



Evaluation of the Implementation of Biology Learning Assessment on the Concept of Environmental Pollution in the Merdeka Curriculum for Grade VIII Junior High School Students

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Abstract

This study aims to evaluate the implementation of Biology learning assessment on the concept of environmental pollution in the Merdeka Curriculum for Grade VIII junior high school students. The evaluation was conducted on the implementation of diagnostic, formative, and summative assessments applied by the teacher during the learning process. This study employed an evaluative approach using Stake's Countenance evaluation model, which includes the stages of antecedents, transactions, and outcomes. The research subjects consisted of one science teacher and 32 Grade VIII junior high school students. Data were collected through observation, document analysis, questionnaires, and interviews. The data were analyzed using descriptive quantitative and qualitative methods by comparing actual conditions with the assessment standards in the Merdeka Curriculum. The results showed that the implementation of Biology learning assessment on environmental pollution material was in the good category, with an average implementation rate of 83.2%. Diagnostic assessment obtained a score of 78.5%, formative assessment 85.6%, and summative assessment 85.4%. Nevertheless, challenges were still found in the implementation of non-cognitive diagnostic assessment and the provision of individual feedback to students. This study recommends the development of more authentic assessments that are oriented toward students' learning needs in accordance with the principles of the Merdeka Curriculum.

Keywords: Evaluation, Learning Assessment, Environmental Pollution, Merdeka Curriculum, Biology.

INTRODUCTION

The Merdeka Curriculum positions assessment as an inseparable component of the learning process (Sinurat, 2025)(Solihin S et al., 2025). Assessment is no longer viewed merely as a tool for measuring learning outcomes but also as a means of obtaining information that teachers can use to improve the learning process and help students achieve the expected competencies (Angelika et al., 2025). In the context of Biology learning, the implementation of appropriate assessment is highly necessary because the material studied requires not only conceptual mastery but also critical thinking and problem-solving abilities related to everyday life (Suriyani et al., 2020)(Yatimah et al., 2019).

One important topic in Biology learning for Grade VIII junior high school students is environmental pollution (Napitupulu et al., 2024). This material has contextual characteristics because it is directly related to various environmental problems that occur around students (Lider, 2022; Harahap, 2025). Therefore, learning about environmental pollution requires assessment that can measure students' conceptual understanding, science process skills, analytical abilities, and environmental awareness (Sinurat, 2025). The implementation of assessment in accordance with the principles of the Merdeka Curriculum is expected to support the achievement of these objectives (Fathimah et al., 2024).

Various studies have shown that the implementation of assessment in the Merdeka Curriculum has experienced positive development (Fathimah et al., 2024). Teachers have begun to implement diagnostic, formative, and summative assessments as part of the learning process (Dike & Parida, 2025). Nevertheless, assessment implementation still faces various challenges, such as limited time, difficulties in developing authentic instruments, and the suboptimal use of assessment results as a basis for follow-up learning activities (Sinurat, 2025).

Previous studies have focused more on the implementation of the Merdeka Curriculum in general or on the application of assessment in various subjects without specifically examining environmental pollution material (Andri et al., 2024). In addition, most studies have only measured the level of assessment implementation without conducting a comprehensive evaluation of the alignment between assessment practices and the assessment principles in the Merdeka Curriculum. This condition indicates a research gap that requires further investigation.

Based on preliminary observations, teachers have implemented various forms of assessment during environmental pollution learning; however, the effectiveness of their implementation has never been evaluated systematically (Hariyatmi & Riani, 2014). The extent to which diagnostic, formative, and summative assessments have been implemented in accordance with the characteristics of the Merdeka Curriculum remains unknown (Alti et al., 2021). Therefore, evaluative research is needed to provide a comprehensive overview of assessment implementation in this material (Hasanah et al., 2015).

The innovation of this study lies in the use of Stake's Countenance evaluation model to comprehensively evaluate the implementation of Biology learning assessment, beginning with the planning stage, continuing through implementation, and extending to assessment outcomes in environmental pollution material. The findings of this study are expected to serve as a basis for teachers to improve assessment quality so that it is more aligned with the principles of differentiated and student-centered learning in the Merdeka Curriculum.

RESEARCH METHODS

This study employed an evaluation method using descriptive quantitative (Nisa & Fitrihidajati, 2024) and qualitative approaches through Stake's Countenance evaluation model, which includes the components of antecedents (assessment planning), transactions (assessment implementation), and outcomes (assessment results). The study was conducted with 32 Grade VIII junior high school students and one science teacher. Data collection techniques included classroom observation (Abdurrahim et al., 2020), document analysis of teaching modules and assessment instruments, the distribution of questionnaires to students, and interviews with the teacher. The research instruments consisted of an observation sheet, interview guidelines, a

document analysis sheet, and a student response questionnaire. Quantitative data were analyzed using the percentage of implementation and categorized into the following criteria: very good (86–100%), good (76–85%), fair (60–75%), and poor (<60%). Qualitative data were analyzed through data reduction, data presentation, and conclusion drawing to strengthen the evaluation results.

RESULTS AND DISCUSSION

Table 1. Evaluation Results of the Antecedents Stage (Assessment Planning)

No	Evaluated Aspect	Percentage (%)	Category
1	Development of assessment objectives	88	Very Good
2	Alignment of the instrument with TP	85	Good
3	Development of diagnostic assessment	76	Good
4	Development of assessment rubrics	82	Good
Average		82,75	Good

The evaluation results at the antecedents stage indicate that the teacher had developed assessment planning properly. The alignment of the instrument with the learning objectives met the standards of the Merdeka Curriculum. However, diagnostic assessment still requires further development, particularly in the non-cognitive aspect.

Table 2. Evaluation Results of the Transactions Stage (Assessment Implementation)

No	Aspek yang Dievaluasi	Persentase (%)	Kategori
1	Implementation of diagnostic assessment	78	Good
2	Implementation of formative assessment	87	Very Good
3	Provision of feedback	80	Good
4	Student involvement in assessment	89	Very Good
Average		83,50	Good

The implementation of assessment during the learning process was in the good category. Formative assessment was conducted routinely through discussions, presentations, and learning quizzes. The high level of student involvement indicates that assessment was able to support active and meaningful learning.

Table 3. Evaluation Results at the Outcomes Stage (Assessment Outcomes)

No	Evaluated Aspect	Percentage (%)	Category
1	Mastery of learning outcomes	86	Very Good
2	Ability to analyze environmental pollution	84	Good
3	Environmental awareness attitude	83	Good
4	Use of assessment results for follow-up learning activities	80	Good
Average		83,25	Good

The evaluation results indicate that most students had achieved learning mastery. Students' ability to analyze environmental problems developed well through contextual-based assessment. The use of assessment results as a basis for follow-up learning activities had been

implemented, although it was not yet optimal. Overall, the implementation of Biology learning assessment on environmental pollution material was categorized as good, with an average score of 83.17%. This result indicates that the assessment principles in the Merdeka Curriculum had been implemented fairly consistently. Nevertheless, several aspects still need to be improved to achieve the very good category.

DISCUSSION

The results of this study indicate that the assessment planning stage was categorized as good. This finding indicates that the teacher understood the importance of developing assessment instruments aligned with learning objectives (Luh et al., 2023). This finding is consistent with previous research stating that assessment planning is the main foundation for the successful implementation of the Merdeka Curriculum (Salam et al., 2022).

In the diagnostic assessment aspect, the percentage obtained was lower than that of the other aspects (Rohim et al., 2023). This condition indicates that the teacher still focused more on cognitive assessment than on non-cognitive assessment (Luh et al., 2023). Similar findings have been reported in various studies on the implementation of the Merdeka Curriculum, which found that diagnostic assessment had not been conducted optimally because of limited time and teachers' understanding (Rohim et al., 2023).

The implementation of formative assessment was categorized as very good. The teacher actively used quizzes, discussions, presentations, and learning reflections to monitor students' learning progress. This result supports the view that formative assessment can increase student engagement in the learning process (Sofah, 2020). The high level of student participation during assessment indicates that contextual environmental pollution learning can increase learning motivation. Students were able to connect the concepts learned with environmental problems encountered in their daily lives, making the learning process more meaningful (Subkhi et al., 2022).

At the outcomes stage, students' learning outcomes showed a high level of mastery. This condition indicates that effective assessment implementation can help teachers identify students' learning needs and provide appropriate follow-up actions (Solihin et al., 2025). Students' analytical ability regarding environmental pollution problems also showed good results (Solihin et al., 2020). This finding is consistent with the characteristics of the Merdeka Curriculum, which emphasizes the development of critical thinking and problem-solving competencies through contextual learning. Nevertheless, the results of this study indicate that the use of assessment results for follow-up learning activities still needs to be improved. The teacher had not fully used assessment data to design differentiated instruction aligned with students' individual needs.

Overall, the findings of this study support various previous findings indicating that assessment implementation in the Merdeka Curriculum has a positive impact on learning quality. Nevertheless, strengthening teachers' competence in developing and using authentic assessment remains an important need. The findings of this study reinforce the importance of integrating assessment with contextual learning. In environmental pollution material, assessment not only measures cognitive ability but also evaluates students' science process skills and environmental awareness attitudes.

Thus, the implementation of Biology learning assessment on environmental pollution material has been conducted in accordance with the principles of the Merdeka Curriculum, although improvements are still needed in diagnostic assessment and follow-up actions based on assessment results to support more adaptive and student-centered learning.

CONCLUSION

The implementation of Biology learning assessment on the concept of environmental pollution in Grade VIII junior high school within the Merdeka Curriculum was categorized as good, with an average implementation rate of 83.17%. Diagnostic, formative, and summative assessments were implemented systematically to support the learning process. The remaining challenges included the implementation of non-cognitive diagnostic assessment and the use of assessment results for differentiated instruction. Therefore, teachers' competence in developing more comprehensive authentic assessments aligned with the characteristics of the Merdeka Curriculum needs to be improved.

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