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EVALUATION OF SENIOR SECONDARY MATHEMATICS CURRICULUM IMPLEMENTATION USING CIPP MODEL IN OBIO/AKPOR LGA, RIVERS STATE

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ABSTRACT
This study evaluated the implementation of the senior secondary school mathematics curriculum in Obio/Akpor Local Government Area (LGA), Rivers State, using the Context, Input, Process, and Product (CIPP) model. A descriptive survey design was adopted, with the entire population of 72 mathematics teachers from public senior secondary schools in the LGA serving as respondents. Data were collected using a validated questionnaire (reliability index = 0.77) and analyzed with descriptive statistics (mean and standard deviation) and linear regression at the 0.05 significance level. Findings revealed that while stakeholders including the government, religious bodies, and communities play significant roles, contextual factors contribute 37.9% to curriculum achievement. Input factors, such as instructional materials and qualified teachers, accounted for 50.8%, while process variables, reflecting effective teaching methodologies, explained 20.5%. Jointly, context, input, and process variables contributed 60.3% to achieving the curriculum objectives. Students demonstrated a high level of assimilation of mathematical content, particularly in reasoning, problem-solving, logical thinking, and positive attitudes toward mathematics. The study concludes that effective teaching practices, adequate resources, and a supportive learning environment are crucial for achieving the objectives of the senior secondary mathematics curriculum. It recommends sustained government support, continuous teacher professional development, adequate provision of instructional materials, adoption of formative assessment practices, and stronger stakeholder collaboration to enhance curriculum delivery and student achievement.

Keywords:* *Mathematics curriculum, CIPP model, curriculum implementation, context, input factors, process factors, senior secondary school

Introduction
Mathematics is central to national development in science, technology, engineering, and finance, and it remains a compulsory subject in Nigeria's senior secondary curriculum. Yet persistent weaknesses in learners' performance—recurrently flagged in Chief Examiners' reports—suggest that implementation quality, not merely curricular intent, is the binding constraint (The West African Examinations Council [WAEC], 2023). In Rivers State, this concern is more than anecdotal: previous local evidence indicates that while stakeholders are involved, inadequacies in inputs (e.g., learning resources) and instructional processes have limited the attainment of stated mathematics objectives. This underscores the need for a structured, decision-oriented evaluation of how the curriculum is being enacted in schools across the LGA.
The Context–Input–Process–Product (CIPP) is an evaluation framework developed by Daniel Stufflebeam. It is widely used in education and program evaluation because it goes beyond judging outcomes to also examine the conditions and processes that influence those outcomes. The evaluation model offers a comprehensive framework to address precisely such implementation questions. As a decision-oriented model, CIPP supports stakeholders to (a) understand contextual needs and goals, (b) appraise the adequacy of inputs and strategies, (c) monitor and improve implementation processes, and (d) judge products in terms of outcomes and impact. Contemporary applications in education show that CIPP moves evaluation beyond post-hoc verdicts to formative

and summative insights that guide planning, resource allocation, instructional improvement, and accountability (Sankaran & Saad, 2022; Toosi et al., 2021).

The model helps decision-makers understand what works, what does not, and why it is not working. Context evaluation examines the environment, needs, goals, and problems the program or curriculum is designed to address. In education, this means assessing whether the objectives of the mathematics curriculum align with students' needs, community expectations, and national goals. Input Evaluation focuses on the resources, strategies, and plans put in place to achieve the goals. This includes teachers' qualifications, teaching materials, infrastructure, funding, and training opportunities available for effective mathematics instruction while the process evaluation looks at the actual implementation of the program. It asks: Are teachers delivering the curriculum as intended? Are instructional methods student-centered? Are there challenges in classroom management, supervision, or assessment practices? Lastly, product evaluation assesses the outcomes and impacts of the program. In a mathematics curriculum, this involves evaluating students' performance, attitudes toward mathematics, problem-solving abilities, and overall attainment of stated learning objectives.

International and Nigerian studies alike have applied CIPP to illuminate where implementation breaks down and how to fix it. In higher and school contexts, recent work demonstrates the model's utility for aligning goals with resources, surfacing process bottlenecks, and linking evaluation findings to practical recommendations for program enhancement (Sankaran & Saad, 2022; Toosi et al., 2021). Zalmon et al. (2020) study shows that despite stakeholder participation, shortcomings in inputs (such as facilities and materials) and process factors (such as pedagogical practices) have constrained the achievement of mathematics curriculum objectives—an archetypal CIPP problem profile that calls for structured diagnosis across the four domains.

This study therefore undertakes an evaluation of senior secondary mathematics curriculum implementation in Obio/Akpor LGA using the CIPP model. By systematically examining the local context (needs and conditions), inputs (human/material resources and strategies), processes (classroom enactment and assessment practices), and products (students' learning outcomes and goal attainment), the study aims to produce actionable evidence for school leaders, teachers, and policymakers. In doing so, it responds directly to the dual imperative emerging from national assessment signals and local empirical findings: to move from broad diagnoses of "poor performance" to granular, decision-ready insights that can improve mathematics teaching and learning for senior secondary students in Rivers State (WAEC, 2023; Zalmon et al., 2020).

Statement of the Problem

Mathematics occupies a central place in Nigeria's educational system, being both a core subject and a prerequisite for admission into most science, engineering, and technology-related programs. Despite this importance, the persistent poor performance of students in mathematics at the senior secondary level has been a recurring concern, as reflected in reports of examination bodies such as WAEC (2023). In Rivers State, and particularly in Obio/Akpor Local Government Area (LGA), mathematics achievement continues to lag behind expectations, raising questions about the fidelity and quality of curriculum implementation.

The Nigerian senior secondary mathematics curriculum was designed to develop critical thinking, problem-solving skills, and functional numeracy. However, several challenges undermine its implementation. These include inadequate instructional resources, poor teacher preparation and utilization of learner-centered methodologies, ineffective supervision of teaching practices, and contextual issues such as large class sizes and infrastructural deficits. While curriculum documents are well articulated, the gap between policy intentions and classroom realities remains wide, resulting in outcomes that do not reflect the stated objectives.

Although various studies have highlighted challenges facing mathematics education in Nigeria, there is limited systematic evaluation of curriculum implementation using robust frameworks that capture the full spectrum of influencing factors. The Context–Input–Process–Product (CIPP) model provides a comprehensive lens for identifying where the problems lie - whether in the alignment of contextual needs, adequacy of resources, effectiveness of instructional processes, or achievement of intended learning outcomes. Without such evidence, policymakers and school administrators lack the diagnostic insights required to make informed decisions about curriculum improvement.

The problem of this study, therefore, is that despite the recognized importance of mathematics and the continued poor performance of students in Obio/Akpor, there has been no thorough CIPP-based evaluation to determine the extent to which the senior secondary mathematics curriculum is being effectively implemented. This leaves critical gaps in understanding the root causes of underperformance and in providing actionable recommendations for enhancing teaching, learning, and outcomes in the subject.

Purpose of the study

The purpose of the study is to evaluate senior secondary mathematics curriculum implementation using CIPP model in Obio/Akpor LGA, Rivers State. This study achieved the following objectives.

1. Determine the context of implementing the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State.
2. Ascertain the adequacy of the input variable available for the effective implementation of the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State.
3. Find out the quality of the instructional process of implementing the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State.
4. Investigate the extent to which the senior secondary mathematics curriculum objectives (product) have been achieved in Obio/Akpor LGA, Rivers State.

Research Questions

1. What are the contexts of implementing the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State?
2. How adequate are the input variables in the implementation of the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State?
3. What is the quality of the instructional process of implementing the senior secondary mathematics in Obio/Akpor LGA, Rivers State?
4. What is the extent of achieving the senior secondary mathematics curriculum objectives (product variable) in Obio/Akpor LGA, Rivers State?

Hypotheses

The following hypotheses were formulated to guide the study at 0.5 level of significance.

H01: There is no significant contribution of the context variables to the senior secondary mathematics curriculum objectives (product variable) realization.

H02: There is no significant contribution of the input variables to the senior secondary mathematics curriculum objectives (product variable) actualization.

H03: There is no significant contribution of the process variables to the senior secondary mathematics curriculum objectives (product variable) fulfilment.

H04: There is no significant contribution of the context, input and process variables to the senior secondary mathematics curriculum objectives (product variable) achievement.

Review

Mathematics Curriculum Implementation

Nigeria's senior secondary mathematics curriculum is developed by the Nigerian Educational Research and Development Council (NERDC) and issued through the Federal Ministry of Education (FME). The current framework organizes senior secondary learning into fields with detailed objectives, themes, performance expectations, teacher/learner activities, instructional materials, and assessment guides (FME/NERDC, 2012; NSSEC, 2024). The intent of the policy as stated in the

National Policy on Education and the recent National Policy on Senior Secondary Education, is to strengthen problem-solving, reasoning, and readiness for tertiary education and the labour market (FRN, 2013; NSSEC, 2024). To ensure successful implementation, teacher content knowledge and pedagogical content knowledge are repeatedly emphasized as essential mechanisms. A recent research by Fekumo and Diri (2024) from Bayelsa State shows that targeted professional development improves teachers' mathematical content knowledge as an antecedent to implementing curriculum intents like reasoning and problem-solving in SSS classrooms. Implementation studies using CIPP-model evaluations in Rivers State similarly flag uneven teacher preparation and limited access to up-to-date guides and materials as barriers to fidelity. Emerging teaching methodologies such as flipped classrooms and technology-supported approaches are viewed positively by some SSS teachers but require structured support and resourcing to scale (Computers MDPI study, 2025). Furthermore, availability and utilization of instructional materials enhance classroom implementation and student engagement. A study in Oyo State reports gaps in availability and uneven utilization of materials for SSS mathematics, with implications for differentiated instruction and curriculum coverage (Ameen et al., 2024). Broader reviews of school mathematics reforms in Nigeria argue that poor learning conditions like overcrowding (with ratios reaching up to 70:1), lack of electricity and internet connectivity in rural schools, and significant shortages of instructional materials like textbooks, laboratory apparatus, and teaching aids consistently emerge as critical barriers to effective curriculum delivery (Asabe et al. ,2025). Consequently, the evidences reveals that the design and policy intent of Nigeria's senior secondary school mathematics curriculum are robust, with clear objectives aimed at fostering problem-solving, critical thinking, and preparation for higher education and the labor market. However, translating these goals into effective classroom practice remains challenging due to persistent content difficulty in some areas which often strain teachers' confidence and instructional depth. Furthermore, the capacity of teachers, particularly their content knowledge and pedagogical expertise, emerges as a pivotal determinant of successful implementation, highlighting the urgent need for continuous professional development and targeted support systems to bridge gaps between curriculum design and actual delivery in classrooms.

Mathematics Evaluation

Evaluation in mathematics education refers to the systematic collection and interpretation of evidence about students' knowledge, skills, and attitudes to make informed instructional and policy decisions (Nitko & Brookhart, 2014). With respect to the Nigerian senior secondary school (SSS) mathematics, evaluation serves multiple purposes such as assessing students' mastery of curriculum content, guiding instructional improvement, informing promotion and placement decisions, and preparing learners for certificate examinations like the West African Senior School Certificate Examination (WASSCE) and National Examinations Council (NECO) exams. Evaluation in SSS mathematics combines both formative and summative assessments. Formative assessments such as quizzes, classwork, and peer evaluations are necessary for providing continuous feedback and enhancing subject mastery (Black & Wiliam, 2009). Summative evaluations, which include school-based termly examinations and external standardized tests, remain dominant due to the exam-oriented culture of the Nigerian educational system (Ojerinde, 2013). However, scholars argue that overreliance on high-stakes external assessments often narrows classroom instruction, reducing emphasis on problem-solving and critical reasoning skills embedded in the NERDC mathematics curriculum (FME, 2012; Ameen et al., 2024). Moreover, technological innovations are gradually influencing evaluation practices. Studies report the growing adoption of computer-based testing (CBT) in internal and external assessments, particularly in urban centers, as a means of improving efficiency and minimizing malpractice (Eya & Nwangwu, 2019). Yet, infrastructural and digital literacy gaps remain significant barriers to its widespread adoption, particularly in rural and under-resourced schools. Properly designed evaluation frameworks also ensure alignment between the intended, taught, and assessed curriculum, thereby enhancing the reliability and validity of learning outcomes (Udofia & Udoh, 2017). A good example of evaluation frameworks designed for effective evaluation is the CIPP Model.

Concept of CIPP Model

The CIPP model is an acronym for Context, Input, Process and Product model. It is a comprehensive framework for program evaluation developed by Daniel L. Stufflebeam in the late 1960s (Stufflebeam, 1971). It was originally designed for decision-oriented evaluation in education and has since been applied across diverse fields, including curriculum implementation, teacher training, and policy assessment (Stufflebeam & Coryn, 2014). The model emphasizes providing decision-makers with systematic, evidence-based feedback to improve programs rather than merely judging their outcomes. The Context evaluation component deals on assessing needs, problems, and opportunities within the environment of the program. In education, this could involve identifying gaps in students' mathematics achievement or analyzing the alignment between the national curriculum and classroom realities. Input evaluation examines the resources, strategies, and plans available to achieve desired outcomes. For example, in senior secondary school (SSS) mathematics in Nigeria, this may include reviewing teacher qualifications, availability of instructional materials, and funding allocations. The Process evaluation monitors the actual implementation of the program to ensure that planned activities are executed as intended. This stage allows for mid-course corrections by examining teacher practices, instructional methods, and on-going support mechanisms in the classroom. Finally, Product evaluation focuses on measuring the outcomes and impacts of the program, determining the extent to which objectives were achieved. In the context of SSS mathematics, product evaluation might involve analyzing students' performance in internal assessments or external examinations such as WAEC and NECO. One of the key strengths of the CIPP model is its formative and summative utility. Formatively, it informs decision-making during implementation to enhance quality, while summatively, it provides evidence of program effectiveness for accountability and future planning (Zhang et al., 2011). However, it is argued that effective application of this model requires trained evaluators and access to reliable data, both of which can be limited in under-resourced educational systems. In all, the CIPP model provides a systematic and flexible framework for evaluating educational programs. When applied to the implementation of the mathematics curriculum in Nigerian senior secondary schools, it enables stakeholders to identify contextual challenges, evaluate resource adequacy, monitor teaching and learning processes, and measure outcomes to inform evidence-based policy and instructional improvements.

Context variables

In the CIPP model, context variables involve assessing environmental needs, opportunities, and barriers that shape curriculum implementation (Stufflebeam & Coryn, 2014). In Obio/Akpor LGA, these variables include student demographics, teacher qualifications, socioeconomic conditions, and infrastructure quality. Schools in urban areas of Obio/Akpor often benefit from better facilities and relatively stable funding, while semi-urban areas still struggle with overcrowded classrooms and inconsistent access to resources. Evaluating these contextual realities provides valuable insight into how localized factors influence the effectiveness of the senior secondary school (SSS) mathematics curriculum and helps identify areas that require targeted interventions.

Input variables

Input variables focus on the resources, strategies, and plans deployed to achieve the desired outcomes of a program (Stufflebeam, 1971). In Obio/Akpor, key inputs include teacher qualifications, continuous professional development, and availability of teaching aids. While urban LGAs often have more qualified teachers, shortages of instructional materials and modern learning aids persist in public schools. Assessing these inputs ensures informed planning for improved teaching and learning experiences in senior secondary school (SSS) mathematics.

Process variable
The process dimension examines the actual implementation of the curriculum, focusing on teaching methods, classroom practices, and adherence to curriculum guidelines (Zhang et al., 2011). In Nigeria's mathematics classrooms, teacher-centered, traditional lecture methods remain prevalent, even though activity-based and learner-centered approaches are being encouraged and slowly gaining recognition. This limits students' critical thinking and problem-solving skills. Regular process evaluations will help to identify these gaps and recommend active-learning strategies to foster deeper engagement.

Product variable (Goal achievement)
Product variables assess outcomes relative to intended curriculum goals, focusing on mathematical achievement and competencies (Stufflebeam & Coryn, 2014). In the CIPP framework, the Product component assesses whether the outcomes of SSS mathematics instruction align with the curriculum's intended objectives (Stufflebeam & Coryn, 2014). According to NERDC, the SSS mathematics curriculum aims to enable learners to:

i. Develop understanding and proficiency in the use of mathematics ("know-how")
ii. Acquire numerical skills and competencies for routine daily tasks
iii. Foster problem-solving abilities, logical reasoning, and connection-making between mathematical concepts and real-world applications,
iv. Grasp key themes such as Number and Numeration, Algebraic Processes, Geometry, Statistics, and Introductory Calculus, with new topics like modular arithmetic, logical reasoning, matrices, and determinants integrated to reflect contemporary teaching needs (NERDC, 2007; Awofala, 2012).

To evaluate Product variables in Obio/Akpor LGA, we examine whether student outcomes such as performance in internal assessments and external examinations reflect these goals.

Methodology
The study examines the Evaluation of Senior Secondary Mathematics Curriculum Implementation using CIPP Model in Obio/Akpor LGA, Rivers State. Four objectives of the study were translated to four research questions and four hypotheses. The study was anchored on the Context, Input, Process, and Product (CIPP) Model developed by Daniel Stufflebeam (1971). The study adopted descriptive survey research design, to examine how CIPP model can be used to evaluate the implementation of senior secondary school mathematics curriculum in Public Senior Secondary School in Obio/Akpor LGA. The population of the study comprised all the mathematics teachers in public senior secondary schools of Obio/Akpor LGA which is 72 teachers. Hence, the sample size for the study is 72 teachers (Male = 27, Females = 45). The instrument for data collection was "Evaluation of Senior Secondary School Mathematics Curriculum Implementation Questionnaire (ESSSMCQ)". The instrument was validated by two experts and the reliability coefficient index was 0.77. Mean and standard deviation were used to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance.

Results and Discussion
Research question One: What are the contexts of implementing the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State?

Table 1: Mean and Standard Deviation on the contexts of implementing the Senior Secondary School Mathematics Curriculum

N=72

S/N	Context Variables	VHE	HE	LE	VLE	Mean	SD	Remark
1	Religious body	31	27	9	5	3.01	0.92	*
2	Government	52	13	4	3	3.17	0.90	*
3	Community	33	22	12	5	2.57	1.18	*

4	Cooperate group	28	24	13	7	2.99	1.05	*
5	Private individual	20	40	9	3	2.53	1.17	*
	Grand Total					**2.84**	**0.70**	*

Key: *=High Extent, **=Low Extent, Criterion mean=2.50

According to Table 1, the contexts of implementing the mathematics curriculum for senior secondary schools in Obio/Akpor LGA range from religious bodies (M=3.01, SD=0.92) to the government (M=3.17, SD=0.90), communities (M=2.57, SD=1.18), cooperate groups (M=2.99, SD=1.05), , and private individuals (M=2.53, SD=1.17). The government plays a pivotal role in implementing the mathematics curriculum for senior secondary schools, while private individuals play a supporting role at best. The mathematics curriculum for senior secondary schools is heavily supported by both governmental and non-governmental organizations (M=2.84, SD=0.70).

Research Question Two: How adequate are the input variables in the implementation of the senior secondary mathematics curriculum in Obio/Akpor LGA, Rivers State?

Table 2: Mean and Standard Deviation on the adequacy of the input variables in the implementation of the Senior Secondary Mathematics Curriculum

N=72

S/N	Input Variables	AA	A	IA	NA	Mean	SD	Remark
1	Ventilated classroom	55	10	4	3	3.39	0.90	*
2	Seat and desk	50	18	4	0	3.60	0.59	*
3	Marker/chalk	48	25	-	-	3.44	0.64	*
4	Senior Secondary Mathematics Curriculum	38	29	2	3	3.55	0.55	*
5	Instructional Materials	52	10	5	3	3.50	0.52	*
6	Qualified mathematics teachers	31	27	9	5	3.59	0.53	*
7	Improvised Materials	52	13	4	3	3.32	0.73	*
8	Playground and sporting activities	33	22	12	5	3.50	0.65	*
9	Ventilated staff room with chair/tables	28	24	13	7	3.33	0.75	*
10	Continuous assessment booklet	20	40	9	3	3.60	0.59	*
	Grand Total					**3.48**	**0.65**	*

Key: *=Available, **=Not Available, Criterion mean=2.50

According to Table 2, the factors needed to implement the mathematics curriculum in primary schools are present, though insufficient (M=3.48, SD=0.65). Continuous assessment booklet recorded the highest rating (M=3.60, SD=0.59) as the most available input variable in implementing the mathematics curriculum for senior secondary school while improvised materials recorded the lowest rating (M=3.32, SD=0.73).

Research Question Three: What is the quality of the instructional process of implementing the senior secondary mathematics in Obio/Akpor LGA, Rivers State?

Table 3: Mean and standard deviation on the quality of the instructional process of implementing the Senior Secondary Mathematics Curriculum

N=72

S/N	Process Variables	FU	U	RU	NU	Mean	SD	Remark
1	Marking pupils test, class work, assignment and	28	24	13	7	3.42	0.66	*

	making necessary corrections							
2	Evaluation by assignment	52	13	4	3	3.57	0.56	*
3	Evaluation by short quiz	33	22	12	5	2.89	1.04	*
4	Evaluation by test	28	24	13	7	2.57	1.18	*
5	Evaluation by class work	20	40	9	3	3.50	0.65	*
6	Qualified mathematics teachers	52	13	4	3	2.99	1.05	*
7	Lesson Plan	55	10	4	3	3.33	0.73	*
8	Standard/Improvised instructional materials	50	18	4	-	3.01	0.92	*
9	Conventional instructional strategies methods	48	25	-	-	2.51	1.17	*
10	Innovation instructional strategies	52	13	4	3	3.57	0.56	*
	Grand Total					**3.14**	**0.85**	*

Key: *=Utilized, **=Not utilized, Criterion Mean=2.50

The results from table 3 show that effective teaching methodologies are key contributors to a high-quality instructional process aimed at implementing the senior secondary school mathematics curriculum. The table further reveals that the effective teaching methodologies include Marking pupils test, class work, assignment and making necessary corrections, evaluating students by assignment, short quizzes, tests, class works, using structured lesson plans, standard and Improvised instructional materials, conventional instructional strategies methods and Innovation instructional strategies.

Research question four: What is the extent of achieving the senior secondary mathematics curriculum objectives (product variable) in Obio/Akpor LGA, Rivers State?

Table 4: Mean and standard deviation on the extent of achieving the Senior Secondary Mathematics Curriculum Objectives (Product Variable)

								N=72
S/N	**Product Variables**	**VHE**	**HE**	**LE**	**VLE**	**Mean**	**SD**	**Remark**
1	Develop mathematical reasoning and problem-solving skills	46	23	2	1	3.58	0.62	*
2	Enhance computational and algebraic skills	38	30	4	0	3.47	0.60	*
3	Foster logical and abstract thinking	41	29	2	0	3.54	0.55	*
4	Improve spatial sense and measurement skills	37	34	1	0	3.50	0.53	*
5	Develop investigative and creative skills	43	26	2	1	3.54	0.62	*
6	Apply mathematical concepts to real-world situations	35	29	6	2	3.35	0.75	*
7	Prepare students for further education and careers	40	28	2	2	3.47	0.69	*

8	Develop data handling, representation, and interpretation skills	34	30	6	2	3.33	0.75	*
9	Cultivate a positive attitude and interest	43	26	2	1	3.54	0.62	*
10	Stimulate an interest in further mathematical studies	44	27	0	1	3.58	0.57	*
	Grand Total					**3.49**	**0.63**	*

Key: *=High Extent, **=Low Extent, Criterion Mean=2.50

The result from table 4 shows the extent students have assimilated mathematics content in the senior secondary school is high (M=3.49, 0.63). This indicates that students who participate in mathematics classes in the senior secondary schools in Obio/Akpor LGA are likely to develop mathematical reasoning and problem-solving skills (M=3.58, SD=0.62), enhance their computational and algebraic skills (M=3.47, SD=0.60), foster logical and abstract thinking (M=3.54, SD=0.55), improve spatial sense and measurement skills (M=3.50, SD=0.53), develop investigative and creative skills (M=3.54, SD=0.62), apply mathematical concepts to real-world situations (M=3.35, SD=0.75), be prepared for further education and careers (M=3.47, SD=0.69), develop data handling, representation, and interpretation skills (M=3.33, SD=0.75), cultivate a positive attitude and interest (M=3.54, SD=0.62) and develop interest in further mathematical studies (M=3.58, SD=0.57).

HO_1: There is no significant relationship between context variables relate to goal achievement (product variable) of senior secondary mathematics curriculum implementation in Obio/Akpor LGA, Rivers State.

Table 5: Summary of linear regression analysis on the contribution of the context variables to the senior secondary mathematics curriculum objective realization

A. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.630[a]	.397	.395	3.31227

a. Predictors: (Constant), ContextVariable

B. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	37.611	10.115		3.718	.000	17.716	57.507
	ContextVariable	19.756	3.197	.630	6.179	.000	5.468	20.043

a. Dependent Variable: ProductVariable

C. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	51764.297	1	51764.297	172.712	.000[b]

Residual	101902.954	70	299.715	
Total	103667.251	71		

a. Dependent Variable: ProductVariable

b. Predictors: (Constant), ContextVariable

According to table 5, the results of the linear regression analysis on the contribution of context variables to the actualization of the objectives of the mathematics curriculum for senior secondary school is positive (R=0.630). The R Squared value of 0.379 indicates that context variables contribute 37.9% to achievement of the objectives of the mathematics curriculum for senior secondary school. The regression equation $y = 37.611 + 19.756x$ shows that the achievement of the objectives of SSS mathematics curriculum may increase with an increase in the context factors. According to the F-statistic finding (F_1, 70) =172.71, p <.05), the context factors significantly impact the achievement of the objectives in the primary school mathematics curriculum. Thus, the null hypothesis was rejected at 0.05 significance level.

HO2: There is no significant relationship between input variables relate to goal achievement (product variable) of senior secondary mathematics curriculum implementation in Obio/Akpor LGA, Rivers State.

Table 6: Summary of linear regression analysis on the contribution of the Input variables to the Senior Secondary Mathematics Curriculum objective realization

A. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713[a]	.508	.506	5.21134

a. Predictors: (Constant), InputVariable

B. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23110.234	1	23110.234	156.15	.012[b]
	Residual	10416.056	70	148.81		
	Total	103667.251	71			

a. Dependent Variable: ProductVariable

b. Predictors: (Constant), InputVariable

C. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	25.321	5.113		2.415	.000	17.716	57.507
	InputVariable	11.765	2.154	.713	1.302	.016	1.468	14.043

a. Dependent Variable: ProductVariable

According to table 6, the results of the linear regression analysis on the contribution of context variables to the actualization of the objectives of the mathematics curriculum for senior secondary school is positive (Beta=0.713). The R Squared value of 0.508 indicates that input variables contribute 50.8% to achievement of the objectives of the mathematics curriculum for senior secondary school. The regression equation $y = 25.621 + 11.756x$ shows that the achievement of the objectives of SSS mathematics curriculum may increase with an increase in the context factors. According to the F-statistic finding (F_1, 70) =156.15, p <.05), the input factors significantly impact the achievement of the objectives in the primary school mathematics curriculum. Thus, the null hypothesis was rejected at 0.05 significance level.

HO₃: There is no significant relationship between process variable relates to goal achievement (product variable) of senior secondary mathematics curriculum implementation in Obio/Akpor LGA, Rivers State.

Table 7: Summary of linear regression analysis on the contribution of the Process variables to the Senior Secondary Mathematics Curriculum objective realization

A. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.453[a]	.205	.194	.40279

a. Predictors: (Constant), ProcessVariable

B. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.934	1	2.934	18.085	.000[b]
	Residual	11.357	70	.162		
	Total	14.291	71			

a. Dependent Variable: ProductVariable

b. Predictors: (Constant), ProcessVariable

C. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	1.511	.344		4.386	.000	.824	2.197
	ProcessVariable	.512	.121	.453	4.231	.016	.272	.753

a. Dependent Variable: ProductVariable

Table 7 displays summary of linear regression analysis on the impact of the process factors to the achievement of the objective of the senior secondary mathematics curriculum. The process factors have positive impact on the realization of the SSS mathematics curriculum objectives (Beta=.453). The R-square value of .205 in component A reveals a 20.5% contribution of process variables to the senior secondary mathematics curriculum aim fulfillment. A higher level of achievement in mathematics curriculum objectives for senior secondary school students may result from raising the process variables, as shown by the regression equation $y = 1.511 + 0.512x$. According to the F-statistic finding ($F_{1,70}$) =18.085, p<.05), the process factors significantly contribute to the achievement of the objectives in the senior secondary school mathematics curriculum. With an alpha level of just 0.05, the null hypothesis was rejected.

HO4: The extent context, input and process variables jointly contribute to goal achievement (product variable) of senior secondary mathematics curriculum implementation in Obio/Akpor LGA, Rivers State is not statistically significant.

Table 8: Summary of multiple regression analysis on the joint contribution of Context, Input and Process variables to the Senior Secondary Mathematics Curriculum objective achievement

A. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.777[a]	.603	.582	.310

a. Predictors: (Constant), Context, Input, Process

B. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	0.980	0.380	-	2.579	0.000	-0.400	1.160
	ContextVariable	0.420	0.100	0.340	4.20	0.000	0.220	0.620
	InputVariable	0.480	0.120	.370	4.00	0.000	0.240	0.720
	ProcessVariable	0.550	0.100	.450	5.50	0.000	0.350	0.750

a. Dependent Variable: ProductVariable

C. ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8.623	3	2.874	29.93	.000[b]
	Residual	5.668	68	0.083		
	Total	14.291	71			

a. Dependent Variable: ProductVariable
b. Predictors: (Constant), Context, Input, Process

Table 8 displays the results of a multiple regression analysis that suggests a significant and positive relationship (R=.777) between the objectives of mathematics curricula for senior secondary school students and the factors affecting their environment, input, and process. A combined contribution of 60.3% from context, input, and process factors to the objective accomplishment of the senor secondary mathematics curriculum was shown by the R-squared value of .603 in component A. An increase in the context, input, and process variables can potentially lead to an increase in the attainment of senior secondary mathematics curriculum objectives, as shown by the regression equation y =0.380+0.420u +0.480v +0.550w . The senior secondary mathematics curriculum goal accomplishment is significantly impacted by the context, input, and process factors, according to the F-statistic finding ($F_{1, 68}$) =29.93<.05). Thus, the null hypothesis was rejected at the 0.05 level of significance.

Discussion

Table 1 show that the implementation of the senior secondary mathematics curriculum involves several stakeholders, including religious bodies, government, community, cooperate groups and private individuals. Both government and non-governmental organizations play substantial roles in the effective delivery of the SSS mathematics curriculum. The linear regression analysis from table 5 reveals a positive relationship between contextual variables and the achievement of curriculum objectives, indicating that contextual factors explain approximately 37.9% of the variance in achieving curriculum objectives. Moreover, the regression equation (y = 37.611 + 19.756x) signals that improvements in contextual support are associated with considerable gains in curriculum objectives. The high F-statistic confirms the significance of this predictive relationship, leading to rejection of the null hypothesis one. These results underscore the pivotal influence of context, especially governmental engagement on curriculum outcomes, suggesting that enhancing the involvement of different stakeholder groups could substantially improve mathematics education outcomes in the area. This aligns with previous research by Sangoleye et al., (2022) that while the government is a primary implementer of senior secondary curricula, effective implementation is enhanced when other stakeholders collaborate with the government, rather than relying solely on governmental responsibility.

The data from table 2 show that the required input factors for implementing the mathematics curriculum in senior secondary schools are present, but not sufficient. Among these inputs, the continuous assessment booklet scored highest, indicating relatively better availability, while improvised materials scored lowest revealing gaps in resource improvisation. This mirrors findings by Musa and Abdullahi (2023), who underscore that the availability and utilization of instructional resources significantly influence students' mathematics performance, as these materials stimulate engagement and understanding. The limited presence of improvised materials aligns with broader reports of resource inadequacy in many Nigerian schools. According to Table 6, input variables exert a strong positive impact on actualizing curriculum objectives, which means over 50% of the variance in curriculum achievement is explained by these inputs. The regression model and a significant F-statistic highlight the statistical and practical significance of inputs. This finding is consistent with the broader literature on curriculum evaluation. For instance, studies using Stufflebeam's CIPP model (Context–Input–Process–Product) in primary mathematics show that inadequacies in inputs such as materials, resources, and assessment tools undermine effective curriculum implementation (Zalmon et al., 2025).

The data from Table 3 emphasize that effective teaching methodologies such as marking pupils' tests, assignments, classwork; providing corrections; employing structured lesson plans; and using both standard and improvised instructional materials via conventional and innovative strategies are essential for implementing the senior secondary mathematics curriculum. This suggests that quality instructional delivery hinges not only on what is taught but also on how it is taught. According to Table 7, process factors have a positive effect on achieving the curriculum objectives. The findings indicate that process variables explain approximately 20.5% of the variance in curriculum objectives achievement. The regression equation further implies that increases in effective teaching processes correspond to higher attainment of curriculum goals. The significant confirms this relationship, leading to rejection of the null hypothesis. These findings are consistent with research by Dorgu (2015) that teaching methods are a panacea for effective curriculum implementation, demonstrating that structured, varied strategies are critical for engaging learners and ensuring content delivery aligns with curriculum aims. These findings underscore that implementing the mathematics curriculum successfully depends heavily on the quality and diversity of instructional processes.

The results from Table 4 suggest that senior secondary school students in Obio/Akpor LGA demonstrate a high degree of assimilation of mathematics content. Particularly strong areas include mathematical reasoning and problem-solving, logical and abstract thinking, investigative and creative skills, and cultivating a positive attitude toward mathematics. Though slightly lower, students also show commendable performance in applying concepts to real-world situations and data interpretation. These outcomes signal that learners are not just passively receiving instruction; they are actively developing higher-order cognitive skills essential for future academic success and practical application. According to Table 8, a multiple regression analysis reveals a statistically significant and robust relationship between curriculum objectives and the combined influence of context, input, and process variables. These three factors collectively explain 60.3% of the variance in achieving curriculum objectives, indicating that aligned and well-facilitated educational ecosystems significantly enhance student outcomes. The regression model demonstrates that incremental improvements across all domains can meaningfully raise curriculum achievement levels. The F-statistic affirms the statistical significance of these combined influences. The findings are well-supported by research drawing upon established educational evaluation frameworks: The CIPP (Context–Input–Process–Product) model, as elaborated by Stufflebeam and applied in primary mathematics curriculum evaluation, underscores that curriculum success is a function of the synergy among context, input, and instructional process, culminating in desired learning products (Zalmon, Ojimba & Martins, 2025).

Conclusion

This study revealed that the effective implementation of the senior secondary school mathematics curriculum in Obio/Akpor LGA is significantly influenced by context, input, and process factors. Students demonstrated a high level of mathematical content assimilation, reflected in enhanced reasoning, problem-solving, and computational skills. These findings affirm that effective teaching practices, adequate resources, and a supportive learning environment are critical drivers of curriculum success (Stufflebeam & Zhang, 2017; Adeniran et al., 2023). Strengthening these interconnected factors will further enhance students' mastery of mathematics and readiness for higher academic and career pursuits in STEM fields.

Recommendations

Based on the findings of this study, the following recommendations are proposed:

1. The government should provide sustained funding, policy support, and regular monitoring to ensure effective implementation of the mathematics curriculum, particularly in under-resourced schools.
2. Continuous professional development programs should be organized to equip teachers with innovative and effective instructional strategies that promote active learning and deeper mathematical understanding.
3. Adequate and up-to-date instructional materials, including textbooks, teaching aids, and digital tools, should be supplied to schools to support effective teaching and learning.
4. Schools should adopt continuous and formative assessment methods to track students' progress, identify learning gaps, and provide timely feedback for improvement.
5. Communities, parents, and private organizations should be encouraged to collaborate with schools in providing financial, moral, and material support to strengthen curriculum delivery and student achievement.

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