



## Quality Assurance and the ASEI-PDSI Lesson Approach in Teaching Mathematics in Junior Secondary Schools in Etche Local Government Area, Rivers State

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### Abstract

Strengthening Mathematics, Arts and Science Education (SMASE) in-service training initiative aims to develop technologically inclined citizens by shifting instruction from teacher-centered to student-centered approaches. This study on Quality Assurance and the ASEI-PDSI lesson approach in teaching mathematics in junior secondary schools in Etche Local Government Area, Rivers State, assessed junior secondary school teachers' attitudes toward SMASE's ASEI-PDSI lesson plan approach; the level of quality assurance in classroom delivery in basic schools; and learners' perceptions of the ASEI-PDSI lesson approach.. A descriptive survey design of the ex post facto type was adopted. The population consisted of all junior secondary schools in Etche Local Government Area, Rivers State. Using purposive and simple random sampling, the study involved 100 teachers, 30 principal officers, and 200 students. Data were collected using three instruments: Teachers' Attitude ASEI-PDSI Lesson Plan Questionnaire (TAALPQ), Principal Officers' Quality Assurance in Classroom Delivery Checklist (POQACD), and Learners' Perception of the ASEI-PDSI Lesson Approach Checklist (LPALAC).. The instruments had content and face validity, and reliability coefficients of 0.79, 0.82, and 0.73 respectively, using Cronbach's Alpha. Data were analyzed using descriptive statistics and independent t-tests, with hypotheses tested at the 0.05 significance level. Findings revealed that 57% of teachers had a poor attitude, 56.67% rated quality assurance very low, and 85% of learners had a fair perception of the ASEI-PDSI approach.. No significant difference was found between male and female teachers' attitudes ( $p > .05$ ). It is recommended that local and multinational support be harnessed to fund and enhance the full implementation of the ASEI-PDSI initiative.

**Keywords:** ASEI-PDSI Lesson Approach; Quality Assurance; Mathematics Teaching; Teacher Attitude; Learner Perception; SMASE

### Introduction

Improving the quality of mathematics education, particularly at the junior secondary school level, has become a global priority due to its foundational role in science, technology, and innovation. The traditional teacher-centered instructional method has been widely criticized for limiting student engagement and critical thinking skills (UNESCO, 2023). In response to this challenge, the Strengthening Mathematics and Science Education (SMASE) program was initiated in several African countries, including Nigeria, in collaboration with the Japan International Cooperation Agency (JICA), to reform the pedagogical approach to teaching mathematics and science (Adebayo & Lawal, 2022). At the core of the SMASE initiative is the ASEI-PDSI teaching framework, which promotes a shift from passive learning to active, student-centered engagement. ASEI, which stands for Activity-based, Student-centered, Experimentation, and Improvisation, is operationalized through the Plan, Do, See, and Improve (PDSI) instructional cycle. This approach emphasizes lesson planning that engages learners actively in the learning process through problem-solving, collaboration, and hands-on activities (Muriuki et al., 2021; Eze & Okonkwo, 2023).

Although empirical studies have shown that the ASEI-PDSI model can significantly enhance student learning outcomes. Further evidence is needed. Eze and Okonkwo (2023) found that students taught using ASEI-PDSI strategies exhibited improved problem-solving skills, deeper conceptual understanding, and more positive attitudes toward mathematics.. Similarly, Muriuki et al. (2021) reported that teachers who adopted ASEI-PDSI

methodologies demonstrated better lesson preparation, more effective classroom delivery, and a higher level of responsiveness to student needs. Despite its documented benefits, the implementation of ASEI-PDSI faces several challenges. Kariuki et al. (2022) noted that many teachers remain resistant to change due to inadequate training, limited access to teaching materials, and a lack of administrative support. Wafubwa (2023) observed that while SMASE training has reached a wide number of educators, the actual classroom practice still heavily relies on traditional methods such as rote learning and the lecture method. This inconsistency undermines the objectives of the ASEI-PDSI reform.

To ensure a successful implementation of ASEI-PDSI, a supportive institutional framework is required. Okafor and Adeniran (2021) emphasized the role of a quality assurance institutional framework and ongoing professional development in sustaining the gains of pedagogical reforms. Their study recommends that, educational authorities should institutionalize monitoring systems and foster peer collaboration among teachers to promote consistency and innovation in lesson delivery. Learner perception is another critical aspect in evaluating the effectiveness of ASEI-PDSI. According to Akintola and Daramola (2022), students exposed to student-centered teaching strategies such as ASEI-PDSI reported increased motivation, a better understanding of mathematics concepts, and greater confidence in solving mathematical problems. Their study further highlighted the need to involve learners in a feedback institutional framework to continuously improve the teaching process. The success of ASEI-PDSI depends on adequate teacher training, effective classroom implementation, administrative support, and mechanisms for continuous quality improvement. However, bridging the gap between policy and practice in Quality Assurance and the ASEI-PDSI lesson approach in teaching mathematics is essential in Junior Secondary Schools in the Etche Local Government Area, Rivers State.

### Statement of the Problem

The SMASE In-service Education and Training (INSET) ASEI-PDSI initiative was introduced in Rivers State through the collaboration of the Rivers State Universal Basic Education (SUBEB), Universal Basic Education (UBE), National Teachers Institute (NTI), Federal Ministry of Education (FME), and Japan International Cooperation Agency (JICA) (UNESCO, 2023). Initially, fewer than 75 teachers were selected from the state and trained at the National Teachers' Institute (NTI) headquarters in Kaduna. The program was implemented in three cycles: Cycle 1 (Attitudinal Change) in April 2014, Cycle 2 (Better ASEI Lessons) in August 2016, and Cycle 3 (Classroom Actualization) in February 2018. Each cycle involved approximately 200 teachers, with an emphasis on continuity so that the same teachers received all three stages of training (Kariuki et al., 2022). Following each cycle, trained teachers returned to their Local Government Areas (LGAs) where Local Government Education Authorities (LGEAs) were to initiate further training sessions. School principals and head teachers were also to initiate school-based training to ensure widespread adoption across schools and among teachers in the state. Despite these systematic processes, the researcher observed that the ASEI-PDSI lesson plan approach has not been effectively integrated into classroom practice in various LGAs, including Etche LGA. Against this background, this study empirically investigates the implementation level of quality assurance and the ASEI-PDSI lesson approach in teaching mathematics in junior secondary schools in the Etche Local Government Area of Rivers State....

### Aim and Objectives of the Study

The aim of the study was to examine quality assurance and the ASEI-PDSI lesson approach in teaching mathematics in junior secondary schools in Etche Local Government Area, Rivers State. The study was specifically to:

1. Assess the attitude of mathematics teachers toward SMASE's ASEI-PDSI lesson plan approach in the teaching and learning of mathematics in junior secondary schools in Etche Local Government Area, Rivers State...
2. Assess the level of quality assurance in classroom delivery in Etche Local Government Area, Rivers State.
3. Investigate learners' perceptions of the use of the ASEI-PDSI lesson approach in Etche Local Government Area, Rivers State.

### Research Questions

1. What is the attitude of mathematics teachers toward the use of the ASEI-PDSI lesson plan approach in teaching and learning in junior secondary schools in Etche Local Government Area, Rivers State?

2. What is the level of quality assurance in classroom delivery using the ASEI-PDSI lesson plan approach in junior secondary schools in Etche Local Government Area, Rivers State?
3. What is the perception of learners regarding the ASEI-PDSI lesson plan approach in mathematics classrooms in the Etche Local Government Area of Rivers State?

### Hypothesis

**There is no significant difference between male and female teachers' attitudes toward the use of the ASEI-PDSI lesson plan approach in the teaching and learning of mathematics in junior secondary schools in the Etche Local Government Area, Rivers State.**

### Methods and Materials

This study adopted a descriptive survey research design using an ex post facto approach. This design was considered appropriate as it allowed the researcher to assess existing conditions, opinions, and practices without manipulating any variables. The population consisted of all junior secondary school mathematics teachers, principal officers, and learners in the Etche Local Government Area, Rivers State, Nigeria, who have been exposed to or are implementing the ASEI-PDSI approach in the teaching of mathematics.. A multi-stage sampling technique was employed. First, purposive sampling was used to select teachers, principal officers, and students who have had exposure to the SMASE ASEI-PDSI training and its classroom implementation. Second; simple random sampling was used to select 100 teachers, 30 principal officers, and 200 junior secondary school students from across the selected schools in the study area. Three instruments were developed and validated for data collection: Teachers' Attitude ASEI-PDSI Lesson Plan Questionnaire (TAALPQ): This instrument assessed teachers' perceptions and attitudes toward using the ASEI-PDSI model. Principal Officers' Quality Assurance in Classroom Delivery Checklist (POQACD): Used by vice principals and ODs to evaluate the quality of lesson implementation. Learners' Perception of ASEI-PDSI Lesson Approach Checklist (LPALAC): Used to gather feedback from students about their classroom experiences. The instruments were subjected to content and face validation by three experts in science education. The reliability of the instruments was established using Cronbach's Alpha, yielding coefficients of 0.79 for TAALPQ, 0.82 for POQACD, and 0.73 for LPALAC, indicating acceptable levels of reliability. Descriptive statistics such as frequency counts, percentages, and mean ratings were used to answer the research questions. The research hypothesis was tested using an independent samples t-test at the 0.05 level of significance. This methodological structure ensures that the study provides comprehensive insight into the effectiveness and perception of the ASEI-PDSI instructional approach across different education stakeholders.

### Results

**Research Question 1: What is the attitude of mathematics teachers toward the use of the ASEI-PDSI lesson plan approach in teaching and learning in junior secondary schools in the Etche Local Government Area of Rivers State?**

**Table 1: Attitude of Teachers to the ASEI-PDSI Lesson Plan Approach in Teaching and Learning mathematics.**

Level	Score Range	Frequency	Percentage
Very good	40-31	-	0.00
Good	30-21	10	10.00
Fair	20-11	33	33.00
Poor	10-1	57	57.00
<b>Total</b>		<b>100</b>	<b>100.00</b>

The research question one was answered based on the rating scale as responded to by the teachers who have been introduced to the ASEI-PDSI lesson plan approach in the teaching and learning of mathematics in Junior Secondary Schools in Etche Local Government Area.. Table 1 reveals that the attitude of teachers toward the ASEI-PDSI lesson plan approaches in the teaching and learning of mathematics in Junior Secondary School in Etche Local Government Area was poor at 57%. The range was determined by the sum of

the items (10) multiplied by 4 (response scale) , which equaled 40. The maximum score was 40 while the minimum was 10. Therefore, the data were recorded as  $40 - 31 = 4$ ,  $30 - 21 = 3$ ,  $20 - 11 = 3$ , and  $10 - 1 = 1$ . The percentage was used to determine the level of their attitude. Thus, it means teachers' showed a poor attitude to the ASEI-PDSI lesson plan approach in teaching and learning of mathematics, in Junior Secondary Schools in Etche Local Government Area, Rivers State..

**Research Question 2: What is the level of quality assurance in classroom delivery using the ASEI-PDSI lesson plan approach in junior secondary schools in the Etche Local Government Area of Rivers State?**

**Table 2: Level of Quality Assurance in Classroom Delivery with the ASEI-PDSI Lesson Approach.**

Level	Score Range	Frequency	Percentage
High	56-43	3	10.00
Moderate	42-28	10	33.33
Low	27-14	17	56.67
<b>Total</b>		<b>30</b>	<b>100.00</b>

Research question two was answered based on the rating scale as assessed by the principal officers of teachers who have been introduced to ASEI-PDSI lesson plan approach in teaching and learning of mathematics, in Junior Secondary School in Etche Local Government Area as shown in Table 2. The mean scores of the responses were summed up, and the decision was made considering the rule. Table 2 shows that the level of quality assurance in classroom delivery with the ASEI-PDSI lesson approach in the Junior Secondary Schools in the Etche Local Government Area, as assessed by the principal officers, was low at 56.67%. The range was determined by the sum of the items (14) multiplied by 4 (response scale) and equaled to 56. The maximum minus minimum ( $56 - 14$ ) equaled 42 divided by 3. Thus, the data was recoded to  $14 - 27 = 1$ ,  $28 - 42 = 2$ , and  $43 - 56 = 3$ . Hence, the percentage was used to determine the level. This implies that there is a low baseline level of quality assurance in classroom delivery with the ASEI-PDSI lesson approach in the Junior Secondary School in the Etche Local Government Area, according to the assessment by the principal officers..

**Research Question 3: What is the perception of learners regarding the ASEI-PDSI lesson plan approach in mathematics classrooms in the Etche Local Government Area of Rivers State?**

**Table 3: Students Perception in the Use of ASEI-PDSI Lesson Approach ASEI-PDSI Lesson Plan Approach in Teaching and Learning mathematics.**

Level	Score Range	Frequency	Percentage
Outstanding	40-31	5	2.50
Good	30-21	25	12.50
Fair	20-10	170	85.00
Total		200	100.00

Research question three was answered based on the data obtained from students who have been under the teaching and learning of the teachers using the ASEI-PDSI lesson approach in the teaching and learning of mathematics in Junior Secondary Schools in the Etche Local Government Area, as shown in Table 3. Table 3 indicates the perception of learners regarding the use of the ASEI-PDSI lesson approach. The results show that students perceived the use of the ASEI-PDSI lesson approach to be fair at 85%. The range was established by the sum of the items (10) multiplied by 4 (response scale) and equaled 40. The maximum minus minimum ( $40 - 10$ ) equaled 30 divided by 3. Hence, the data was recoded to  $40 - 31 = 3$ ,  $30 - 21 = 2$ , and  $20 - 10 = 1$ . The results imply that learners are fair with the use of the ASEI-PDSI lesson approach in classroom delivery.

**There is no significant difference between male and female teachers' attitudes toward the ASEI-PDSI lesson plan approach in the teaching and learning of mathematics in Junior Secondary Schools in Etche Local Government Area.**

**Table 4: Difference Between Male and Female Teachers' Attitudes Toward the ASEI-PDSI Lesson Plan Approach.**

Respondents	N	Mean	SD	SEM	T	Df	P	Decision
Male	40	29.0	4.5	0.71	- 1.03	98	0.305	<b>Not Rejected</b>
Female	60	30.0	5.1	0.66				

An independent-sample t-test was conducted on the responses from students of the sampled schools as shown in Table 4, it indicates that there is no significant difference that exists between male and female teachers on the use of ASEI-PDSI lesson plan approach in teaching and learning of mathematics in Junior Secondary Schools in Etche Local Government Area..  $p > .05$ . Since the p-value is greater than the .05 threshold, the hypothesis was therefore not rejected. It is evident that there is no difference in male and female in the use of ASEI-PDSI lesson plan approach in teaching and learning of mathematics, in Junior Secondary Schools in Etche Local Government Area.. This implies that male and female teachers have a similar attitude towards the use of the ASEI-PDSI lesson plan approach in teaching and learning mathemaThe findings of this study reveal a critical gap between the intended outcomes of the SMASE ASEI-PDSI instructional model and its actual implementation in junior secondary schools within Etche Local Government Area. Government Area. From the results of the data in Table 1, the study found that 57% of teachers demonstrated a poor attitude toward the use of the ASEI-PDSI lesson plan approach.. This result reflects the persistent resistance to pedagogical change highlighted in the literature. Kariuki et al. (2022) observed that despite exposure to SMASE training cycles, many teachers fail to implement ASEI-PDSI strategies due to insufficient training, lack of teaching materials, and minimal adminis Similarly, Wafubwa (2023) emphasized that many educators still default to traditional methods which is consistent with the current stud's findings.tudy's findings.

From the Quality Assurance in Classroom Delivery in Research Question 2, the assessment by principal officers showed that 56.67% rated the quality assurance in ASEI-PDSI implementation as low.. This is however stressed upon through the study of Muriuki et al. (2021), and Okafor and Adeniran (2021), who emphasized the need for robust monitoring mechanisms and continuous professional development to ensure reliability in ASEI-PDSI delivery. The study confirms that although structures for implementation exist, quality assurance measures are either weak or inconsistently applied at the school level.

Learners' perceptions in research question 3 were also underwhelming, with 85% rating the approach as merely "fair." This suggests a disconnect between ASEI-PDSI's intended learner engagement and the actual classThis contradicts studies such as Akintola and Daramola (2022), and ze and Okonkwo (2023), who reported increased learner motivation and improved attitudes in schools that adopted student-centered approaches.ntered approaches. The disparity may indicate either partial or ineffective implementation of ASEI-PDSI principles in the study area. The hypothesis testing showed no significant difference between male and female teachers' attitudes, aligning with the understanding that resistance or acceptance of pedagogical innovations is not inherently gender-based, but rather influenced by training, institutional support, and personal beliefs (UNESCO, 2023).

### Conclusion

This study highlighted gaps in the implementation of the SMASE ASEI-PDSI instructional approach in junior secondary schools within Etche Local Government Area of Rivers State.. Despite its potential to transform mathematics teaching through activity-based student-centered methods, the findings indicate that both teacher attitude and quality assurance in lesson delivery are below expectations. In addition, learners' fair perception suggests that the intended impact of the approach has not been fully realized. These outcomes point to systemic challenges such as inadequate follow-up training, insufficient instructional support, and weak monitoring structures. Generally, addressing these issues is crucial for enhancing mathematics teaching and learning

outcomes, aligning with 1st century pedagogical goals

### Recommendations

The following were recommended based on the findings from the study:

1. Teachers should undergo periodic retraining and capacity-building workshops focused specifically on ASEI-PDSI lesson planning and implementation. This will reinforce pedagogical skills and renew their commitment to student-centered teaching strategies.
2. School heads and education authorities should develop robust supervision frameworks to ensure that ASEI-PDSI principles are consistently applied during classroom instruction. Regular evaluation and feedback will promote accountability and improvement.
3. To ensure effective implementation, schools must be equipped with the necessary teaching aids, resource books, and infrastructure that align with the ASEI-PDSI model. This will facilitate hands-on learning and improve student engagement.

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