



Evaluation of the Formative Assessment System for Ecosystem Material Based on the Independent Curriculum in Junior High Schools

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Abstract

This study aims to evaluate the implementation of the formative assessment system for ecosystems based on the Independent Curriculum at the junior high school (SMP) level. The study used a descriptive quantitative approach with a survey method. The subjects consisted of 72 seventh-grade students and four science teachers at SMPs that had implemented the Independent Curriculum. Data collection was conducted through questionnaires, observation sheets, and documentation of formative assessment results. Data analysis used descriptive statistics, including percentages and average scores. The results showed that the implementation of formative assessment on ecosystems material was good, with an average implementation rate of 81.4%. The feedback indicator achieved the highest score of 85.2%, while the utilization of assessment results for learning improvement achieved the lowest score of 76.3%. The findings indicate that formative assessment can help teachers identify students' learning difficulties and increase students' engagement in learning about ecosystems. This study recommends strengthening the follow-up of formative assessment results so that learning objectives in the Independent Curriculum can be optimally achieved.

Keywords: formative assessment, ecosystem, Independent Curriculum, learning evaluation, junior high school.

INTRODUCTION

The Independent Curriculum positions assessment as an integral part of the learning process, aiming to support the continuous development of student competencies (Utami et al., 2023). One form of assessment that is a primary focus in this curriculum is formative assessment (Darmawan et al., 2024). Formative assessment serves to obtain information on student learning progress throughout the learning process so that teachers can make appropriate and continuous improvements to teaching strategies (Andri et al., 2024). In junior high school science lessons, ecosystems are a topic that demands conceptual understanding and critical thinking skills (Solihin & Dedah, 2022). This material covers the relationships between biotic and abiotic components, food chains, food webs, energy flow, and environmental balance (Karnadi et al., 2021). The complexity of these concepts often leads to students experiencing misconceptions if the learning process is not accompanied by ongoing evaluation through formative assessment (Rusman et al., 2025).

The implementation of formative assessment in the Independent Curriculum requires teachers to use various assessment techniques such as observation, reflective questions, assignments, quizzes, and direct feedback (Putri & Sriyati, 2024). Through these assessments, teachers can identify student learning needs and adapt learning to suit their characteristics. Thus, formative assessment serves not only as an assessment tool but also as a means of improving the quality of learning (Angelika & RusiloDinta Nurachma, 2025). Various previous studies have shown that the implementation of formative assessment can improve learning outcomes, learning motivation, and student engagement in science learning (Pratiwi et al., 2026). However, most studies have focused on the impact of formative assessment on student learning outcomes without evaluating the quality of its implementation based on the components recommended in the Independent Curriculum. Furthermore, research specifically examining formative assessment in ecosystems at the junior high school level is still relatively limited (Sulaiman, 2023).

The research gap is evident in the limited number of studies evaluating the implementation of formative assessment based on indicators such as assessment planning, assessment implementation, feedback, student engagement, and the utilization of assessment results in learning. Some studies only measure final student learning outcomes without examining the effectiveness of the assessment system used during the learning process. The innovation of this research lies in the development of a formative assessment system evaluation model that integrates the five main components of the Independent Curriculum: planning, implementation, feedback, student participation, and learning follow-up. This approach allows for a more comprehensive evaluation of the quality of formative assessment implementation in ecosystems.

Based on this description, this research is crucial to provide an empirical overview of the quality of formative assessment implementation on ecosystems based on the Independent Curriculum in junior high schools. The research findings are expected to serve as a basis for teachers and schools to improve the effectiveness of formative assessment, thereby making science learning more meaningful and student-centered.

RESEARCH METHODS

This study used a quantitative approach with an evaluative survey method to analyze the implementation of the formative assessment system for ecosystems based on the Independent Curriculum at the junior high school (SMP) level (Sugiyono, 2018). The research design used was a quantitative descriptive study aimed at providing an overview of the level of implementation of formative assessment based on established indicators. The study was conducted in the even semester of the 2025/2026 academic year at a junior high school that has implemented the Independent Curriculum (Jonathan Sarwono, 2010).

The study subjects consisted of 72 seventh-grade students and four science teachers directly involved in the ecosystems learning process. Subjects were selected using a purposive sampling technique, considering that both teachers and students had implemented the Independent Curriculum-based learning and implemented formative assessment throughout the learning process. Data were collected through questionnaires, observations, and documentation (Sugiyono, 2017). The questionnaire was used to obtain information on students' perceptions of the implementation of formative assessment, while observation sheets were used

to assess the implementation of formative assessment by teachers during learning activities. Documentation was conducted on the learning materials, assessment instruments, and assessment results used by teachers in the ecosystems material. The research instruments were developed based on the five main indicators of formative assessment in the Independent Curriculum: assessment planning, assessment implementation, feedback, student engagement, and utilization of assessment results for follow-up learning (Ahyar et al., 2020).

Prior to use, the research instruments were validated by two science education experts and one learning evaluation expert to ensure content validity. The validation results indicated that all instruments were suitable for use, with some improvements in wording and indicator clarity. Next, the instruments were piloted in a small group to determine readability and item consistency. The data obtained were analyzed using descriptive statistics in the form of average scores and percentages. The percentage of formative assessment implementation was calculated by comparing the obtained scores to the maximum score, then converted into assessment categories. The interpretation criteria used included excellent (86–100%), good (76–85%), sufficient (60–75%), and poor ($\leq 59\%$). The results of the analysis are presented in tabular form and interpreted descriptively to describe the quality of the implementation of the formative assessment system on ecosystem material based on the Independent Curriculum in junior high schools (Firmansyah et al., 2021).

RESULTS AND DISCUSSION

Table 1. Characteristics of Research Respondents

Respondent Characteristics	Frequency (n)
Male Students	34
Female Students	38
Science Teachers	4
Total Respondents	76

Based on Table 1, the number of respondents in this study consisted of 72 students and 4 science teachers, resulting in a total of 76 respondents. The student respondents consisted of 34 male students and 38 female students from grade VII of junior high school. This respondent composition indicates that the research data was obtained from diverse sources and is relevant to the implementation of formative assessment on ecosystem material.

Table 2. Instrument Validation Results

Aspect	Percentage (%)	Category
Indicator Appropriateness	92.5	Very Valid
Language Clarity	89.7	Very Valid
Alignment with the Merdeka Curriculum	94.3	Very Valid
Average	92.2	Very Valid

Based on Table 2, the instrument validation results show that all aspects were categorized as very valid, with an average percentage of 92.2%. The Merdeka Curriculum's suitability aspect received the highest score, at 94.3%, while the language clarity aspect

received a score of 89.7%. These results indicate that the research instrument is suitable for collecting data on the implementation of formative assessments.

Table 3. Results of the Formative Assessment System Evaluation

No.	Indicator	Percentage (%)	Category
1	Assessment Planning	80.5	Good
2	Assessment Implementation	82.1	Good
3	Feedback Provision	85.2	Good
4	Student Engagement	82.9	Good
5	Utilization of Assessment Results	76.3	Good
Average		81.4	Good

Based on Table 3, the implementation of the formative assessment system on ecosystems achieved an average percentage of 81.4%, categorized as good. The feedback indicator achieved the highest score of 85.2%, while the utilization of assessment results indicator received the lowest score of 76.3%. These findings indicate that formative assessment has been implemented well, although the learning follow-up aspect still needs improvement.

Table 4. Students' Responses to Formative Assessment

Aspect	Percentage (%)
Helps in Understanding the Learning Material	84.7
Increases Learning Motivation	80.6
Helps Identify Learning Mistakes	87.1
Enhances Learning Participation	79.8
Supports Learning Reflection	81.3

Based on Table 4, the majority of students responded positively to the implementation of formative assessment in ecosystems learning. The aspect of helping students identify learning errors received the highest percentage, at 87.1%, while the aspect of increasing learning activity received the lowest percentage, at 79.8%. These results indicate that formative assessment can help students understand their weaknesses and improve their learning process.

Table 5. Results of the Observation of Teachers' Implementation of Formative Assessment

Activity	Percentage (%)	Category
Initial Assessment Before Learning	78.5	Good
Assessment During Learning	84.2	Good
Immediate Feedback	86.8	Very Good
Learning Reflection	80.1	Good
Follow-up on Assessment Results	75.4	Fair

Based on Table 5, observation results indicate that teachers' implementation of formative assessments ranged from good to very good. Direct feedback received the highest score of 86.8%, while follow-up on assessment results received the lowest score of 75.4%. These findings indicate that teachers actively implemented formative assessments throughout the learning process.

Table 6. Challenges in the Implementation of Formative Assessment

Challenge	Percentage of Teachers (%)
Limited Time Availability	75
Large Number of Students	50
Instrument Development	25
Follow-up Remedial Actions	75

Based on Table 6, the main obstacles faced by teachers in implementing formative assessments were time constraints and remedial follow-up, each reaching 75%. Furthermore, the large number of students also hindered optimal monitoring of learning progress. These results demonstrate the need for more effective learning management strategies to support the optimal implementation of formative assessments.

Based on Table 1, the number of respondents, consisting of 72 students and 4 science teachers, indicates that the research involved parties directly involved in the implementation of formative assessment on ecosystems. Teacher and student involvement is crucial because formative assessment serves not only as a tool for evaluating learning outcomes but also as a means of obtaining information about students' learning progress throughout the learning process (Nada et al., 2023). This aligns with the learning and assessment guidelines in the Independent Curriculum, which emphasize that formative assessment is used to continuously monitor student competency development and serve as a basis for learning improvement. The instrument validation results in Table 2 show an average percentage of 92.2%, categorized as highly valid. This high level of validity indicates that the instrument used aligns with the formative assessment indicators in the Independent Curriculum, including planning, implementation, feedback, student engagement, and learning follow-up. Valid instruments are crucial because the quality of research data is influenced by the accuracy of the measurement tools used to evaluate the assessment process (Puspita A. F et al., 2024). These findings support research stating that the development of assessment instruments must align with learning outcomes and the characteristics of the Independent Curriculum to provide accurate information regarding student progress (Khafidin et al., 2022).

Table 3 shows that the implementation of the formative assessment system achieved an average score of 81.4%, categorized as good. These results indicate that teachers have implemented formative assessment quite optimally in teaching ecosystems. Good implementation of formative assessment allows teachers to obtain information regarding students' levels of understanding, allowing them to tailor learning to their needs. These findings align with research by Poerwanti et al. (2024), which states that formative assessment in science learning plays a crucial role in improving the quality of learning because it helps teachers continuously monitor student learning progress.

The feedback indicator received the highest score, at 85.2%. This finding indicates that teachers responded directly to student work throughout the learning process. Feedback is a key component of formative assessment because it helps students understand errors, refine learning strategies, and improve academic achievement. The results of this study are supported by Dewi (2024), who explained that providing feedback in formative assessments has a significant effect on improving student learning outcomes in the implementation of the Independent Curriculum (Ayu Lestari et al., 2025).

Based on Table 4, student responses to formative assessments were positive, with the highest percentage at 87.1% for the aspect of helping students identify learning errors. These results indicate that students felt formative assessments provided an opportunity to understand their weaknesses before the final evaluation. This condition aligns with the principles of formative assessment, which position students as active participants in the learning process through reflection and continuous improvement. Research by Puspita A. F et al., (2024) also showed that formative assessments in the Independent Curriculum (Curriculum Merdeka) can increase student learning awareness because students receive clear information about their competency development.

Table 5 shows that the implementation of formative assessments by teachers ranged from good to very good. Providing direct feedback received the highest score of 86.8%, while following up on assessment results received the lowest score of 75.4%. These results indicate that teachers actively conduct evaluations during learning, but not all teachers are able to develop remedial and enrichment programs based on assessment results. Similar findings were found in the research of Fahlevi, (2022) stated that one of the weaknesses in implementing formative assessment in junior high schools is the suboptimal follow-up of assessment results as a basis for improving learning.

Based on Table 6, the biggest obstacles faced by teachers were limited time and the implementation of remedial follow-up, each reaching 75%. The large number of students makes it difficult for teachers to provide individual feedback and monitor learning progress comprehensively. This condition aligns with the research findings of Kusumawardani and Santoso, which showed that limited learning time and administrative burdens are the main obstacles to implementing formative assessment in science learning. Furthermore, recent research also indicates that teachers still need training on assessment design and strategies for following up assessment results in the Independent Curriculum.

Overall, the research results indicate that the formative assessment system for ecosystems material has supported the implementation of the Independent Curriculum in junior high schools. This success is evident in the high level of student engagement, the effectiveness of feedback, and the assessment's ability to help teachers identify students' learning needs. However, the follow-up aspect of assessment results still requires strengthening through remedial planning, enrichment, and the use of more varied assessment strategies. This finding reinforces the findings of various studies from 2024–2026, which stated that the success of formative assessment is determined not only by the implementation of the assessment but also by the teacher's ability to utilize the assessment results as a basis for making ongoing learning decisions.

CONCLUSION

Based on the research results, the implementation of the formative assessment system for ecosystems material based on the Independent Curriculum in junior high schools is in the good category with an average implementation rate of 81.4%. The aspects of providing feedback and student engagement show high achievement, thus supporting a more active and learner-centered learning process. Student responses to formative assessment are also considered positive because it helps them understand the material, recognize learning errors, and increase motivation in participating in science lessons. However, the utilization of assessment results for follow-up learning, such as remedial and enrichment activities, still needs to be improved so that the function of formative assessment in supporting student competency achievement can be implemented optimally in accordance with the principles of the Independent Curriculum.

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