# Evaluation of the Nigerian Senior Secondary Education Mathematics Curriculum Implementation

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***Abstract*: This research study evaluated the Nigerian senior secondary education Mathematics curriculum implementation in Obio/Akpor local government area of Rivers State using the Stufflebeam's Context Input Process Product (CIPP) evaluation model. Evaluation survey design was adopted for the study with a population of 18,087 senior secondary school students and 72 Mathematics teachers from the 20 public senior secondary schools in the area. Simple random sampling technique was used to select 390 students and 60 Mathematics teachers making 450 samples with the aid of Taro Yamane formula. The researchers developed Context, Input, Process and Product Curriculum Evaluation Model Questionnaire (CIPPCEMQ) was the instrument for data collection. The CIPPCEMQ has a reliability coefficient of 0.71 obtained by test-retest method. The study was guided by four research questions and four hypotheses. Mean and standard deviation were used to answer the research questions while regression analysis was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that the Government, private individual, cooperate group and the community were involved in the implementation of the senior secondary education Mathematics curriculum in the area but available input variables and the quality of the instructional process did not significantly contribute to the effective implementation of the senior secondary education Mathematics curriculum as the curriculum objectives (product) were not being achieved. Also, the joint contribution of the context, input and process variables did not contribute significantly to the effective implementation of the Mathematics curriculum. The study therefore recommended adequate provision of the learning resources and improvement in the quality of the instructional process to guarantee effective implementation of the senior secondary education Mathematics curriculum in the area.**

***Keywords:* Evaluation, senior secondary education, Mathematics, curriculum, implementation**

## I. INTRODUCTION

Mathematics which is the study of numbers, algebra, geometry, statistics and calculus is very relevant to the modern society following its role in the development of science, technology, engineering and economics. Mathematics has been recognized as the mother of all learning and the queen of all sciences. It is essential in almost every field such as science, technology, engineering, arts, banking and finance, economics, fashion and design, carpentry and many more. In acknowledging the place of Mathematics in nation building, the Federal Republic of Nigeria made Mathematics education compulsory in the senior secondary education level (Federal Republic of Nigeria, 2014). Mathematics is one of the compulsory curriculum subjects taught at the basic and post basic education levels in Nigeria.

The term curriculum has been defined differently by different people. However, a more modest definition of curriculum according to Achuonye and Ajoku (2013) was given by Tamer and Tamer (1975). Tamer and Tamer (1975) as cited in Achuonye and Ajoku (2013) defined curriculum as the planned and guided learning experiences and intended learning outcomes formulated through the systematic reconstruction of knowledge and experience under the auspices of the school, for the learners continuous and willful growth in personal-social competence. Curriculum is a blue print of an instructional guide while the Mathematics curriculum is a blue print of an instructional guide in Mathematics. The Mathematics curriculum is a booklet produced by the Nigerian Educational Research and Development Council (NERDC) which contain a plan of Mathematics learning experiences consisting of objectives of teaching Mathematics, themes, sub-themes, topics, performance objectives, content, teacher and learner activities, learning materials and evaluation guide.

The NERDC designed the Mathematics curriculum for the early childhood education, primary education, junior secondary education and the senior secondary education. The senior secondary education Mathematics curriculum gives direction to instruction in Mathematics at the post-basic education level and provides a framework for evaluating the extent of implementation. The purpose of the Mathematics curriculum is to ensure effective teaching and learning of Mathematics. Curriculum evaluation is concerned with the collection and use of information for decision making about an educational programme (Achuonye & Ajoku, 2013). Curriculum evaluation is necessary to find out how far the learning experiences as developed and organized are actually producing desired results because the actual teaching procedures involve a considerable number of variables including variations in individual students, the environmental conditions in which learning goes on, the skill and personality characteristics of the teacher which make it impossible to guarantee that the actual learning experiences provided are precisely those that are outlined in the learning units (Achuonye & Ajoku, 2013). It is necessary to carry out periodic evaluation of the senior secondary education

Mathematics curriculum to ascertain that the planned learning experiences actually functions to guide the teacher in achieving the desired learning objectives.

The current edition of the senior secondary education Mathematics curriculum was produced in the year 2012 by the NERDC with the five themes of number and numeration, algebraic processes, geometry, statistics and introductory calculus (NERDC, 2012). According to Odili (2006), the seven objectives of the secondary (senior) education Mathematics curriculum are: to generate interest in Mathematics and provide a solid foundation for everyday living; to develop computational skills; to foster the desire and ability to be accurate to a degree relevant to the problem at hand; to develop and practice logical and abstract thinking; to develop ability to recognise problems and to solve them with related Mathematics knowledge; to provide necessary mathematical background for further education; and to stimulate and encourage creativity. A critical analysis of the senior secondary education Mathematics curriculum objectives reveals that the curriculum was designed to develop the cognitive (knowledge), psychomotive (skill) and affective (attitude) domains of the learners. Developing Mathematics knowledge, logical and abstract thinking are cognitive development; developing computational skills and stimulating creativity or creative skills are psychomotive development while generating interest in Mathematics and fostering the desire and ability to be accurate to a degree relevant to the problem at hand refer to developing the learners' attitude or affective domain. Therefore, to effectively implement the senior secondary education Mathematics curriculum is giving learners the opportunity to acquire mathematical knowledge, develop mathematical skills and cultivate mathematical attitudes of precision, accuracy and perseverance. Learning Mathematics gives the learners the opportunity to develop mathematical skills such as computational, process, problem solving, thinking (critical, logical and abstract), creative, reasoning and communication skills. Mathematical skills are necessary to function in information and ever changing technological world. It is therefore necessary to evaluate the junior secondary Mathematics curriculum which was first published in 2007 and revised in 2012 (NERDC, 2012) to determine the extent of implementation.

The Nigerian Educational Research and Development was given the mandate to develop school curricula for all levels of the educational system in Nigeria (NERDC, 2012). The implementation of the developed curriculum rest solely on teachers and other agencies of government and non-government such as the National Examination Council (NECO), the West African Examination Council (WAEC), Science Teachers Association of Nigeria (STAN), National Mathematical Centre (NMC), Curriculum Organisation of Nigeria, Mathematical Association of Nigeria and many others. Curriculum development is the process of planning learning opportunities intended to bring about certain changes in the learner and the assessment of the extent to which these changes have taken place (Achuonye & Ajoku, 2013). Curriculum implementation refers to the process of translating the curriculum document to operating curriculum in such a way that the pre-determined objectives are attained (Achuonye & Ajoku, 2013). Curriculum implementation is the instructional phase in the curriculum process; it is the task of translating the curriculum document into the operating curriculum by the combined efforts of the students, teachers and others concerned (Odili, 2006). Curriculum implementation involves effectively utilizing the input variables in a learning context for quality instructional process. Stakeholders in education and relevant established examination bodies have been showing great concern over the poor performance of students in Mathematics. Charles-Ogan (2014) reported that an average of 72% of students who sat for the May/June West African Senior Secondary Certificate Examination (WASSCE) in General Mathematics from 1991 to 2016 fail Mathematics. Similar report by Zalmon and Wonu (2017) revealed that 72.69% of students who sat for the May/June WASSCE in General Mathematics for the past twenty-six years obtained pass and below (D7–F9). This abysmal trend in students' Mathematics performance could be traced to ineffective implementation of the Mathematics curriculum at the senior secondary education level through curriculum evaluation.

Curriculum evaluation is a feedback mechanism that guarantees a reliable and dependable basis for action or the fate determiner of a given curriculum package (Williams & Olele, 2015). Achuonye and Ajoku (2013) defined curriculum evaluation as the process concerned with the collection and use of information for decision making about an educational programme. Curriculum evaluation is vital in an educational system because it provides information on the strength and weakness of a particular curriculum or programme for possible decision to modify, review, improve or end the curriculum (Williams & Olele, 2015). There are several models of curriculum evaluation. Williams and Olele (2015) identified the following four evaluation models: needs/assessment models, formative evaluation model, summative evaluation models and Kirkpatrick's four-level evolution model. This study adopted the Stufflebeam's 1971 summative evaluation model which is a decision management orientation model designed to guide decisions about planning, structure, implementation and recycling (Williams & Olele, 2015). Other summative evaluation models according to Williams and Olele are Stake's 1967 model and Provus's 1969 model.

Stufflebeam's evaluation model commonly refers to as the CIPP model is derived from the following four levels of decision guides: Context evaluation (planning decision), Input evaluation (structure decision), Process coordination (implementing decision) and Product evaluation (recycling decision) (Williams & Olele, 2015). This model was adopted for this study because to effectively implement the curriculum, certain features, factors or variables must be rightly put in place. In Stufflebeam's model, the variables are categorized as the Context Input Process and Product (CIPP) variables of curriculum or programme evaluation. The organizations or groups involved in the implementation of the curriculum constitute the context variables. Some organizations, groups or individuals involved in the Mathematics curriculum implementation process are government, religious body, private enterprises and co-operate group. The input variables are the injections into the curriculum such as the human and material resources required for effective teaching and learning of Mathematics. They include availability of qualified Mathematics teachers, ventilated classrooms and staffrooms, equipped Mathematics laboratory and library, computer laboratory, seat, boards, chalk or marker, note books and text books and others. The process variables express the operational procedures and management of a curriculum such as effective lesson planning and teaching, utilization of innovative and conventional teaching methods and efficient evaluation techniques required for effective Mathematics curriculum implementation. The products of the curriculum refer to the output variables which basically are the graduates of the programme who at the point of graduation are expected to achieve the objectives of the curriculum. The Stufflebeam's CIPP model of curriculum evaluation was adopted in this study to determine the extent to which the available context, input and process variables contribute to the realization of the senior secondary education Mathematics curriculum objectives (product).

*Statement of the Problem*

Effective implementation of the Mathematics curriculum at all the levels of our educational system has been a major challenge. Implementing the Mathematics curriculum particularly at the senior secondary education level has been greeted with many setbacks. There are problems of very high disparity in student-teacher ratio, lack of instructional materials and learning facilities such as the mathematics laboratory, poor student-teacher relationship and poor quality of instruction due to the utilization of ineffective instructional approaches. The outcome is certainly abysmal performance of students in the subject. It is sad to note that despite the indispensability of Mathematics in human daily activities, empirical evidence has shown that students are not doing well in the subject at both West African Senior Secondary Certificate Examination (WASSCE) and National Senior Secondary Certificate Examination (NSSCE).

Consequently, there is need to evaluate the implementation of the senior secondary education Mathematics curriculum to ascertain what has gone wrong. The study shall provide answers to the questions on the extent of involvement of government and non-governmental organizations in the implementation of the Mathematics curriculum in senior secondary schools. The issues of inadequate availability of learning resources and poor quality of the instructional process in Mathematics which are the challenges facing the effective implementation of the senior secondary Mathematics curriculum were some of the issues addressed in this study. The question therefore is: Does the available input variables and the quality of instructional process significantly contribute to the effective implementation of the senior secondary education Mathematics curriculum in Obio/Akpor local government area of Rivers State?

## II. AIM AND OBJECTIVES OF THE STUDY

The of this study is to evaluate the senior secondary education Mathematics curriculum implementation in Obio/Akpor local government area in Rivers State using Stufflebeam's Context, Input, Process and Product (CIPP) model of curriculum evaluation. The objectives of the study are to:

1. Ascertain the extent of involvement of government and non-governmental organizations (context) in the implementation of the senior secondary education Mathematics curriculum.
2. Find out how the extent of availability of the input variables for the implementation of the senior secondary education Mathematics curriculum.
3. Determine the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics.
4. Determine the extent of implementation (achievement) of the senior secondary education Mathematics curriculum objectives (product).

*Research Questions*

The following research questions guided the study:

1. What is the extent of involvement of government and non-governmental organizations (context) in the implementation of the senior secondary education Mathematics curriculum?
2. What is the extent of availability of the input variables for the implementation of the senior secondary education Mathematics curriculum?
3. What is the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics?
4. What is the extent of achieving the senior secondary education Mathematics curriculum objectives (product)?

*Hypotheses*

The following hypotheses were formulated and tested at 0.05 level of significance to guide the study:

$H_{01}$: There is no significant contribution of the context variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

$H_{02}$: There is no significant contribution of the input variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

$H_{03}$: There is no significant contribution of the process variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

$H_{04}$: There is no significant joint contribution of the context, input, and process variables to the product variable in the implementation of the senior secondary education Mathematics curriculum.

## III. METHODOLOGY

This study adopted an evaluation survey design. Evaluation survey design is carried out on programmes or events in order to make judgment about the value or worth or effectiveness of that programme or event. The population consisted of 18,087 senior secondary school students comprising of 7,668 male and 10419 female students and 72 Mathematics teachers (38 male and 34 female) from 20 public secondary schools in Obio/Akpor local government area of Rivers State (Rivers State Senior Secondary Schools Board, 2018). A sample of 390 students and 60 Mathematics teachers obtained from the population by Taro Yamane formula was selected using simple random sampling technique for the study. The Context Input Process and Product Model Questionnaire (CIPPMQ) was the instrument for data collection. The CIPPMQ was designed by the researchers. It was patterned after the four point Likert like rating scale of Very High Extent (VHE) -4 points, High Extent (HE) -3 points, Low Extent (LE) -2 poinst and Very Low Extent (VLE) -1 point for the context, process and product variables and Adequately Available (AA) - 4 points, Available (A) -3 points, Inadequately Available (IA) - 2 points and Not Available (NA) for input variables. The instrument had two sections. The first section contained demographic information of the respondents while the second section was used to elicit information from the respondents based on the CIPP model. Students responded to the items on product variables while the teachers responded to the items on the context, input and process variables. The face and content validity of CIPPMQ was established by four experts in Mathematics Education. Using test-retest method and the Pearson's Product Moment Correlation (PPMC), the reliability coefficient of the CIPPMQ was obtained as 0.71. Forty (40) students and 10 teachers who were not part of the sample of the study were used to collect data for the reliability of the instrument. The researchers administered the instruments personally with the aid of the Mathematics teachers. Data collected were analysed using mean, standard deviation and regression analysis. All the research questions were answered with mean and standard deviation and the four hypotheses tested with regression analysis. A criterion mean of 2.50 was used to determine the extent of involvement of stakeholders (context variable), availability of the input variables and the extent of utilizing best practices in the instructional process for effective Mathematics curriculum implementation.

## IV. RESULTS

*Research question one:* What is the extent of involvement of government and non-governmental organizations (context) in the implementation of the senior secondary education Mathematics curriculum?

Table 1: Mean (M) and Standard deviation (Std) on the extent of involvement of government and non-governmental organizations (context) in the implementation of senior secondary education Mathematics curriculum

| S/N | Context Variables | VHE | HE | LE | VLE | Mean | Std. | Decision |
|---|---|---|---|---|---|---|---|---|
| 1. | Government | 45 | 8 | 6 | 1 | 3.62 | 0.74 | High |
| 2. | Religious body | 3 | 17 | 38 | 2 | 2.35 | 0.63 | Low |
| 3. | Private Individual | 7 | 24 | 25 | 4 | 2.57 | 0.79 | High |
| 4. | Cooperate group | 21 | 22 | 16 | 1 | 3.05 | 0.83 | High |
| 5. | Community | 29 | 15 | 10 | 6 | 3.12 | 1.03 | High |
| | Grand Mean | | | | | 2.94 | 0.80 | High |

Data in table 1 showed that the extent of involvement of government and non-governmental organizations (context) in the implementation of the senior secondary education Mathematics curriculum is high (M = 2.94; Std = 0.80). Table 1 also showed that the senior secondary education Mathematics curriculum is highly implemented by the government (M = 3.62; Std = 0.74), the community (M = 3.12; Std = 1.03), cooperate group (M = 3.05; Std = 0.83) and private individual (M = 2.57; Std = 0.79) in the area. The extent of involvement of religious body or organization is low (M = 2.35; Std = 0.63).

*Research question two:* What is the extent of availability of the input variables for the implementation of the senior secondary education Mathematics curriculum?

Table 2: Mean and standard deviation on the extent of availability of the input variables for the implementation of the senior secondary education Mathematics curriculum

| S/N | Input Variables | AA | A | IA | NA | Mean | Std. | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Ventilated staff room with chairs/tables | 17 | 25 | 7 | 0 | 3.17 | 0.62 | A |
| 2 | Ventilated classroom | 15 | 37 | 6 | 2 | 3.08 | 0.70 | A |
| 3 | White maker board | 35 | 18 | 5 | 2 | 3.43 | 0.79 | A |
| 4 | Chalk board | 38 | 14 | 4 | 4 | 3.43 | 0.89 | A |
| 5 | Seat and Desk | 34 | 20 | 5 | 1 | 3.45 | 0.72 | A |
| 6 | Marker/chalk | 30 | 25 | 5 | 0 | 3.42 | 0.65 | A |
| 7 | Senior secondary Mathematics curriculum | 45 | 12 | 1 | 2 | 3.67 | 0.69 | A |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 8 | Instructional Materials | 28 | 27 | 4 | 1 | 3.37 | 0.68 | A |
| 9 | Mathematics laboratory | 16 | 34 | 5 | 5 | 3.12 | 0.83 | A |
| 10 | Library containing Mathematics textbooks and accessible to students | 8 | 22 | 19 | 11 | 2.45 | 0.95 | NA |
| 11 | Librarian | 8 | 21 | 20 | 11 | 2.43 | 0.95 | NA |
| 12 | Qualified Mathematics teachers | 37 | 21 | 2 | 0 | 3.58 | 0.56 | A |
| 13 | Senior secondary Mathematics textbooks belonging to students | 6 | 40 | 12 | 2 | 2.83 | 0.64 | A |
| 14 | Mathematics workbooks belonging to students | 3 | 43 | 12 | 2 | 2.78 | 0.58 | A |
| 15 | Register | 54 | 1 | 3 | 2 | 3.78 | 0.69 | A |
| 16 | Diary | 46 | 9 | 1 | 4 | 3.62 | 0.83 | A |
| 17 | Scheme of work | 54 | 4 | 2 | 0 | 3.87 | 0.43 | A |
| 18 | Note book and pen for students | 14 | 37 | 7 | 2 | 3.05 | 0.70 | A |
| 19 | Continuous assessment booklet | 14 | 41 | 3 | 2 | 3.12 | 0.64 | A |
| 20 | Playground and sporting activities | 34 | 23 | 2 | 1 | 3.50 | 0.65 | A |
| | Grand Mean | | | | | 3.26 | 0.71 | A |

A= Available ($M \geq 2.5$); NA= Not Available ($M < 2.5$)

The data in table 2 showed that the input variables for the implementation of the senior secondary education Mathematics curriculum are available (M = 3.26; Std = 0.71) in the area. The table also revealed that the few learning injections that are not available include equipped and accessible library (M = 2.45; Std = 0.95) with librarian (M = 2.43; Std = 0.95).

*Research question three:* What is the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics?

Table 3: Mean and standard deviation on the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics

| S/N | Process Variables | VHE | HE | LE | VLE | Mean | Std. | Decision |
|---|---|---|---|---|---|---|---|---|
| 1 | Teaching with lesson plan | 54 | 6 | 0 | 0 | 3.90 | 0.30 | High |
| 2 | Utilisation of standard improvised instructional materials | 15 | 36 | 3 | 3 | 3.10 | 0.71 | High |
| 3 | Teaching with conventional strategies/methods | 14 | 38 | 6 | 2 | 3.07 | 0.69 | High |
| 4 | Use of innovation instructional strategies/ methods | 20 | 26 | 9 | 5 | 3.02 | 0.91 | High |
| 5 | Evaluating students by giving test | 43 | 14 | 2 | 1 | 3.65 | 0.63 | High |
| 6 | Evaluation by class work | 43 | 14 | 1 | 2 | 3.63 | 0.69 | High |
| 7 | Evaluation by giving assignment | 43 | 15 | 2 | 0 | 3.68 | 0.54 | High |
| 8 | Evaluation by short quiz | 6 | 6 | 39 | 8 | 2.17 | 0.79 | High |
| 9 | Organising Mathematics quiz competition | 1 | 10 | 39 | 10 | 2.03 | 0.64 | High |
| 10 | Marking students' test, class work, assignment and making necessary corrections | 47 | 10 | 3 | 0 | 3.73 | 0.55 | High |
| | Grand Mean | | | | | 3.20 | 0.65 | High |

Data in table 3 indicated that the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics in the area is high (M = 3.20; Std = 0.64). The table revealed that Mathematics teachers hardly organize Mathematics quiz competition (M = 2.03; Std = 0.64).

*Research question four:* What is the extent of achieving the senior secondary education Mathematics curriculum objectives (product)?

Table 4: Mean and standard deviation on the extent of implementation (achievement) of the senior secondary education Mathematics curriculum objectives

| S/N | Production Variables | VHE | HE | LE | VLE | Mean | Std. | Decision |
|---|---|---|---|---|---|---|---|---|
| | Cognitive (Knowledge) Domain | | | | | | | |
| 1. | Cultivate the understanding of mathematical concepts necessary to thrive in the ever-changing technological world | 190 | 161 | 29 | 10 | 3.36 | 0.73 | High |
| 2. | Develop and practice logical thinking | 169 | 166 | 42 | 13 | 3.26 | 0.78 | High |
| 3. | Develop and practice abstract thinking when is needed in the study of mathematics | 143 | 164 | 66 | 17 | 3.11 | 0.84 | High |
| 4. | Understand and grasp the knowledge of equations, inequalities, identities, formulas and functions | 162 | 144 | 68 | 16 | 3.16 | 0.85 | High |
| 5. | Understand and grasp the measures for simple 2-d and 3-d figures | 135 | 184 | 57 | 14 | 3.12 | 0.79 | High |
| 6. | Understand and grasp the intuitive, deductive and analytic approach to study geometric figures | 150 | 163 | 57 | 20 | 3.14 | 0.85 | High |
| 7. | Develop essential elements of reasoning and connection within the study of Mathematics | 124 | 178 | 66 | 22 | 3.04 | 0.85 | High |
| 8. | Develop the essential element of problem solving within the study of Mathematics | 136 | 150 | 75 | 29 | 3.01 | 0.92 | High |
| | Mean of mean | | | | | 3.15 | 0.83 | High |
| | | | | | | | | |
| | Psychomotor (Skill) Domain | | | | | | | |
| 9. | Develop skills and capacities in basic computations in real numbers and symbols. | 133 | 164 | 79 | 14 | 3.07 | 0.83 | High |
| 10. | Develop skills and capacities in reasoning mathematically | 104 | 212 | 63 | 11 | 3.05 | 0.73 | High |
| 11. | Develop skills and capacities in applying mathematical knowledge to solve a variety of problems | 144 | 129 | 83 | 34 | 2.98 | 0.97 | High |
| 12. | Develop skills and capacities in handling data and generating information | 128 | 173 | 66 | 23 | 3.04 | 0.86 | High |
| 13. | Develop skills and capacities in using modern technology appropriately to learn and do Mathematics | 143 | 155 | 79 | 13 | 3.10 | 0.83 | High |
| 14. | Cultivate the understanding of and application of mathematical skills necessary to thrive in the ever changing technological world | 132 | 159 | 82 | 17 | 3.04 | 0.85 | High |
| | Mean of mean | | | | | 3.05 | 0.85 | High |
| | | | | | | | | |
| | Affective (Attitude) Domain | | | | | | | |
| 15. | Foster the attitudes to be interested in learning Mathematics | 152 | 154 | 57 | 27 | 3.11 | 0.90 | High |
| 16. | Foster the attitudes to willing apply mathematical knowledge | 111 | 172 | 78 | 29 | 2.94 | 0.88 | High |
| 17. | Foster the desire and ability to be accurate to a degree relevant to the problem | 129 | 146 | 88 | 28 | 2.97 | 0.91 | High |
| 18. | Develop ability to recognize problems and to solve them with related mathematical knowledge | 130 | 159 | 73 | 28 | 3.00 | 0.70 | High |
| 19. | Foster the attitudes to be confident in their abilities to do Mathematics | 119 | 171 | 76 | 23 | 2.99 | 0.86 | High |
| 20. | Foster the attitude to appreciate that Mathematics is a dynamic field with roots in many cultures | 108 | 151 | 95 | 35 | 2.85 | 0.93 | High |
| 21. | Have the willingness to study Mathematics in tertiary institutions | 129 | 169 | 72 | 20 | 3.04 | 0.85 | High |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 22. | Have the willingness to study Engineering courses in tertiary institutions | 147 | 127 | 89 | 27 | 3.01 | 0.94 | High |
| 23. | Have the interest to study technology based courses in tertiary institutions | 153 | 144 | 67 | 25 | 3.09 | 0.90 | High |
| 24. | Will be interested in studying Science courses in tertiary institutions | 156 | 130 | 81 | 23 | 3.07 | 0.92 | High |
| 25. | Will be willing to study Statistics in tertiary institutions | 142 | 139 | 88 | 21 | 3.03 | 0.90 | High |
| 26. | Have the desire to study Management courses in tertiary institutions | 111 | 153 | 101 | 24 | 2.90 | 0.89 | High |
| 27. | Have the interest to study Economics in tertiary institutions | 106 | 162 | 97 | 25 | 2.89 | 0.88 | High |
| 28. | Studying General Mathematics in senior secondary school is interesting | 148 | 145 | 72 | 25 | 3.07 | 0.90 | High |
| 29. | Prepared for further studies in Mathematics and other related fields. | 130 | 162 | 73 | 25 | 3.02 | 0.88 | High |
| 30. | Studying Further Mathematics in senior secondary school is interesting | 157 | 124 | 80 | 29 | 3.05 | 0.95 | High |
| | Mean of mean | | | | | 3.00 | 0.89 | High |
| | Grand mean | | | | | 3.05 | 0.86 | High |

Data in table 4 showed that the extent of achieving the senior secondary education Mathematics curriculum objective (product) is high (M = 3.05; Std = 0.86) with the highest achievement in knowledge (M = 3.15; Std = 0.83) then skills (M = 3.05, Std = 0.85) and attitude (M = 3.00, Std = 0.89).

*$H_{01}$:* There is no significant contribution of the context variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

Table 5: Summary of regression analysis on the contribution of the context variables to the senior secondary education Mathematics curriculum implementation

**A.** Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .19[a] | .035 | .018 | 8.38416 |

a. Predictors: (Constant), Context

**B.** Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 90.30 | 7.740 | | 11.667 | .000 |
| | Context | .76 | .521 | .187 | 1.448 | .153 |

a. Dependent Variable: Product

**C.** ANOVA[a]

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 147.344 | 1 | 147.344 | 2.096 | .153[b] |
| | Residual | 4077.056 | 58 | 70.294 | | |
| | Total | 4224.400 | 59 | | | |

a. Dependent Variable: Product

b. Predictors: (Constant), Context

Data in table 5A showed a weak positive relationship (r = 0.19) between the context and the product variables with the context variable contributing 3.50% to the realization of the senior secondary education Mathematics curriculum objectives. Data in table 5B gives the regression equation $y = 90.30 + 0.76x$; which implies that an increase in the context variable will lead to an increase in the product variable. Data in table 5C revealed that there is no significant contribution of the context variables to the product variable in the senior secondary education Mathematics curriculum implementation ($F_{(1,\ 58)} = 2.09$, p>.05). Therefore, the null hypothesis one was retained at 0.05 alpha level.

$H_{02}$: There is no significant contribution of the input variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

Table 6: Summary of regression analysis on the contribution of the input variables to the senior secondary education Mathematics curriculum implementation

A. Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .011[a] | .000 | -.017 | 8.53381 |

a. Predictors: (Constant), Input

B. Coefficients[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 102.297 | 10.913 | | 9.373 | .000 |
| | Input | -.014 | .167 | -.011 | -.083 | .934 |

a. Dependent Variable: Product

| C. ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | .497 | 1 | .497 | .007 | .934[b] |
| | Residual | 4223.903 | 58 | 72.826 | | |
| | Total | 4224.400 | 59 | | | |
| a. Dependent Variable: Product | | | | | | |
| b. Predictors: (Constant), Input | | | | | | |

Data in table 6A showed a very weak positive relationship (r = 0.01) between the input and the product variable with the input variable contributing 0.00% to the achievement of the senior secondary education Mathematics curriculum objectives. Data in table 6B gives the regression equation $y = 102.20 - 0.014x$; which implies that a unit increase in the input variable will lead to a unit decrease in the product variable. Data in table 6C revealed that there is no significant contribution of the input variables to the product variable in the senior secondary education Mathematics curriculum implementation ($F_{(1,\ 58)}$ = 0.007, p>.05). Therefore, the null hypothesis two was retained at 0.05 alpha level.

**$H_{03}$:** There is no significant contribution of the process variable to the product variable in the implementation of the senior secondary education Mathematics curriculum.

Table 7: Summary of regression analysis on the contribution of the process variables to the senior secondary education Mathematics curriculum implementation

| **A.** Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .03[a] | .001 | -.017 | 8.53145 |
| a. Predictors: (Constant), Process | | | | |

| **B.** Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 99.600 | 9.199 | | 10.828 | .000 |
| | Process | .056 | .286 | .026 | .197 | .844 |
| a. Dependent Variable: Product | | | | | | |

| **C.** ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 2.829 | 1 | 2.829 | .039 | .844[b] |
| | Residual | 4221.571 | 58 | 72.786 | | |
| | Total | 4224.400 | 59 | | | |
| a. Dependent Variable: Product | | | | | | |
| b. Predictors: (Constant), Process | | | | | | |

Data in table 7A revealed a very weak positive relationship (r = 0.03) between the process and the product variable with the process variable contributing 0.10% to the achievement of the senior secondary education Mathematics curriculum objectives. Data in table 7B gives the regression equation $y = 99.60 + 0.056x$; indicating that a unit increase in the process variable will lead to a unit increase in the product variable. Data in table 7C revealed that there is no significant contribution of the context variable to the product variable in the implementation of the senior secondary education Mathematics curriculum ($F_{(1,\ 58)}$ = 0.039, p>.05). Therefore, the null hypothesis three was retained at 0.05 alpha level.

*$H_{04}$:* There is no significant joint contribution of the context, input, and process variables to the product variable in the implementation of the senior secondary education Mathematics curriculum.

Table 8: Summary of regression analysis on the joint contribution of the context, input and process variables to the senior secondary education Mathematics curriculum implementation

| A. Model Summary | | | | |
|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
| 1 | .24[a] | .056 | .006 | 8.43685 |
| a. Predictors: (Constant), Context, Input, Process | | | | |

| B. Coefficients[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 97.610 | 11.455 | | 8.521 | .000 |
| | Process | .115 | .353 | .053 | .325 | .746 |
| | Context | 1.144 | .635 | .283 | 1.801 | .077 |
| | Input | -.257 | .235 | -.202 | -1.091 | .280 |
| a. Dependent Variable: Product | | | | | | |

| C. ANOVA[a] | | | | | | |
|---|---|---|---|---|---|---|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 238.297 | 3 | 79.432 | 1.116 | .350[b] |
| | Residual | 3986.103 | 56 | 71.180 | | |
| | Total | 4224.400 | 59 | | | |
| a. Dependent Variable: Product | | | | | | |
| b. Predictors: (Constant), Context, Input, Process | | | | | | |

Data in table 8A showed a positive relationship (r = 0.24) between the joint variables and the product variable with the joint variables contributing 5.60% to the product variable in the implementation of the senior secondary education Mathematics curriculum. Data in table 8B gives the regression equation $y = 97.61 + 1.14x_1 - 0.26x_2 + 0.12x_3$ where $x_1, x_2$ and $x_3$ are the context, input and process variables respectively while $y$ is the product variable. The regression equation of the joint contribution of the independent variables indicated that a unit increase in the context and process variables will lead to a unit increase in the product variable while a unit increase in input variable will lead to a unit decrease in the dependent variable. Data in table 8C revealed that there is no significant joint contribution of the context, input, and process variables to the product variable in the implementation of the senior secondary education Mathematics curriculum ($F_{(1, 56)}$ = 1.116; p>.05). Therefore, the null hypothesis four was retained at 0.05 alpha level.

## V. DISCUSSION OF FINDINGS

*Context variables and the senior secondary Mathematics curriculum implementation*

Data in table 1 showed that the extent of involvement of government and non-governmental organizations (context) in the implementation of the senior secondary education Mathematics curriculum is high (M = 2.94; Std = 0.80). Table 1 also showed that the senior secondary education Mathematics curriculum is highly implemented by the government (M = 3.62; Std = 0.74), the community (M = 3.12; Std = 1.03), cooperate group (M = 3.05; Std = 0.83) and private individual (M = 2.57; Std = 0.79) in the area. The extent of involvement of religious body or organization is low (M = 2.35; Std = 0.63). The low level of involvement of religious organizations in curriculum implementation could be due to their inability to obtain accreditation of their schools from government. Schools are not allowed to function in religious buildings in Rivers State. Data in table 5A showed a weak positive relationship (r = 0.19) between the context and the product variables with the context variable contributing 3.50% to the realization of the senior secondary education Mathematics curriculum objectives. Data in table 5B gives the regression equation $y = 90.30 + 0.76x$; which implies that an increase in the context variable will lead to an increase in the product variable. Data in table 5C revealed that there is no significant contribution of the context variables to the product variable in the senior secondary education Mathematics curriculum implementation ($F_{(1, 58)}$ = 2.09, p>.05). Similar studies were conducted by Wright and Sanders (1997) and Okebukola (2004).

*Input variables and the senior secondary Mathematics curriculum implementation*

The data in table 2 showed that the input variables for the implementation of the senior secondary education Mathematics curriculum are available (M = 3.26; Std = 0.71) in the area. The table also revealed that the few learning injections that are not available include equipped and accessible library (M = 2.45; Std = 0.95) with librarian (M = 2.43; Std = 0.95). Data in table 6A showed a very weak positive relationship (r = 0.01) between the input and the product variable with the input variable contributing 0.00% to the achievement of the senior secondary education Mathematics curriculum objectives. Data in table 6B gives the regression equation $y = 102.20 - 0.014x$; which implies that a unit increase in the input variable will lead to a unit decrease in the product variable. Data in table 6C revealed that there is no significant contribution of the input variables to the product variable in the senior secondary education Mathematics curriculum implementation ($F_{(1, 58)}$ = 0.007, p>.05). Earlier studies in curriculum implementation were done by Behm and LIoyd (2009) and Remillard and Boyans (2004) with related findings.

*Process variables and the senior secondary Mathematics curriculum implementation*

Data in table 3 indicated that the extent of utilizing effective instructional practices during the process of instruction in senior secondary Mathematics in the area is high (M = 3.20; Std = 0.64). The table revealed that Mathematics teachers hardly organize Mathematics quiz competition (M = 2.03; Std = 0.64). Data in table 7A revealed a very weak positive relationship (r = 0.03) between the process and the product variable with the process variable contributing 0.10% to the achievement of the senior secondary education Mathematics curriculum objectives. Data in table 7B gives the regression equation $y = 99.60 + 0.056x$; indicating that a unit increase in the process variable will lead to a unit increase in the product variable. Data in table 7C revealed that there is no significant contribution of the context variable to the product variable in the implementation of the senior secondary education Mathematics curriculum ($F_{(1, 58)}$ = 0.039, p>.05). This finding does not corroborate with the finding of Aminu (2005).

*The contribution of the context, input and process variables to the implementation of the senior secondary Mathematics curriculum implementation*

Data in table 4 showed that the extent of achieving the senior secondary education Mathematics curriculum objective (product) is high (M = 3.05; Std = 0.86) with the highest achievement in knowledge (M = 3.15; Std = 0.83) then skills (M = 3.05, Std = 0.85) and attitude (M = 3.00, Std = 0.89). Data in table 8A showed a positive relationship (r = 0.24) between the joint variables and the product variable with the joint variables contributing 5.60% to the product variable in the implementation of the senior secondary education Mathematics curriculum. Data in table 8B gives the regression equation $y = 97.61 + 1.14x_1 - 0.26x_2 + 0.12x_3$ where $x_1, x_2$ and $x_3$ are the context, input and process variables respectively while $y$ is the product variable. The regression equation of the joint contribution of the independent variables indicated that a unit increase in the context and process variables will lead to a unit increase in the product variable while a unit increase in input variable will lead to a unit decrease in the dependent variable. Data in table 8C revealed that there is no significant joint contribution of the context, input, and process variables to the product variable in the implementation of the senior secondary education Mathematics curriculum ($F_{(1, 56)}$ = 1.116; p>.05). Generally, the study found out that the extent of involvement of government and non-governmental organizations, the available learning resources and the quality of the instructional process do not significantly contribute to the effective implementation of the senior secondary education Mathematics curriculum. Related studies and findings were made by Drake and Shern (2009) and Oredein and Oloyede (2007).

## VI. CONCLUSION

This study evaluated the senior secondary education Mathematics curriculum implementation using the Stufflebeam's CIPP summative evaluation model in Obio/Akpor local government area of Rivers State. The study found out that the government, the community, cooperate group and private individual are highly involved in the implementation of the Mathematics curriculum while religious organization had low involvement. The study also revealed that though the extent of available learning resources and utilization of conventional and innovative instructional practices were high, they do not significantly contribute to the effective implementation of the senior secondary education Mathematics curriculum in the area. The study showed that though the extent of achieving the senior secondary education Mathematics curriculum objective is high but there is no significant joint contribution of the context, input, and process variables to the realization of the curriculum objectives (product variable).

## VII. RECOMMENDATIONS

The study recommended as follows:

1. All stakeholders in the education sector should be actively involved in the senior secondary education Mathematics curriculum implementation including religious organizations because Mathematics education for all is the responsibility of all.
2. School administrators and Mathematics teachers should ensure effective utilization of the available instructional resources and facilities in schools for effective curriculum implementation in Mathematics.
3. Mathematics teachers should ensure quality instructional process through effective teaching and learning in order to achieve the noble objectives of the senior secondary education Mathematics curriculum.
4. Proprietors of public schools should ensure adequate provision of learning resources and improvement in the quality of the instructional process to guarantee effective implementation of the senior secondary education Mathematics curriculum.

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