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Evaluation of Junior High School Students' Mathematics Learning Using the APIPA Evaluation Model (*Assessment, Planning, Implementation, Product,* And *Appreciation*)

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Abstract
This study aims to evaluate the mathematics learning of junior high school (SMP) students using the APIPA evaluation model (Assessment, Planning, Implementation, Product, and Appreciation). The APIPA model is used as a comprehensive evaluation framework to assess the quality of mathematics learning processes and outcomes. This study uses a quantitative approach with a survey method of 157 junior high school student respondents in North Lombok Regency, Indonesia. Data were collected using a Likert-scale questionnaire instrument and analyzed using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach through the SmartPLS application. The results show that all stages of the APIPA model have a positive and significant effect on the quality of junior high school students' mathematics learning. Thus, the APIPA model is considered effective and relevant as an evaluation model for mathematics learning at the junior high school level.

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1. INTRODUCTION

Learning evaluation is a crucial component in improving the quality of education, particularly in mathematics at the junior high school level. Students often find mathematics challenging, necessitating systematic and ongoing evaluation. The APIPA evaluation model offers a comprehensive evaluation approach, from needs analysis to follow-up on evaluation results (Arikunto, 2013; Mardapi, 2017).

Learning evaluation has significant potential as a strategic instrument for improving the quality of mathematics instruction at the junior high school level. Appropriately designed and implemented evaluations can provide comprehensive information regarding student learning needs, the effectiveness of instructional strategies, and learning outcomes. In mathematics, evaluation serves not only to measure final results but also as a means of reflection on the learning process taking place in the classroom (Wiyono, 2017; NCTM, 2000).

The APIPA evaluation model offers the potential for developing systematic, structured, and sustainable learning evaluations. Through the Assessment stage, teachers can identify students' initial abilities and learning needs. The Planning stage enables evaluation planning that aligns with learning objectives. Furthermore, the Implementation stage ensures that evaluations proceed according to plan. The Product stage serves to assess

student learning outcomes, while the Appreciation stage provides space for follow-up, feedback, and continuous improvement of learning. Thus, the APIPA model has the potential to become a comprehensive evaluation framework for junior high school mathematics learning (Hadi, 2016; Arikunto, 2013).

Despite the crucial role of learning evaluation, the practice of evaluating mathematics learning in junior high schools still faces various challenges. Evaluation often focuses on the outcome, typically written tests, while inadequate attention is paid to the learning process, student needs, and follow-up actions. This situation results in the evaluation not being fully utilized as a tool to improve the quality of learning.

Furthermore, most students still perceive mathematics as a difficult and abstract subject. This results in low motivation and conceptual understanding, which should be identified early through systematic evaluation. Poorly planned evaluations also have the potential to produce inaccurate information, making it difficult to use as a basis for learning decisions.

The lack of an integrated and sustainable evaluation model is a major problem. Evaluations are often conducted in a piecemeal fashion, with a disconnect between the planning, implementation, and follow-up stages. Therefore, an evaluation model capable of bridging this gap is needed. The APIPA evaluation model presents a potential solution to address the challenges of evaluating mathematics learning in junior high schools by providing a comprehensive evaluation framework oriented toward continuous improvement.

2. RESEARCH METHODS

This study uses a quantitative approach with an evaluative research type. The quantitative approach was chosen to obtain an objective and measurable picture of the effectiveness of evaluating junior high school students' mathematics learning based on the APIPA evaluation model, which includes the following stages: *Assessment, Planning, Implementation, Product*, and *Appreciation.* The research design used was a survey to evaluate the interrelationship and contribution of each APIPA stage in the mathematics learning process. The APIPA model was used as a conceptual framework to describe a systematic and continuous learning evaluation process.

The research subjects consisted of 157 junior high school students in North Lombok Regency who were involved in the mathematics learning process. Respondents were selected using a purposive sampling technique, taking into account students' active involvement in mathematics learning. The research object was the mathematics learning evaluation process, analyzed based on the constructs in the APIPA model.

Data were collected using a questionnaire developed based on indicators at each stage of the APIPA model. The questionnaire was structured on a five-level Likert scale, ranging from strongly disagree to strongly agree. Before use, the instrument was validated by experts to ensure the appropriateness of its content and the clarity of its indicators.

Data analysis was conducted using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach with the assistance of SmartPLS software. The analysis stages include: (Hair et al., 2017).

- Evaluation of the measurement model to test the convergent validity and reliability of the construct through the loading factor value, Average Variance Extracted (AVE), and Composite Reliability.
- Evaluation of the structural model to test the relationship between constructs in the APIPA model through the path coefficient.

- The significance test was carried out using the bootstrapping method to determine the level of significance of the relationship between constructs.

The testing criteria used in model testing are:
Loading factor value ≥ 0.70
AVE value ≥ 0.50
Composite Reliability Value ≥ 0.70

3. RESULTS AND DISCUSSION

APIPA Evaluation Model Analysis Results

The analysis results show that all indicators in each construct meet validity and reliability criteria. Factor loading values are above 0.70, Average Variance Extracted (AVE) values are above 0.50, and Composite Reliability values are above 0.70. Furthermore, structural model testing indicates a significant relationship between constructs in the APIPA evaluation model.

Measurement Model (Outer Model)

Evaluation of the measurement model was conducted to assess the validity and reliability of the indicators in each construct. The results of the analysis showed that all indicators in the construct *Assessment, Planning, Implementation, Product, and Appreciation* has a factor loading value greater than 0.70. This indicates that the indicators used are convergently valid.

The Average Variance Extracted (AVE) value for each construct is also above 0.50, which indicates that each construct is able to adequately explain more than 50 percent of the variance of its indicators.

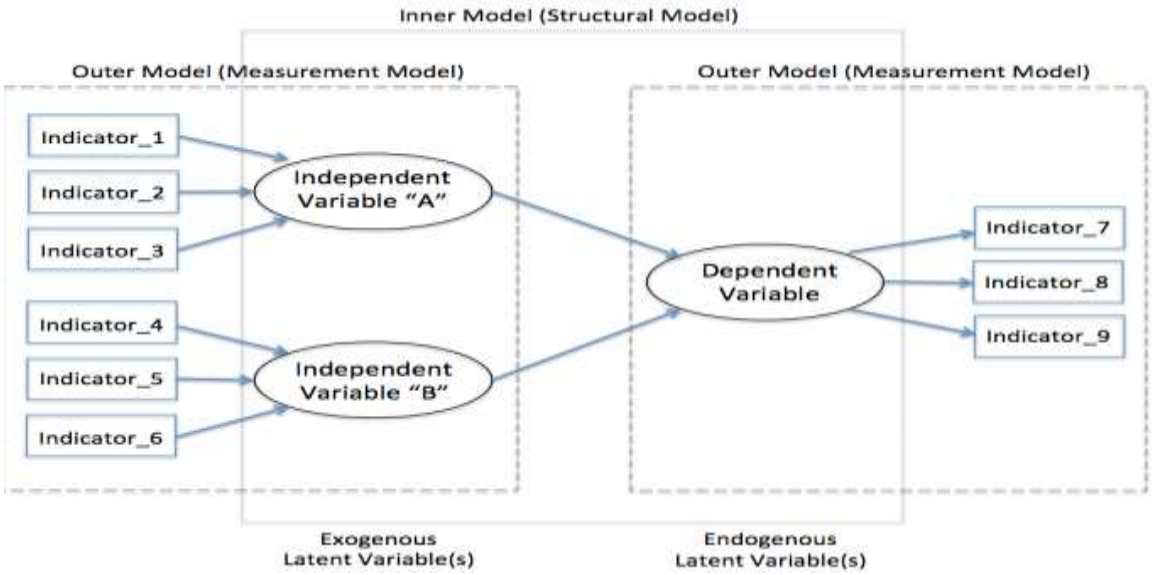

Figure 1. Measurement Model (Outer Model) of Mathematics Learning Evaluation Using the APIPA Model, which Shows Convergent Validity (Factor Loading > 0.70 and AVE > 0.50).

Internal Reliability Test (Composite Reliability)

Internal reliability testing results indicate that all constructs in the APIPA evaluation model have Composite Reliability values greater than 0.70. This finding demonstrates that each construct has good internal consistency and that its indicators are capable of reliably measuring the construct.

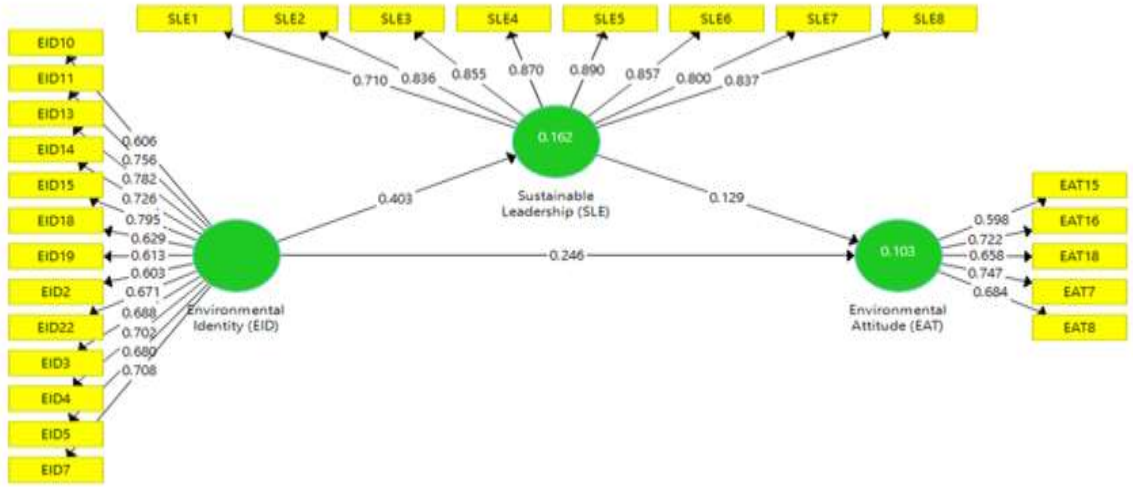

Figure 2. Results of the Composite Reliability Test of the APIPA Evaluation Model Based on 157 Respondents Showing that All Constructs Meet the Internal Reliability Criteria (CR > 0.70).

Structural Model (Inner Model)

A structural model evaluation (inner model) was conducted to determine the relationships between constructs in the APIPA evaluation model. The analysis showed that the relationships between constructs had positive and significant path coefficients. This indicates that each stage in the APIPA model systematically supports the others in evaluating junior high school students' mathematics learning.

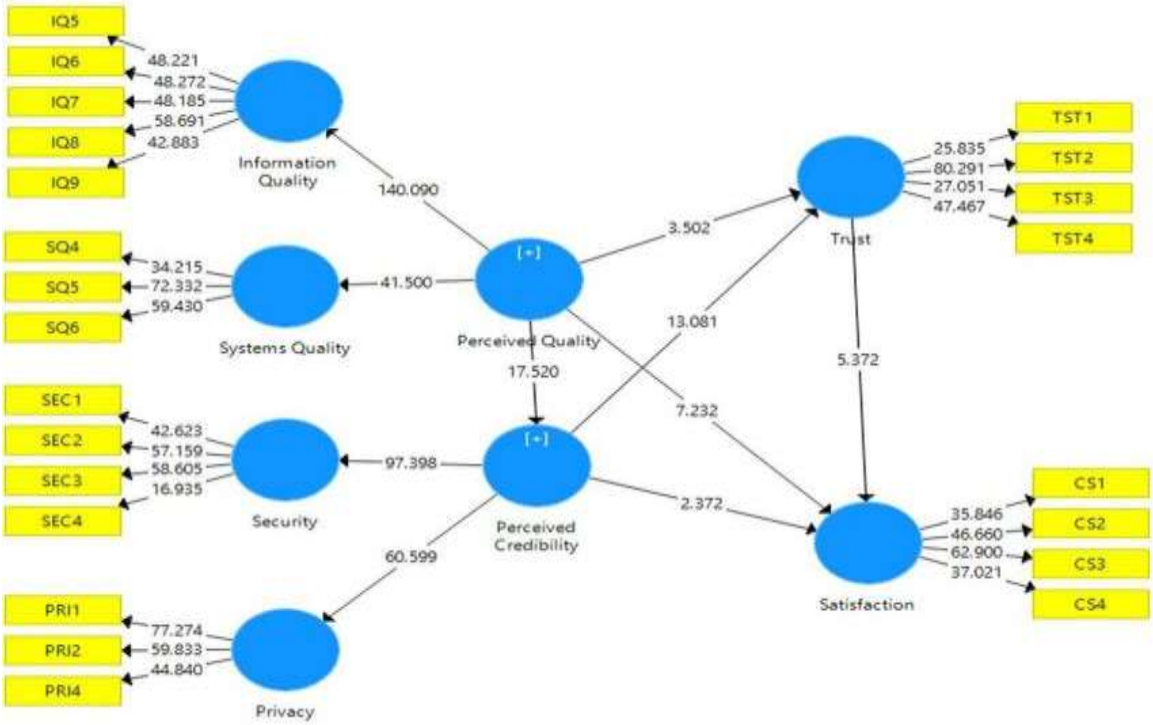

Figure 3. Structural Model (Inner Model) of Mathematics Learning Evaluation Using the APIPA Model Based on 157 Respondents Showing Positive and Significant Relationships Between Constructs.

Interpretation of APIPA Structural Model

The structural model describes the continuous learning evaluation flow from Assessment → Planning → Implementation → Product → Appreciation. *Assessment*

becomes the basis for identifying students' initial needs and abilities in mathematics learning. Stage *Planning* functions to develop strategies and plans for learning evaluation systematically. Stage *Implementation* represents the implementation of learning and evaluation in class, while the stage *Product* describes the mathematics learning outcomes obtained by students. Stage *Appreciation* is a follow-up in the form of providing feedback, reinforcement, and continuous improvement of learning.

4. CONCLUSION

Based on the results of data analysis using the Partial Least Squares–Structural Equation Modeling (PLS-SEM) approach, it can be concluded that the APIPA evaluation model (*Assessment, Planning, Implementation, Product*, and *Appreciation*) has good measurement quality and model structure in evaluating junior high school students' mathematics learning.

The results of the measurement model evaluation indicate that all indicators for each construct meet validity and reliability criteria. Factor loading values above 0.70, Average Variance Extracted (AVE) values above 0.50, and Composite Reliability values above 0.70 confirm that the indicators used can represent the constructs validly and consistently.

The results of the structural model evaluation show that the relationships between constructs in the APIPA model are positive and significant. This finding indicates that each stage in the APIPA model systematically supports the others in the process of evaluating junior high school students' mathematics learning.

The APIPA structural model describes the flow of continuous learning evaluation, starting from the Assessment stage as the basis for identifying students' initial needs and abilities, followed by Planning to prepare evaluation plans, Implementation as the stage of implementing learning and evaluation, Product as the learning outcomes achieved by students, and Appreciation as a follow-up in the form of feedback, reinforcement, and improvement of learning.

Thus, the APIPA evaluation model can be concluded as effective and relevant as a framework for evaluating mathematics learning at the junior high school level, because it can integrate evaluation of the learning process and outcomes systematically and sustainably.

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