

INVESTIGATING TEACHERS' DIFFICULT MATHEMATICS CONCEPT FOR EFFECTIVE IMPLEMENTATION OF SENIOR SECONDARY SCHOOL CURRICULUM. IMPLICATION FOR FUNCTIONAL EDUCATION

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Abstract

The study, investigation of teachers' difficult mathematics concepts in senior secondary school curriculum was carried out in Afikpo Education Zone of Ebonyi state. The study adopted a descriptive survey research design. Simple random sampling technique was used to draw fifty-two(52) mathematics teachers from five local government areas that made up Afikpo Education Zone. Three research questions and one null hypothesis guided the study. A four-point scale questionnaire was used to draw responses from the respondent. The instrument was validated by two experts and the reliability coefficient was found to be 0.66 using Cronbach Alpha. Mean and standard deviation were used to answer the research questions while z-test statistics was used to test the null hypothesis at 0.05 level of significant. The findings of the study revealed that some concepts like construction and loci, geometric progressions among others were identified as difficult mathematics concepts by teachers. Some of the causes of the identified difficult concepts include non-provision of instructional materials and lack of interest and workshops. Teachers also believed that provision of instructional materials, motivation and organizing workshops for mathematics teachers could go a long way in solving the problems. It was therefore recommended that governments, professional bodies should provide instructional materials and as well organize workshops to equip teachers on the new mathematics concepts.

Introduction

Education plays a vital role in refuelling the economic growth of any nation. Diya (2010) referred education as the key driver to economic, social and political development of a nation. It is an important tool for assessing the developmental level of any society.

Curriculum is developed at every level of education be it primary, secondary or tertiary and across different subjects or courses. Curriculum is seen as the vehicle through which education works. Onyejekwe (2005)

defines it as all the learning obtained by students which is planned and directed by the school to attain its educational goal. This helps to produce a wholesome, pleasant and understanding individual who will interact wisely and wholesomely within and outside the classroom environment (Chioma, 2005). The proper structure and component of any curriculum are the statement of objective, content, teaching strategies, teaching materials and evaluation (Uka&Iji 2011). Mathematics curriculum follows suit and have changed over the years to meet the societal need and technological development.

Mathematics as a discipline is a language of science and technology which bring about the desired development in a nation. Mathematics occupies a central position in school curriculum and has remained in its position in the Nigeria educational system till date. This is one of the reasons the subject is made a core subject in secondary school curriculum. The core curriculum for mathematics is designed to produce a general education for all students. Mathematics contents are vast, interrelated and possesses interconnected elements. The curriculum builds on work done at a lower and treats in greater detail at higher level. This trend helps to build solid foundation in mathematics and increases understanding in the subject.

Despite the effort at the curriculum planning stage to boost teaching and students understanding of the subject, students have continued to show little or no interest in studying the subject. The evidence of this could be seen in the result obtained by most students in final examinations, be it internal or external (WAEC 2015-2016). This trend is disheartening especially to students aspiring for higher education in areas where a credit in mathematics is required, one of the major contributing factor to this poor achievement in mathematics as noted by Ekwue and Umukoro (2011) is the fear and notion held by most students that mathematics contents are vast and difficulty with much computation, coupled with the teacher's poor knowledge and method of teaching the subject.

The term difficult concept are those concepts that are not easy to teach by the teacher nor learn by the students (Iji&Omenka 2015). They went further to say that difficult concept is not completely the inability of a student to obtain a pass mark in a collection of mathematical problem but what constitute a persistent hitch and make the procedural approach to cognition of mathematical concept a hideous task all the time. However, teachers see some mathematics concepts as being difficult. This could be evidenced in the work of Charles organ and George (2015), which showed that teachers find mensuration, longitude and latitude, bearing as topics being difficult. Also topics like quadratic expression, plane geometry, loci, construction trigonometry, probability, bearings, distances and graphs were also identified

as being difficult by the teachers (Akani,2015; Okigbo&Ejikeme 2017)This has landed them in avoiding those concepts in the classroom and concentrating more on those that seem to appear less difficult. This cannot help to solve the problem at hand since examiners continue to set questions across all mathematics contents. Students therefore have no option than to leave some questions unanswered during examination thereby contributing to their poor achievement in mathematics.

Good curriculum demands good implementation. Teachers are the implementer of the curriculum as they take it to the door steps of the receivers. Therefore, if these teachers are not well trained to master the curriculum contents and its subordinates, there will be implementation problem and this calls for attention into investigating teachers' difficult mathematics concepts for effective teaching and learning of mathematic. This hopefully will go a long way to facilitate and improve students' achievement in mathematics.

Statement of Problem

Mathematics plays a key role in shaping how individuals deals with the various spheres of life, be it private, social or cooperative. A good look at the national curriculum for mathematics reveals the applicability of mathematics knowledge in our formal and informal activities. This notwithstanding, students have continued to dread the subject as was confirmed by WACE chief examiners report. This trend is frustrating to students aspiring for higher education in area where a credit in mathematics is required. Teachers are responsible for translating national curriculumat the classroom level. These teachers need to be properly trained and equipped with respect to curriculum content for its effective teaching and learning. Now the question is, are there areas of mathematics contents teachers find difficult to teach?

Purpose of the Study

The general purpose of the study is to investigate teacher's difficult mathematics contents for effective implementation of senior secondary school curriculum. Specifically, the study tries to find out

1. Senior secondary mathematics curriculum teachers find difficult toteach
2. The reasons why the concepts are difficulty
3. Possible solutions to the identified causes

Research Questions

- 1.What are the senior secondary school mathematics concepts teachers find difficult to teach
- 2.What are the reasons for the identified difficult concepts
- 3.What are the possible solution to the identified causes

Hypothesis

There is no significant mean difference in both male and female teachers identified difficult mathematics concepts

Method

The design adopted for the study was descriptive survey research design. The population of the study comprises of all the mathematics teachers in Afikpo education zone of Ebonyi State. A simple random sampling technique was used to select twenty (20) schools out of forty-three (43) secondary schools that make up Afikpo Education Zone. All the mathematics teachers in the selected schools were used giving us a sample of 52 teachers (18 males and 34 females). A self-developed questionnaire on mathematics difficult concept was used to gather information from the respondents. The instruments were validated by experts and a reliability coefficient of 0.66 was obtained using Cronbach alpha. This instrument was distributed to the respondents in their different schools with the help of research assistants and then fully returned after completion. Mean and standard deviation were used to answer the research questions while z-test statistics was used to test the null hypothesis at 0.05 level of significant.

In decision making, a statement with a mean value of 2.5 and above is taken as being difficult (D) while a mean value below 2.5 is taken as not difficult (ND) while the normal decision rule for z-test statistics is being applied.

Results

Research question 1: What are the mathematics concepts teachers find difficult to teach at senior secondary schools

Table 1: Mathematics concepts teachers find difficult to teach

S/N	CONCEPTS	VD	D	MD	ND	MEAN X	SD	DEC
1	Indices	3	5	24	20	1.83	0.88	ND
2	Logarithm	5	7	28	12	2.10	0.86	ND
3	Standard form	8	33	24	17	2.04	0.69	ND
4	Approximation	10	10	20	12	2.34	1.00	ND
5	Chords and arcs	12	15	15	10	2.56	1.04	D
6	Cyclic quad	12	12	9	9	2.56	1.18	D
7	Linear equation	6	8	18	20	2.0	1.0	ND
8	Quadratic equation	10	12	12	18	2.67	1.2	D
9	Simultaneous linear and quadratic equation	5	10	22	15	2.10	0.93	ND

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10	Sine and cosine rule	12	20	10	10	2.65	1.04	D
11	Longitude and latitude	16	18	10	8	2.81	1.04	D
12	Bearing and distances	15	18	10	10	2.77	1.08	D
13	Mean,median,mode	6	14	12	20	1.92	1.07	ND
14	Frequency tables and graphs	6	16	17	13	2.29	.98	ND
15	Mean deviation and standard deviation	5	2	20	25	2.33	.64	ND
16	Vector components	12	15	15	10	2.56	1.05	D
17	Vector algebra	10	18	16	8	2.58	.97	D
18	Gradient or a straight line	4	10	18	20	1.96	.994	ND
19	Equation of a straight line	4	8	22	18	1.96	.90	ND
20	Vector components	12	15	15	10	2.56	1.05	D
21	Gradient or a straight line	4	10	18	20	1.96	.94	ND
22	Equation of a straight line	4	8	22	18	1.96	.90	ND
23	Gradient of a curve	12	20	12	8	2.69	.99	D
24	Simplification of algebraic fractions	6	15	17	14	2.25	.98	ND
25	solutions of algebraic equations	10	10	20	12	2.34	1.04	ND
26	Arithmetic progression	10	8	17	15	2.57	.76	D
27	Geometric progression	14	26	7	5	2.88	.89	D
28	Construction and loci	20	18	10	5	2.90	.99	D
29	Simple statement	10	12	20	10	2.2	1.01	ND
30	Compound statement	5	12	20	15	2.13	.94	ND

Research Question 2: What are the teachers' reasons for the identified difficult mathematics concepts.

Table 2: Teachers reasons for the identified difficult mathematics concepts

S/N	ITEMS	SA	A	D	SD	MEAN	SD	DEC
1	Non provision of adequate instructional materials	16	14	10	10	2.66	1.09	Accept
2	Lack of interest on the part of the teachers	19	13	12	8	2.83	1.09	Accept

3	Lack of textbooks that covers mathematics contents	7	66	20	17	1.98	0.99	Reject
4	Lack of organized fresher’s workshop for teachers	16	18	10	8	2.81	1.04	Accept
5	Insufficient time for research work	10	16	14	12	2.41	1,05	Reject
6	Over loading of mathematics curriculum	18	15	10	9	2.81	1.09	Accept
7	Poor background on some concepts during secondary education	12	17	13	10	2.60	1.02	Accept

Research Question 3: What are the possible solutions to the identified causes.

Table 3: Teachers responses on the possible solution to the identified causes

S/N	ITEMS	SA	A	D	SD	MEAN	SD	DEC
1	Government should provide adequate mathematics textbook	12	12	12	16	2.38	1.15	Reject
2	Teachers should be encourage to improvise instructional material when necessary	16	15	9	12	2.69	1.14	Accept
3	Mathematics teachers should be motivated as a way of encouraging them	18	22	6	66	3.00	.96	Accept
4	More time should be allocated to the teaching and learning of mathematics to ensure coverage of contents	20	16	8	8	2.92	1.07	Accept
5	Seminars/workshops should be regularly organised for teachers to update their knowledge especially on new concepts	10	20	10	12	2.53	1.06	Accept

6	Grants should be given to teachers who wants to upgrade themselves	18	20	8	6	2.96	.98	Accept
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Null Hypothesis: There is no significant mean difference in both male and female teachers identified difficult mathematics concept.

Table 4: z-test statistics of male and female teachersmean identified difficult mathematics concepts.

Teachers	Mean	SD	N	df	z-cal	z-crit	Decision
Male	2.34	1.09	18	50	0.64	1.96	NS
Female	2.54	1.04	34				
Total			52				

Discussions:

Table 1 revealed that mathematics concepts like chords and arcs, cyclic quads, longitude and latitude, bearings and distances, construction and loci, vectors, arithmetic and geometric progressions are identified as being difficult by teachers with construction and loci as the most difficult followed by geometric progression and longitude and latitude. The z-test statistics also revealed that there is no significant difference in both male and female teachers identified difficult mathematics concepts. The findings are in consonance with the earlier findings of Charles-Organ and George(2015), and Okigbo and Ejikeme (2017) that topics like Longitude and Latitude, Loci and Construction, Quadratic Equations are seen as difficult mathematics concepts by teachers.

Table 2 also indicated that some of the causes of the identified difficult mathematics concepts by teachers are non-provision of instructional materials,lack of interest, insufficient time for research, over loading of mathematics curriculum and lack of organized refreshers course for mathematics teachers. This finding is also in line with that of Okigbo and Ejikeme(2017) who disclosed that inadequacy of appropriate instructional materials and poor interest and attitude towards mathematics as some of the causes of the identified difficult mathematics concepts.

Table 3 showed also some possible solutions to the identified difficult mathematics concepts to include motivation of teacher's efforts, allocating more time for mathematics teaching, organizing workshops and seminars for teachers and giving them study leaves and grants to upgrade themselves.

Recommendations

The following recommendations were made based on the findings:

Mathematics teachers should be provided with enough instructional materials by government and school authority for effective teaching. Professional bodies like MAN, STAN should organize workshops and seminars for mathematics teachers to update themselves on new concepts and new methods of teaching.

Government should provide grants and study leave to mathematics teachers to enable them further their studies

Teachers to be should be properly trained in their various institutions on construction and improvisation of instructional materials by equipping our tertiary mathematics workshops

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