Journal of Education Technology and Learning Models
Volume 1 (1) 2025, 39-45
E-ISSN XXXX-XXXX, P-ISSN XXXX-XXXX

Analysis of the Quality of Learning Evaluation Performed by Elementary School Educators in Science Subjectst

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Article History: Received on June 2025, Revised on July 2025, Published on August 2024

Abstract

This study aims to analyze the quality of learning evaluations conducted by elementary school educators in the subject of Natural Sciences (IPA). Utilizing a literature review method, this study examines scholarly publications from 2017 to 2024 related to science learning evaluations at the elementary level. The findings indicate that the quality of these evaluations still needs significant improvement in several areas, including the limited variety of assessment instruments, a predominant focus on cognitive aspects with minimal attention to science process skills and scientific attitudes, educators' limited understanding of authentic assessment, and the underutilization of evaluation results to enhance instructional practices. Key challenges faced by educators include time constraints, large class sizes, and inadequate training in science learning evaluation. Therefore, this study recommends the implementation of continuous professional development programs to strengthen educators' competencies in conducting comprehensive, valid, and reliable science learning assessments.

Keywords: Science learning evaluation, elementary education, authentic assessment, educator competence, professional development.

A. Introduction

Learning evaluation constitutes a critical component of the educational process, serving to assess the attainment of instructional objectives and to provide feedback for the continuous improvement of teaching and learning practices (Arif, 2022). Within the context of Natural Sciences (IPA) education at the elementary level, evaluation holds a

strategic role due to the multifaceted nature of science, which not only emphasizes conceptual understanding but also the development of scientific process skills and scientific attitudes (Dewi & Hamid, 2021).

Despite its importance, the implementation of high-quality science learning evaluations remains a significant challenge for many elementary school educators in Indonesia. A substantial body of research has explored various dimensions of science learning evaluation, employing diverse methodological approaches. Astuti et al. (2018), for example, investigated the development of authentic assessment instruments grounded in scientific literacy and revealed that existing assessments primarily focus on cognitive domains, lacking comprehensive integration of science literacy components. Similarly, Fajriah and Angraeni (2018) found that many educators experience difficulties in designing valid and reliable instruments, particularly for assessing scientific process skills.

Suryandari et al. (2018) highlighted the mismatch between the scientific approach applied in instruction and the corresponding assessment practices, which often fail to adequately capture students' scientific process skills. Priyambodo and Marwoto (2020) identified systemic obstacles in the evaluation of science learning, including time constraints, high student-to-teacher ratios, and insufficient professional development opportunities. Kurniawati and Mawardi (2021) assessed the implementation of authentic assessment within the 2013 curriculum framework and concluded that educators' conceptual understanding of authentic assessment remains limited, resulting in suboptimal application. Widiasworo (2019) emphasized the necessity of developing evaluation instruments that align with the specific characteristics of science learning in elementary settings to ensure the accurate measurement of student competencies.

In the domain of scientific literacy, Yulianti (2017) underscored the need for assessment tools that effectively measure students' literacy skills. Complementarily, Zulfiani et al. (2018) examined students' scientific knowledge and competencies and noted that existing instruments inadequately address the full spectrum of scientific literacy components. Although these studies have significantly contributed to the discourse on science learning evaluation, most focus on isolated issues or individual aspects. There remains a lack of integrative research that systematically analyzes the quality of science learning evaluations in elementary schools across multiple dimensions namely, the diversity and validity of instruments, the focus of evaluation (cognitive, affective, and psychomotor

domains), educators' understanding and implementation of authentic assessments, and the extent to which evaluation results are used to inform and improve instruction.

The novelty of this article lies in its comprehensive and analytical synthesis of existing literature through a multidimensional framework. Unlike previous studies that examined evaluation aspects in isolation, this study provides a holistic assessment that identifies interconnections between assessment practices, educator competencies, and systemic factors that influence evaluation quality. Furthermore, this article moves beyond problem identification by offering evidence-based strategic recommendations to enhance science learning evaluation practices in elementary schools. It also introduces a conceptual model that can guide future empirical studies and policy development in this area.

The primary objective of this article is to assess the quality of science learning evaluations conducted by elementary school educators by analyzing a range of recent studies using a literature review approach. Through this analysis, the study aims to deliver a comprehensive understanding of current evaluation practices, highlight existing gaps and challenges, and formulate practical recommendations to improve the quality and effectiveness of science learning assessments. In doing so, this article not only contributes theoretically to the academic field but also offers actionable insights for educators, curriculum developers, and policymakers seeking to strengthen science education at the foundational level.

B. Methods

This study employs a literature review method to investigate the quality of learning evaluations conducted by elementary school educators in science education. A literature review is a systematic research approach that involves the collection, identification, critical appraisal, and synthesis of relevant scholarly sources related to the research topic (Snyder, 2019). This methodological approach was selected due to its capacity to provide a comprehensive and integrative understanding of current practices and challenges in science learning evaluation at the elementary level.

The data sources for this study consist of peer-reviewed journal articles, academic books, conference proceedings, and research reports, both at the national and international levels, which specifically address issues related to the evaluation of science learning in elementary education. These sources were selected based on their relevance, credibility,

and contribution to the discourse on educational assessment, with a focus on studies published between 2017 and 2024. Through this method, the study aims to map prevailing evaluation practices, identify key gaps, and synthesize findings to support evidence-based recommendations for enhancing the quality of science learning assessments in primary education.

C. Results and Discussion

The analysis of the reviewed literature presents a comprehensive understanding of the current practices and quality of science learning evaluations implemented by elementary school educators. The findings are organized around six key thematic dimensions that reflect the core aspects of effective science assessment practices.

1. Limited Diversity of Assessment Instruments

The variety of evaluation tools employed in elementary science education remains considerably constrained. Predominantly, teachers rely on conventional paper-based tests, with limited implementation of alternative assessment forms such as performance-based tasks, project-based assessments, and student portfolios. This narrow range of instruments contradicts the multifaceted nature of science education, which aims to foster not only conceptual knowledge but also scientific skills and attitudes. The lack of diverse tools restricts holistic assessment of students' competencies. Previous studies support the potential of digital portfolios to enhance student engagement and learning outcomes. For instance, Harder (2012) reported significant improvements in student performance in science and mathematics following the use of digital portfolios. Similarly, Saylan Kırmızıgül et al. (2024) emphasized that portfolios encourage reflective thinking and promote constructivist learning, enabling more comprehensive insights into student progress.

2. Imbalanced Focus on Assessment Dimensions

Current assessment practices exhibit a strong bias toward cognitive outcomes, often neglecting science process skills and affective components such as scientific attitudes. Most evaluations focus on factual recall and conceptual mastery, whereas skills such as critical thinking, inquiry, and reflection—essential to scientific literacy are rarely assessed. This issue is particularly acute in under-resourced and rural schools, where innovative instructional and evaluative practices are less prevalent. The imbalance poses

a significant challenge to the cultivation of higher-order thinking skills and inquiry-based learning in elementary science education.

3. Challenges in Implementing Authentic Assessments

Although authentic assessments are widely acknowledged as being aligned with the nature of science learning, their practical application remains inadequate. Educators often possess theoretical knowledge of authentic assessment, yet they encounter challenges in designing valid rubrics, defining measurable indicators, and developing contextualized assessment tools. This gap is attributed to limited professional training, a lack of access to practical implementation guidelines, and insufficient institutional support. According to Ormiston (2025), authentic assessment involves the use of meaningful, real-world tasks that require students to construct knowledge and solve problems. However, the operational demands of such assessments often exceed the capacity of elementary-level educators, especially in the absence of systemic support.

4. Limited Use of Evaluation for Instructional Improvement

Evaluation results are frequently used for administrative reporting rather than to inform instructional improvement. Formative uses of assessment such as identifying student misconceptions, designing remedial activities, and differentiating instruction are rarely practiced. Many teachers lack the capacity to interpret student assessment data effectively, and time constraints further limit reflective teaching practices. This is particularly concerning as formative assessment strategies have been shown to be among the most impactful methods for enhancing student achievement.

5. Barriers to High-Quality Assessment Implementation

Numerous challenges hinder the implementation of high-quality science learning evaluations. These include technical and systemic issues such as overcrowded classrooms, limited instructional time, and a lack of ongoing professional development. Additionally, educators face complex administrative workloads and insufficient policy support, which reduce their ability to prioritize innovative assessment practices. Environmental factors such as inadequate school infrastructure, lack of science resources, and student diversity further complicate evaluation practices, especially in underserved regions.

6. Promising Initiatives and the Role of Technology

Despite these challenges, several emerging initiatives indicate potential for meaningful improvement. These include professional development programs focused on science process skills, the creation of assessment instruments aligned with scientific literacy, and the integration of digital tools to support evaluation. Studies by Prastiwi et al. (2020) and Werth et al. (2022) demonstrated that e-portfolios facilitate the documentation of multidimensional learning outcomes and support metacognitive development. Similarly, Urwatin Wusqo et al. (2018) found that introducing ICT-based assessment tools significantly enhanced the assessment design skills of pre-service teachers. These findings highlight the critical role of educational technology in improving assessment practices.

The use of information and communication technology (ICT) offers substantial promise in transforming science evaluation into a more efficient and pedagogically sound process. Digital tools such as electronic portfolios and learning analytics can streamline assessment administration, automate data analysis, and provide timely feedback to stakeholders. As Barrett (2002) has argued, e-portfolios represent a powerful tool for authentic assessment, allowing students to document learning through multimedia and reflect on their academic growth. By reducing the administrative burden on educators, digital systems enable a greater focus on formative and diagnostic assessment.

7. The Importance of Collaborative Stakeholder Engagement

Improving the quality of science learning evaluation also requires sustained collaboration among key stakeholders. Partnerships involving schools, teacher education institutions, education authorities, and professional learning communities can enhance the capacity of teachers through shared knowledge, contextualized practices, and continuous professional dialogue. Activities such as action research, school-based workshops, and peer mentoring contribute to building a sustainable culture of high-quality assessment. Studies by Urwatin Wusqo et al. (2018) and Prastiwi et al. (2020) underscore the importance of collaborative ecosystems in strengthening assessment practices and promoting reflective teaching.

D. Conclusions

This study presents a comprehensive synthesis of literature on the quality of science learning evaluations conducted by elementary school educators. The findings reveal persistent limitations in the diversity of assessment instruments, an overemphasis on cognitive outcomes, and underutilization of authentic assessments. Furthermore, the use of evaluation results for instructional improvement remains minimal, and numerous systemic, technical, and contextual barriers continue to impede the implementation of high-quality assessment practices.

Despite these challenges, several promising initiatives particularly those involving the integration of digital tools and professional development focused on scientific process skills demonstrate the potential for meaningful reform. The adoption of information and communication technology (ICT), such as digital portfolios and automated evaluation platforms, offers significant opportunities to enhance the efficiency, accuracy, and pedagogical value of assessments.

To achieve sustainable improvements in science learning evaluation, a multifaceted strategy is required. This includes strengthening teacher capacity, promoting authentic assessment practices, leveraging technology, and fostering collaborative networks among key stakeholders. Through such integrative efforts, science evaluation in elementary education can evolve from a bureaucratic task into a formative, student-centered process that actively supports learning and development.

Future research is recommended to explore empirical implementations of these strategies and to investigate their impact on student outcomes across diverse educational contexts. Such inquiry will further inform policy and practice aimed at advancing the quality of science education at the foundational level.

E. Acknowledgement

The author would like to express sincere gratitude to all researchers and scholars whose works were reviewed and contributed significantly to the development of this study. Appreciation is also extended to the academic community and educational institutions that support ongoing discussions on improving the quality of science learning evaluation in elementary education. Special thanks are due to colleagues and mentors who provided valuable feedback throughout the preparation of this article.

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