ratings of difficulty levels of senior school general Mathematics topics in Ekiti South Senatorial District, taking the cognizance of academic qualifications and years of teaching experience of teachers.

Purpose of the Study

The main purpose of this study is to investigate the teachers' and students' rating of difficulty levels of topics in senior school Mathematics curriculum. Specifically, the study intends to examine whether there is any difference between teachers and students ratings of difficulty levels of Mathematics topics using teachers' qualification and experience index.

Research Questions

The study will attempt to find answers to the following questions:

- i. What are the teachers' ratings of difficulty levels of Mathematics topics?
- ii. What are the students' ratings of difficulty levels of Mathematics topics?

Research Hypotheses

The following hypotheses are generated and for testing in this study:

1. There is no significant difference in the rating of difficulty levels of Mathematics topics based on teachers' qualification.
2. There is no significant difference in the rating of difficulty levels of Mathematics topics based on teachers' experience

Methodology

The study adopted a descriptive research design of the survey type in which researchers designed questionnaire was used. The research attempted to obtain the ratings of difficulty levels of topics by students and teachers as expressed by their opinion. The target population for the study was all Mathematics teachers and students in the senior secondary III (SS3) schools within Ekiti-South Senatorial District. Purposive sampling technique was used to select three hundred and forty three (343) students' and fifty five (55) SS3 Mathematics

teachers for data collection in Ekiti-South Senatorial District. The research instruments for this study were questionnaire designed by the researchers. Two set of questionnaires titled “Teachers’ Rating of Difficulty Levels of Mathematics Topics Questionnaire (TRDLMTQ)” and “Students’ Rating of Difficulty Levels of Mathematics Topics Questionnaire (SRDLMTQ)” were used. In order to ensure face and content validity of the instruments, TRDLMTQ and SRDLMTQ was given to two Mathematicsexperts from Government College, Ikere-Ekiti, Ekiti State, and expert in Tests, Measurement and Evaluation in the Department of Science Education, University of Ilorin, Nigeria. Cronbach’s Alpha was used to test the reliability of the instruments and reliability index obtained for TRDLMTQ was 0.97 and 0.92 for SRDLMTQ respectively. The instruments were administered by the researchers to the students and teachers with the help of the research assistants and Mathematics teachers in the sampled schools. The statistical tools that were used in analyzing the data collected from the sample Mathematics teachers and students was frequency count, mean, rank and Chi-square (X^2) test.

Results

Descriptive Analysis

From the table 1 and 2, the difficulty of a particular topics is determined by mean scores as follows: Mean less than 1.40 is referred to asnot difficult, 1.40 to 1.79 is referred to less difficult, 1.80 to 1.99 is referred to difficult and 2.00 above is referred to very difficult.

Research Question 1: What are the teachers’ ratings of difficulty levels of Mathematics topics?

Table 1: Mean Scores Comparison of Mathematics Topics as Rated by Teachers

Topics	Mean Scores	Levels of Difficulty	Rank
Integration of Simple Algebraic functions	2.28	Very Difficult	1 st
Application of linear and quadratic equations to capital market	1.97	Difficult	2 nd
Proof of some basic theorems	1.94	Difficult	3 rd
Arithmetic of finance	1.89	Difficult	4 th
Logical Reasoning 2	1.82	Difficult	5 th
Constructions	1.80	Difficult	6 th
Differentiation of Algebraic functions	1.80	Difficult	7 th
Longitude and Latitude	1.78	Less Difficult	8 th
Trigonometry	1.77	Less Difficult	9 th
Gradient of a curve	1.75	Less Difficult	10 th
Circle theorems	1.75	Less Difficult	11 th
Measures of Central Tendency for grouped data	1.72	Less Difficult	12 th
Surface Area and Volume of Sphere	1.72	Less Difficult	13 th
Logarithms 3	1.71	Less Difficult	14 th
Logical Reasoning 1	1.69	Less Difficult	15 th
Simultaneous Linear and Quadratic Equations	1.69	Less Difficult	16 th
Matrices and determinant	1.69	Less Difficult	17 th
Coordinates geometry of straight line	1.69	Less Difficult	18 th
Chord properties	1.68	Less Difficult	19 th
Bearings	1.68	Less Difficult	20 th
Trigonometry Graphs of Trigonometric Ratios	1.68	Less Difficult	21 st
Trigonometric Ratios	1.66	Less Difficult	22 nd
Equation of a straight line	1.65	Less Difficult	23 rd
Cumulative frequency graph	1.62	Less Difficult	24 th
Application of real life situations	1.62	Less Difficult	25 th
Probability	1.60	Less Difficult	26 th
Algebraic fractions	1.55	Less Difficult	27 th
Histograms of grouped data	1.55	Less Difficult	28 th
Modular Arithmetic	1.52	Less Difficult	29 th
Surds	1.49	Less Difficult	30 th
Quadratic Equation 2	1.46	Less Difficult	31 st
Measures of Dispersion	1.46	Less Difficult	32 nd
Mensuration	1.43	Less Difficult	33 rd
Data presentation	1.43	Less Difficult	34 th
Measures of Central Tendency	1.38	Not Difficult	35 th
Logarithms 2	1.32	Not Difficult	36 th
Sequence and Series	1.28	Not Difficult	37 th
Linear inequalities	1.28	Not Difficult	38 th
Sets	1.25	Not Difficult	39 th
Quadratic Equation 1	1.23	Not Difficult	40 th
Number Base System	1.22	Not Difficult	41 st
Indices	1.17	Not Difficult	42 nd
Logarithms 1	1.15	Not Difficult	43 rd
Simple Equations and Variations	1.12	Not Difficult	44 th
Approximations	1.11	Not Difficult	45 th

Table 1 shows the mean scores of difficulty levels of Mathematics topics as rated by Mathematics teachers. The result showed that integration of simple algebraic functions was the most difficult with mean score of 2.28, followed by application of linear and quadratic equations to capital market with mean score of 1.97 and proof of some basic theorems with mean score of 1.94. This means that integration of simple algebraic functions was the most difficult topic as rated by Mathematics teachers, followed by application of linear and quadratic equation and then proof of some basic theorems. However, the least rated Mathematics topics were Logarithms 1, followed by Simple equation and variation, and Approximations with mean score of 1.15, 1.12 and 1.11 respectively. The result also revealed that, 1 topic was rated as very difficult, 6 topics were rated as difficult, 27 topics were rated as less difficult and 11 topics were rated as not difficult to teach by teachers.

Research Question 2: What is the students’ rating of difficulty levels of Mathematics topics?

Table 2: Mean Scores Comparison of Mathematics Topics as Rated by Students

Topics	Mean Scores	Level of Difficulty	Rank
Proof of some basic theorems	2.22	Very Difficult	1 st
Logical Reasoning 1	2.21	Very Difficult	2 nd
Application of linear and quadratic equations to capital market	2.15	Very Difficult	3 rd
Trigonometry Graphs of Trigonometric Ratios	2.13	Very Difficult	4 th
Application of real life situations	2.12	Very Difficult	5 th
Chord properties	2.10	Very Difficult	6 th
Differentiation of Algebraic fractions	2.08	Very Difficult	7 th
Integration of Simple Algebraic functions	2.08	Very Difficult	8 th
Mensuration	2.08	Very Difficult	9 th
Constructions	2.08	Very Difficult	10 th
Data presentation	2.07	Very Difficult	11 th
Gradient of a curve	2.06	Very Difficult	12 th
Measures of Dispersion	2.05	Very Difficult	13 th
Linear inequalities	2.05	Very Difficult	14 th
Trigonometric Ratios	2.04	Very Difficult	15 th
Circle theorems	2.03	Very Difficult	16 th
Surface Area and Volume of Sphere	2.02	Very Difficult	17 th
Arithmetic of finance	2.01	Very Difficult	18 th
Equation of a straight line	2.01	Very Difficult	19 th
Measures of Central Tendency	2.01	Very Difficult	20 th
Algebraic fractions	2.01	Very Difficult	21 st
Logarithms 3	2.00	Very Difficult	22 nd
Coordinates geometry of straight line	2.00	Very Difficult	23 rd
Logical Reasoning 2	1.98	Difficult	24 th
Longitude and Latitude	1.95	Difficult	25 th

Trigonometry	1.93	Difficult	26 th
Histograms of grouped data	1.93	Difficult	27 th
Quadratic Equation 2	1.92	Difficult	28 th
Bearings	1.91	Difficult	29 th
Simultaneous Linear and Quadratic Equations	1.90	Difficult	30 th
Sequence and Series	1.87	Difficult	31 st
Measures of Central Tendency for grouped data	1.86	Difficult	32 nd
Cumulative frequency graph	1.85	Difficult	33 rd
Matrices and determinant	1.81	Difficult	34 th
Probability	1.78	Less Difficult	35 th
Surds	1.76	Less Difficult	36 th
Quadratic Equation 1	1.74	Less Difficult	37 th
Number Base System	1.72	Less Difficult	38 th
Modular Arithmetic	1.72	Less Difficult	39 th
Simple Equations and Variations	1.69	Less Difficult	40 th
Logarithms 2	1.67	Less Difficult	41 st
Indices	1.52	Less Difficult	42 nd
Sets	1.46	Less Difficult	43 rd
Logarithms 1	1.45	Less Difficult	44 th
Approximations	1.41	Less Difficult	45 th

Table 2 shows students’ ratings of difficulty levels of Mathematics topics. Proof of some basic theorems has the highest mean score of 2.22, followed by Logical Reasoning with mean score of 2.21 and Application of linear and quadratic equations to capital market with mean score of 2.15 are the most difficult Mathematics topics as they formed the 1st, 2nd and 3rd ratings respectively while the least rated are Approximations with mean score of 1.41, followed by Logarithms 1 with mean score of 1.45 and Sets with mean score of 1.46. The table also reveals that twenty three (23) topics were rated as very difficult, eleven (11) topics were rated difficult, and eleven (11) topics were rated less difficult to learn by the students.

Testing of Hypotheses

Research Hypothesis 1: There is no significant difference in the rating of difficulty levels of Mathematics topics based on teachers’ qualification.

Table 3: Qualification: Chi-Square Tests

	Value	df	P
Pearson Chi-Square	65.00 ^a	3	.00
Likelihood Ratio	89.35	3	.00
Linear-by-Linear Association	6.08	1	.01
N of Valid Cases	55		

P<0.05

Table 3 shows that there was a significant difference in the ratings of difficulty levels of Mathematics topics based on teachers' qualification with $X^2_{(2,55)} = 65.00^a$, $p < 0.05$. Since p-value is less than 0.05 alpha level, the hypothesis 1 is hereby rejected. This means that qualification of teachers differ in the ratings of difficulty levels of Mathematics topics.

Research Hypothesis 2: There is no significant difference in the rating of difficulty levels of Mathematics topics based on teachers' experience.

Table 4: *Qualification: Chi-Square Tests*

	Value	df	P
Pearson Chi-Square	89.52 ^a	3	.00
Likelihood Ratio	71.63	3	.02
Linear-by-Linear Association	4.51	1	.03
N of Valid Cases	55		

p<0.05

Table 4 shows the chi-square result of the difference in the rating of difficulty levels of Mathematics topics based on teachers' experience with Chi-square statistic: $X^2_{(2,55)} = 89.52^a$, $p < 0.05$. Since p-value is less than 0.05 significant level, the hypothesis 2 is hereby rejected. This implies that teachers' experienced had significant influence on the rating of the difficulty levels of Mathematics topics.

Discussion

The findings showed that, most of the Mathematics topics were either very difficult, difficult, less difficult or not difficult as rated by teachers. The most difficult Mathematics topics are: Integration of Simple Algebraic functions, Application of linear and quadratic equations to capital market, Proof of some basic theorems, Arithmetic of finance, Logical Reasoning 2, Constructions and Differentiation of Algebraic functions with mean scores ranging from 1.80 to 2.30, while the least difficult Mathematics topics are: Linear inequalities, Sets, Quadratic Equation 1, Number Base System, Indices, Logarithms 1, Simple Equations and Variations and Approximations with mean scores ranging from 1.00 to 1.30. It can be deduced that levels of difficulty of Mathematics topics will vary since they rated the topics differently. This study is in line with the finding of Azuka, Jekayinfa, Durojaiye and Okwuoza (2013) that also identified those topics as difficult to teach.

The findings showed students rated levels of difficulty of Mathematics topics based on very difficult, difficult, less difficult and not difficult. The following topics received the highest ratings: Proof of some basic theorems, Logical Reasoning 1, Application of linear and quadratic equations to capital market, Trigonometry Graphs of Trigonometric Ratios, Application of real life situations and Chord properties with mean score between 2.00 to 2.50 while the following were the lowest rated topics: Probability, Surds, Quadratic Equation 1,

Approximations, Modular Arithmetic, Simple Equations and Variations, Logarithms 2, Indices, Sets, Logarithms 1 and Number Base System with mean scores between 1.00 to 1.50. This study is in line with Ameen and Salman (2016) which identified those newly introduced topics as difficult to learn by students and difficult to teach by teachers.

The findings show that there was a significant difference in the rating of difficulty levels of Mathematics topics based on teachers' qualification with Chi-square value. This means that the rating of Mathematics topics based on teachers' qualification vary significantly, that is, qualified teachers' rated Mathematics topics different from their not-qualified counterpart. The findings agreed with: Abe and Adu (2013), Unoroh (2004), Ahiazu and Princewill (2011). The finding disagrees with the findings of Azuka, Jekayinfa, Durojaiye and Okwuoza (2013).

The findings also revealed that there was a significant difference in the rating of difficulty levels of Mathematics topics based on teachers' experience with Chi-square value. This indicates that experienced' teachers' pattern of rating of difficulty levels of Mathematics topics were completely opposite of their less/not-experienced colleagues. The finding agrees with Akanni (2015) that teaching experience of teachers influences their perception of Mathematics topics. This finding is in line with an adage that says 'experience is the best teacher' and disagrees with the findings of Adegun and Adegun (2013) and Azuka, Jekayinfa, Durojaiye and Okwuoza (2013).

Conclusion and Recommendations

Based on findings from the study it can be concluded that teachers' educational qualifications as well as years of teaching experience influence students' rating of difficulty levels of Mathematics topics. Therefore, teachers are advised to bring their wealth of experience in teaching to the level of the students' aptitude to make classroom interactions more interesting so as to arouse the interest of the students to academic excellence. This would assist in solving the problem of poor academic performance of senior secondary school students and improving widely the acclaimed fallen standard of education. In addition, qualified teachers, irrespective of their gender should be employed to teach Mathematics in secondary schools in order to reduce levels of difficulty of Mathematics topics.

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