



Evaluation of the Implementation of Objectives of the Senior Secondary School Mathematics Curriculum in Awgu Education Zone, Enugu State

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Abstract

This study evaluated the implementation of the objectives of mathematics curriculum in senior secondary schools in Awgu Education Zone of Enugu State. An evaluation research design was adopted for the study. The population of the study comprised 16,190 students that sat for WASSCE from 2016-2020, the 60 mathematics teachers in 54 public secondary schools in the area. A sample of 31 mathematics teachers (16 urban and 15 rural) was drawn using a simple random sampling technique. Evaluation of the Implementation of Mathematics Curriculum Teachers' Questionnaire (EIMTQ) was used for data collection. Frequency count, percentage, mean and standard deviation were used to answer the research questions while t-test and chi-square were used to test the hypotheses at 0.05 level of significance. The results showed that the extent to which the objectives of mathematics curriculum are implemented by urban and rural school teachers is high and significant in favour of urban school mathematics teachers. The results showed that lack of supervision, poor funding, inadequate instructional facilities, among others are the challenges of implementing mathematics curriculum in Awgu education zone. Based on these findings, the study recommended among others that school authorities must ensure that they recruit only competent and professionally qualified teachers in order to promote sound instructional delivery and ease the process of implementing the curriculum objectives.

Keywords: Mathematics; Evaluation; Achievement; Curriculum; Objectives; Awgu.

Introduction

Mathematics occupies crucial and unique place in human societies, and it represents strategic key in the development of the whole mankind. That is why Hom and Gordon (2021) asserted that Mathematics is the building block for everything in our daily lives, including mobile devices, architecture, art, money, engineering, and even sports. It is the science that deals with the logic of shape, quantity and arrangement. Moursund (2015) further explained mathematics as an aid to representing and attempting to resolve problem situations in all disciplines. As often seen in human lives, numbers are used always and the essentiality of numbers in human lives cannot be over-emphasized. Mathematics is one of the school subjects that any nation needs for industrial and any technical advancement, useful for most vocation and higher specialized courses of learning (Odili, as cited in Tali, Mbwas & Abe 2011). Aguele and Usman (2007) asserted that the level of mathematics determines the level of science and technological component of any nation. Hence, the fact that mathematics is the

cornerstone of scientific and technological development would be an understatement (Oyedepi, 2016).

Based on the importance of mathematics, the Federal Government of Nigeria paid particular attention by making it a core subject in both primary and secondary school education as specified in the National Policy on Education (FRN, 2014). Despite the relevance of mathematics, in our daily lives, mathematics teaching and learning have faced tremendous problems ranging from teachers' poor attitude towards teaching mathematics (Atnafu 2014), to students' poor attitude towards the subject (Mazana, Montero & Casmir 2019), leading to poor performance in the subject which is a matter of great concern. From the researcher's personal observation, students shy away from mathematics or any subject that has the rudiment of mathematics. In fact, greater number of students have developed phobia for the subject while some have little interest in it (Okafor & Anaduaka, 2013). If left for students to choose, most students might



not want to enrol in the subject but just because it is a core and compulsory subject, and they have to get a credit pass in it before furthering their academic career, they had to enroll.

This state is reflected in the annual poor performance or inconsistencies in the performance of students in Senior Secondary School Certificate Examination (SSCE) (West Africa Examinations Council (WAEC)). Data from National Bureau of Statistics (NBS) (2019) and chief examiner's report, showed the result of Senior Secondary School Certificate Examination (SSCE) (WAEC) from 2016-2019 in the thirty-six (36) states plus Abuja, the federal capital territory. It showed that from 2016 to 2019, 52.3% (2016), 56.5% (2017), 33.8% (2018), 64.18% (2019) of candidates had five (5) credits passes including Mathematics in West Africa Senior Secondary Certificate Examination (WASSCE). Though these figures showed that decline in the achievement is most obvious in 2018 (33.8%) and can be said to be at average in 2016, 2017 and 2019. It still showed that 40% to 50% of Senior Secondary School Students repeat classes each year.

There are lots of factors that could be contributory to this poor or fluctuating trend in the students' academic performance, ranging from students' learning skills, students' motivation and readiness, parental background, peer influence, teachers' quality, learning resources, poor implementation of the curriculum objectives and so on (UNESCO, 2021). These factors in one way or the other deter the effort and success of teaching and learning mathematics and thus obvious in students' academic performance. Since, mathematics is very important in the lives of the students and development of the nation, the implementation of its curriculum objectives must have to be done in the most efficient and effective manner.

Mathematics curriculum produced by the Nigerian Educational Research and Development Council (NERDC) (2014), contain plans of mathematical learning experience, divided into themes, subthemes, topics, objectives, content, teacher and learners' activities, learning materials and evaluation guide. The purpose is to ensure effective teaching and learning of mathematics. Mathematics education curriculum in the secondary school is aimed at preparing the students with the right frame of formation of values or attitude for the students to fit in the highly competitive society where the intelligent survives more. The secondary school curriculum prepares and equips

the students for self-realization, self-reliance, and independence in the future. Raji (2016) added that a school curriculum is said to be effective to the society it was developed for, when it is properly implemented. For the objectives of mathematics curriculum to be achieved, it should be effectively implemented. Implementation means the act of putting a plan to action. Furthermore, curriculum implementation is the process of carrying out series of planned activities towards achieving the stated objectives of educational programme in schools and colleges (Onipede, 2013). This study seeks to evaluate the implementation of the mathematics curriculum objectives and the challenges teachers face in doing this. Because of the variation in facilities in rural and public secondary schools, the implementation of the mathematics curriculum and achievement of the objectives can potentially vary in rural and urban areas.

Research Questions

The following questions were posed to guide the study:

1. To what extent have the objectives of mathematics curriculum for senior secondary schools been implemented by the teachers?
2. What are the challenges teachers face in implementing objectives of the Mathematics curriculum?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

1. There is no significant difference in the mean responses of mathematics teachers in urban and rural public secondary schools on the extent to which the objectives of mathematics curriculum for senior secondary schools have been implemented.
2. There is no significant difference in the mean responses of teachers in urban and rural public Secondary schools on challenges they face in implementing the objectives of the Mathematics curriculum.

Research Method

The design of the study was an evaluation research design. Evaluation design according to Nworgu (2015) is used when research systematically tries to make value judgments or decisions on materials, methods, programmes, individuals or systems. The study was carried out in Awgu education zone in Enugu state. There are three local government areas in Awgu education zone. They are; Awgu Local Government

Area that consists 28 secondary schools, Aninri Local Government Area that consists 15 secondary schools and Oji-River Local Government Area that consists 11 secondary schools all controlled by Enugu State Post Primary School Management Board

The population of the study comprised the 54 public secondary schools in Awgu education zone (where Awgu L.G.A has 28, Oji-River L.G.A has 11, while Aninri L.G.A has 15 public secondary schools respectively), and the 60 mathematics Teachers in the public Secondary Schools in Awgu Education zone (where Awgu L.G.A has 29, Oji-River L.G.A has 16, while Aninri LGA has 15 mathematics teachers respectively). The study sampled 2 Local Government Areas (Oji-River and Aninri LGAs) out of the 3 Local Government Areas that make up Awgu education zone, (urban and rural). The 26 public secondary schools in the 2 sampled LGAs were all used for the study. All the 31 Mathematics teachers in these sampled schools served as the respondents for the study. 11 out of the 26 public secondary schools in the sampled LGAs are located in the urban area and have 16 mathematics teachers whereas 15 schools out the 26 public secondary schools in the sampled LGAs are located in the rural area and have 15 mathematics teachers.

The instrument for data collection is a questionnaire titled Evaluation of the Implementation of Mathematics Curriculum Teachers' Questionnaire. Section A contains the demographic information i.e location of school. Section B is made up of 2 clusters. Cluster A consist 23 items that evaluated the extent the mathematics curriculum objectives have been achieved by teachers in Awgu Education zone, and was measured using four Likert rating scale such as; Very High Extent (VHE) (4), High Extent (HE) (3), Low Extent (LE) (2) and Very Low Extent (VLE) (1) . Cluster B consists 8 items that evaluated the challenges teachers face in implementing mathematics curriculum in public secondary schools in Awgu Education zone which was measured using the four point Likert scale such as Strongly Agree (SA) (4), Agree (A) (3), Disagree (D) (2) and Strongly Disagree (SD) (1).

The instrument was duly validated and a reliability coefficient of 0.95 and 0.75 for clusters A and B respectively was obtained using Cronbach Alpha. The instrument for obtaining data for the study were administered by the researcher with the help of two research assistants. Data collected were analysed using frequency counts and percentages as well as mean and standard deviation. t-test was used to test the null hypotheses

Results

Table 1: Mean and standard deviation on the extent to which the objectives of senior secondary school Mathematics curriculum have been achieved by teachers in urban and rural public secondary schools.

S/N	Item Statement	Urban (N=16)		Rural (N=15)	
		\bar{X}	SD	\bar{X}	SD
1	Students cultivate the understanding of mathematical concepts necessary to thrive in the ever-changing technological world	3.13	.72	2.67	.49
2	Students develop and practice logical thinking	3.06	.57	2.60	.51
3	Students develop and practice abstract thinking when needed in the study of mathematics	3.19	.75	2.60	.63
4	Students understand and grasp the knowledge of equations inequalities, identities formulas and functions	2.94	.57	2.60	.74
5	Students understand and grasp the measures of simple D and 3D figures	2.94	.77	2.47	.64
6	Students understand and grasp the intuitive, deductive and analytic approach to study geometric figures	3.31	.60	2.67	.62
7	Students develop essential elements of problem-solving within the study of mathematics	3.06	.85	2.60	.83
8	Students develop essential element of reasoning and connection with the study of mathematics	2.81	.75	2.67	.82

9	Students develop skills and capacities in basic computations in real numbers and symbols	3.06	.85	2.67	.49
10	Students develop skills and capacity in reasoning mathematically	3.00	.89	2.87	.52
11	Students develop skills and capacities in applying mathematics knowledge to solve variety of problems	3.00	.63	2.87	.64
12	Students develop skills and capacities in handling data and generating information	3.38	.62	2.80	.41
13	Students develop skills and capacities in using modern technology appropriately to learn and solve mathematics.	2.88	.62	2.60	.51
14	Students cultivate the understanding of the application of mathematical skills necessary to thrive in the ever-changing technological world.	3.00	.73	2.53	.52
15	Students have developed interest in learning mathematics	2.94	.68	2.47	.64
16	Students are willing to apply mathematical knowledge in their daily activities	2.69	.48	2.53	.64
17	Students are confident in solving mathematics	3.00	.52	2.40	.63
18	Students develop ability to recognize and solve problems with related mathematical knowledge	2.88	.62	2.60	.63
19	Students have willingness to study mathematics in tertiary institutions	3.06	.57	2.27	.59
20	Students have the willingness to study Engineering course in the tertiary institutions	2.63	.96	2.33	.82
21	Students have interest in studying science course in tertiary institution	3.00	.63	2.80	.68
22	Students have the interest in studying technology-based courses in the tertiary institution	3.00	.63	2.73	.70
23	Students have interest in studying statistics and other courses that involve calculations in the tertiary institution	2.81	.66	2.53	.52
Cluster Mean		2.99	.42	2.60	.30

The result presented in Table 1 shows the mean and standard deviation on the extent to which the objectives of Mathematics curriculum for senior secondary have been achieved in urban and rural public schools in Awgu Education zone of Enugu state. The result shows that the urban school Mathematics teachers had mean response ratings between 2.50-3.49 range set for high extent to items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23. This is an indication that to a high extent, the objectives of Mathematics Curriculum in the items are achieved by urban teachers. The cluster mean value of 2.99 with standard deviation of 0.42 shows that there is a high extent to which the objectives of senior secondary Mathematics Curriculum are achieved by urban teachers. The cluster standard deviation implies a low variation in their responses. The result further shows that the rural school Mathematics teachers had mean response ratings between 2.50-3.90 range set for high extent for items 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14,

16, 18, 21, 22 and 23. This means that there is a high extent to which the objectives of Mathematics curriculum in the items were achieved by rural teachers. More so, the result shows that items 5, 15, 17, 19 and 20 had mean values between 1.50-2.49 range set for low extent. This means that there is a low extent to which the objectives of Mathematics Curriculums in the items are achieved by rural Mathematics teachers. The cluster mean value of 2.60 with standard deviation of 0.30 indicates that there is a high extent to which the objectives of Mathematics curriculum are achieved by rural school teachers. The cluster standard deviation of 0.30 shows that there exist similarities in the responses.

Table 2: t-test analysis on the difference in the mean responses of urban and rural Mathematics teachers on the extent to which the objectives of Mathematics curriculum have been achieved

Location	N	\bar{X}	SD	Df	t-value	Sig.	Dec.
Urban	16	2.99	.42	29	2.928	0.007	S
Rural	15	2.60	.30				

Table 2 shows the t-test analysis on the difference in the mean responses of urban and rural Mathematics teachers on the extent to which the objectives of Mathematics curriculum have been achieved. The result shows that the $t(df=29) = 2.928$, $p < 0.05$ were obtained. Since the associated exact probability value of 0.007 is less than 0.05 level of significance set for decision making, the null hypothesis was rejected. This means that there is a significant

difference in the mean responses of mathematics teachers in urban and rural public Secondary Schools in Awgu education zone, Enugu state on the extent the objectives of mathematics curriculum for senior secondary schools have been achieved. Inference drawn is that the objectives of Mathematics curriculum in Awgu education zone were achieved more significantly by urban Mathematics teachers than rural teachers.

Table 3: Mean and standard deviation on challenges faced by teachers in implementing mathematics curriculum in urban and rural public secondary schools

S/N	Item Statement	Urban(N=16)		Rural(N=15)	
		\bar{X}	SD	\bar{X}	SD
1	In-effective Supervision of the implementation process of mathematics curriculum senior secondary schools	3.56	.63	3.13	.52
2	Poor knowledge of the subject matter.	3.69	.60	3.40	.63
3	In adherence of 1:40 Teacher-student Ratio.	3.50	.63	3.20	.68
4	Negligence on the Part of Government to support senior secondary mathematics curriculum implementation.	3.69	.60	3.40	.63
5	Poor funding.	3.38	.89	2.93	.70
6	Lack of instructional materials for teaching and learning.	3.25	.86	2.87	.64
7	Teachers' poor attitude in the implementation process	3.50	.63	3.20	.94
8	Lack of qualified mathematics teachers.	2.69	1.14	2.40	.63
Cluster Mean		3.41	.42	3.07	.39

Key: \bar{X} = Mean, SD= Standard deviation

The result of the analysis presented in Table 14 shows the mean and standard deviation on the challenges faced by teachers in the implementation of mathematics curriculum in urban and rural public schools in Awgu education zone of Enugu State. The result shows that the mean response rating or urban teachers to items 1, 2, 3, 4 and 7 are within the criterion mean range of 3.50-4.00 set for strongly agreed. This implies that it is strongly agreed that the challenges on the items are faced by teachers while implementing mathematics curriculum in urban schools. The result

also shows that the mean response rating to items 5, 6 and 8 are within the benchmark mean of 2.50-3.49 set for agreed. This means that it is agreed that the challenges stated on the items militates against the implementation of mathematics curriculum in urban schools. The cluster mean of 3.41 with standard deviation of 0.42 is an indication that it is agreed that all the challenges stated are faced by teachers while implementing mathematics curriculum in urban public schools. On the other hand, the table further reveals that the mean response ratings of rural teachers to items 1,

2, 3, 4, 5, 6 and 7 are within the criterion mean range of 2.50-3.49 set for agreed. This is an indication that it is agreed that the challenges stated in the items are faced by teachers while implementing mathematics curriculum in rural schools. Furthermore, the result shows that the mean response ratings to item 8 is within the criterion mean range of 1.5-2.49 set for disagreed. This means that rural teachers disagreed that the

challenge stated in item 8 does not militate against the implementation of mathematics curriculum. The cluster mean of 3.07 with standard deviation of 0.39 indicates that it is agreed that the challenges stated are faced by teachers while implementing mathematics curriculum in rural public secondary schools in Awgu education zone of Enugu state.

Table 4: t-test analysis on the difference in the mean responses on challenges faced by teachers, in implementing Mathematics curriculum in urban and rural public Secondary schools.

Location	N	\bar{X}	SD	Df	t-value	Sig.	Dec.
Urban	16	3.41	.42	29	2.324	0.027	S
Rural	15	3.07	.40				

Table 4 shows the t-test result on the significance difference in the mean responses on challenges teachers face, in implementing Mathematics curriculum in urban and rural public Secondary schools in Awgu Education zone, in Enugu State. The result shows that, $t(df=29)2.324$, $p<0.05$ were obtained since the associated exact probability value of 0.027 is less than 0.05 level of significance, the null hypothesis was rejected. This means that there is a significant difference on challenges faced by teachers, in implementing Mathematics curriculum in urban and rural public Secondary schools in Awgu Education zone, in Enugu State. Inference drawn is that the challenges teachers in urban schools face is significantly different from the challenges teachers in urban schools face in implementing mathematics curriculum in Awgu education zone, Enugu state.

Discussion of Findings

The result of this study shows that there is a high extent to which the objectives of Mathematics curriculum for senior secondary schools have been achieved in both urban and rural public schools. The result shows that the extent to which the objectives of mathematics curriculum was achieved in urban school is significantly higher than that of rural public schools. This result is an indication that mathematics teachers in urban public senior secondary schools ensure that mathematics instructions are delivered in accordance with the specified objectives more than those in the rural schools. This result could have been like this because, mathematics teachers in urban public schools are more qualified than those in rural public schools, this could have made them stick to the objectives of

mathematics curriculum. More so, it is possible that there are adequate instructional resources and conducive classroom environment as well as welfare packages which could have motivated mathematics teachers in urban schools towards achieving the objectives of mathematics curriculum more than those in the rural schools. All these factors could have made the findings of this study the way it is. This result is supported by the findings of Raji (2018) who reported that the implementation of mathematics curriculum is fairly in line with the objectives stated. The result also aligns with the findings of Oyat, Nwogwugwu and Idika (2021). On the contrary, the finding disagreed with the study of Ntibi and Edoho (2017). The differences observed in the above findings could be as a result of factors such as the area of the study, the personality attributes of the teachers such as interest, motivation, qualifications, among others.

The finding of this study on the challenges faced by teachers while implementing objectives of the mathematics curriculum in urban and rural public secondary schools shows that both urban and rural public school teachers face challenges such as ineffective supervision of curriculum implementation process, poor knowledge of subject matter by teachers, not adhering to 1:40 teacher-student ratio, negligence on government part, poor funding, lack of instructional materials, poor teachers' attitude and lack of qualified mathematics teachers, among others. The result shows that the challenges faced by urban teachers are similar to that faced by rural school teachers. This is probably because both schools in urban and rural locations are own and managed by the government, so, the challenges experienced are likely to be uniform. More

so, this result could be because less attention has been given to the education sector of the country by government authorities who are concerned. This lack of attention and negligence could have contributed to these challenges that have been found. The result of this study is in agreement with the findings of Brodie, Jina and Modau (2009) and Nyawira (2015) who reported separately that lack of qualified teachers and instructional facilities are some of the challenges facing curriculum implementation. The study of Raji (2018) was also strengthened by the finding of this study as the author found that lack of instructional materials form challenges faced by teachers while implementing mathematics curriculum at the secondary school level. These results indicates that inadequate qualified teachers, poor funding, lack of teaching resources, among others are some of the challenges facing curriculum implementation.

Conclusion

Based on the findings of this study, it was concluded that the objectives of mathematics curriculum for senior secondary schools are being achieved in urban and rural public secondary schools of Awgu education zone in favour of urban schools. The lack of supervision, poor knowledge of subject matter, poor funding, among others are the challenges faced by urban and rural school mathematics teachers in the implementation of mathematics curriculum in Awgu education zone of Enugu State. Measures need to be put in place to stem the challenges and continue to enhance the implementation of the curriculum objectives.

Recommendations

The following recommendations were discussed based on the findings of the study

1. Teachers should ensure that they develop sound and good knowledge of mathematics as well as the instructional delivery processes. This will enable them to teach mathematics efficiently, thereby promoting students' understanding which could lead to achievement of the objectives.
2. School authorities must ensure that they recruit only competent and professionally qualified teachers in order to promote sound instructional delivery and ease the process of implementing the curriculum objectives.

3. Government officials and supervisors should ensure that they visit and supervise schools regularly to ensure that the various elements of the curriculum are in place and in accordance with the expected objectives and implementation processes of the curriculum
4. Curriculum planners/developers should ensure that resources are put in place to ensure that the curriculum implementation processes are consistent with the objectives of the curriculum.

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