

Science Teachers' Strategies for Differentiated Assessment for Students with Basic Literacy Difficulties

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Abstract

The diversity of students' literacy abilities poses a challenge to implementing science assessments, particularly for students with basic literacy difficulties. The predominance of written assessments may not accurately reflect students' competencies; therefore, differentiated assessment is needed to accommodate students' learning needs and characteristics. This study aimed to describe science teachers' strategies for implementing differentiated assessment for students with basic literacy difficulties at SMP Negeri 1 Larangan. The study employed a qualitative case study design. Data were collected through semi-structured interviews, non-participant observations, and document analysis. Data were analyzed using the interactive analysis model of Miles, Huberman, and Saldana, which includes data reduction, data display, and conclusion drawing. The findings revealed that the teachers' strategies consisted of three stages: planning, implementation, and assessment and evaluation. During the planning stage, teachers identified students' initial abilities through diagnostic assessment. During the implementation stage, teachers employed various assessment methods, including oral assessments, observations, performance assessments, simplified instructions, and visual media tailored to students' needs. During the evaluation stage, teachers used the assessment results to provide feedback and improve subsequent learning. These strategies supported the implementation of a more equitable, adaptive, and student-centered assessment process for learners with basic literacy difficulties.

Keywords: differentiated assessment; science teacher; basic literacy difficulties; teacher strategies; case study.

1 INTRODUCTION

Science education at the junior secondary school level aims not only to develop students' conceptual understanding but also to foster science process skills, critical thinking, problem-solving abilities, and scientific attitudes. Therefore, assessment is an integral component of the teaching and learning process, providing information on students' learning achievement and serving as a basis for teachers to design appropriate instructional follow-up. In line with the implementation of the Merdeka Curriculum, assessment is expected not only to measure learning outcomes but also to support the learning process through continuous feedback that accommodates students' individual learning needs. Consequently, assessment practices should address the diversity of students' characteristics, including differences in learning readiness, academic abilities, interests, and learning profiles. In the context of science education, assessment should not rely solely on written tests. It should also incorporate various assessment methods, such as observation, performance assessment, oral assessment, project-based assessment, and portfolios, to comprehensively evaluate students' knowledge, science process skills, and scientific attitudes (Jufrida et al., 2019). The use of diverse assessment approaches enables all students to demonstrate their competencies in ways that align with their individual characteristics and learning needs. Therefore, assessment plays a crucial role in promoting adaptive, inclusive, and student-centered science learning while supporting the achievement of meaningful learning outcomes (Herwina, 2021; Tomlinson, 2017).

Although assessment in the Merdeka Curriculum emphasizes flexibility and responsiveness to students' learning needs, its implementation in schools still faces challenges, particularly for students with basic literacy difficulties. At SMP Negeri 1 Larangan, science assessment remains largely text-based, relying on written tests and laboratory reports that have not fully accommodated the needs of students who struggle with reading and writing. Consequently, some students have difficulty understanding assessment instructions and expressing their conceptual understanding of science in writing, even though they can demonstrate their knowledge through practical activities, observations, or oral explanations. As a result, assessment is constrained by several factors, including teachers' limited understanding of differentiated assessment concepts, the lack of alternative assessment methods, and the limited availability of assessment instruments tailored to students' diverse learning needs (Ariani et al., 2024). Nevertheless, every student has the right to receive a fair and equitable assessment that reflects their individual learning characteristics (Zahro et al., 2025). Therefore, differentiated assessment has been recognized as an approach that provides equal opportunities for all students to demonstrate their competencies through diverse and adaptive assessment methods (Tomlinson, 2017; Widiastuti et al., 2026). In light of these conditions, investigating science teachers' strategies for implementing differentiated assessment is essential to provide empirical evidence of how teachers design and implement assessment practices that accommodate students with basic literacy difficulties while promoting more inclusive assessment practices in science education.

Previous studies have extensively discussed differentiated assessment as an instructional approach for addressing students' diverse learning needs within the Merdeka Curriculum. Existing research has primarily focused on the general implementation of differentiated assessment, teachers' perceptions, its influence on student learning outcomes, and the challenges encountered during its application (Ariani et al., 2024; Tomlinson, 2017; Widiastuti et al., 2026). However, limited attention has been given to the implementation of differentiated assessment in science education, particularly for students with basic literacy difficulties. Furthermore, previous studies have generally examined differentiated assessment across heterogeneous classrooms without specifically investigating how science teachers adapt assessment practices for students who experience difficulties in reading and writing. As a result, there remains insufficient empirical evidence regarding the strategies employed by science teachers to design, implement, and evaluate differentiated assessment that accommodates the learning characteristics of these students. This study addresses this gap by focusing specifically on science teachers' strategies for implementing differentiated assessment through three interconnected stages: assessment planning, implementation, and evaluation, using an in-depth qualitative case study approach. By exploring teachers' practical strategies within an authentic classroom context, this study provides a more comprehensive understanding of how differentiated assessment can be adapted to support students with basic literacy difficulties and contributes empirical evidence to strengthen this understanding.

Addressing the identified research gap, this study aims to comprehensively describe the strategies science teachers use to implement differentiated assessment for students with basic literacy difficulties at SMP Negeri 1 Larangan. The study focuses on three key dimensions of differentiated assessment strategies: assessment planning, implementation, and evaluation. During the planning stage, the study examines how teachers identify students' learning readiness and literacy characteristics through diagnostic assessment and use this information to design appropriate assessment activities. The implementation stage focuses on the assessment methods and adaptations teachers employ, including oral and performance assessments, observation, and the use of visual media or simplified instructions to accommodate students with basic literacy difficulties. The evaluation stage investigates how teachers use assessment results to provide feedback, reflect on students' learning progress, and improve subsequent assessment practices. These dimensions align with the principles of differentiated assessment, which emphasize adapting assessment processes to students' readiness, interests, and learning profiles (Herwina, 2021; Tomlinson, 2017). The scope of this study is limited to the implementation of differentiated assessment in science learning at SMP Negeri 1 Larangan and specifically involves science teachers and students with basic literacy difficulties. Therefore, the findings are intended to provide an in-depth contextual understanding of differentiated assessment practices rather than to generate findings that are statistically generalizable to other educational settings.

2 METHODOLOGY

This study employed a qualitative approach using a descriptive case study design to gain an in-depth understanding of science teachers' strategies for implementing differentiated assessment for students with basic literacy difficulties at SMP Negeri 1 Larangan. A qualitative approach was selected because the study aimed to explore meaning, processes, and real classroom practices rather than to test hypotheses or examine statistical relationships among variables. Qualitative research enables researchers to investigate educational phenomena within their natural settings and interpret participants' experiences from their own perspectives (Creswell, 2011). This approach was considered appropriate because the implementation of differentiated assessment is strongly influenced by students' characteristics, teachers' pedagogical decisions, and the classroom context, all of which require comprehensive, contextual exploration. Furthermore, this study adopted a descriptive case study design because it focused on a single bounded case, namely the implementation of differentiated assessment by science teachers for students with basic literacy difficulties in one junior secondary school. According to Creswell, (2011), a case study is an in-depth exploration of a bounded system through multiple sources of information, whereas Yazan, (2015) emphasizes that case studies facilitate a comprehensive understanding of complex educational phenomena within real-life contexts. Therefore, the combination of a qualitative approach and a case study design enabled the researcher to comprehensively examine assessment planning, implementation, and evaluation through interviews, classroom observations, and document analysis, thereby providing an authentic description of differentiated assessment practices in science learning.

2.1 Research Participants

The participants in this study were selected using purposive sampling because qualitative case study research prioritizes the relevance and richness of information over the number of participants. Purposive sampling enables researchers to select participants with direct experience, knowledge, and involvement in the phenomenon under investigation (Ames et al., 2019). This approach was appropriate because the study sought an in-depth understanding of science teachers' strategies for implementing differentiated assessment for students with basic literacy difficulties rather than statistical representativeness. Before participant selection, a preliminary observation and informal interviews with teachers were conducted to identify students experiencing basic literacy difficulties, including challenges with reading, understanding written instructions, writing responses, and performing basic arithmetic during science learning activities. The study involved five participants, including two science teachers as primary informants and three seventh-grade students with basic literacy difficulties as supporting informants. The two teachers taught science in Classes 7A, 7G, and 7H and were directly responsible for planning, implementing, and evaluating differentiated assessment in their classrooms. The three students were selected from Classes 7A, 7G, and 7H based on the initial identification results and recommendations from the science teachers, who had extensive knowledge of the students' learning characteristics. Including both teachers and students enabled the researcher to obtain multiple perspectives on differentiated assessment practices and strengthened the credibility of the findings through source triangulation. The selected participants represented the specific context of differentiated assessment implementation in science learning at SMP Negeri 1 Larangan and provided comprehensive information relevant to the objectives of this study.

2.2 Instruments and Research Procedures

The primary research instruments in this study were the researcher, interview guidelines, observation sheets, and documentation guides. In qualitative research, the researcher serves as the key instrument for collecting, interpreting, and analyzing data in its natural context (Creswell, 2011). To support systematic data collection, semi-structured interview guidelines were developed based on the research objectives and the dimensions of differentiated assessment, namely assessment planning, implementation, and evaluation. Observation sheets were designed to document teachers' assessment practices, classroom interactions, and assessment adaptations for students with basic literacy difficulties. Documentation guides were used to examine teaching modules, assessment instruments, scoring rubrics, students' work, and other relevant educational

documents. The credibility of the instruments was established through expert review and alignment with the research focus, while data trustworthiness was strengthened through methodological and source triangulation across interviews, observations, and documentation.

The research procedure consisted of three stages: pre-research, research implementation, and post-research. During the pre-research stage, the researcher conducted a literature review, prepared the research proposal, obtained research permission, conducted preliminary observations, and developed the research instruments. During the implementation stage, data were collected through semi-structured interviews, non-participant observations, and document analysis at SMP Negeri 1 Larangan. The final stage involved organizing, transcribing, analyzing, and interpreting the collected data to generate findings on science teachers' strategies for implementing differentiated assessment for students with basic literacy difficulties.

2.3 Data Analysis

The collected data were analyzed using the interactive model of Miles, Huberman, and Saldana, which is widely used in qualitative research to support a systematic, iterative analysis. This model was selected because it enables researchers to analyze data continuously throughout the research process rather than only after data collection is complete. According to Saldaña, (2017), qualitative data analysis consists of three interrelated components: data reduction, data display, and conclusion drawing and verification.

The first stage, data reduction, involved selecting, simplifying, coding, and organizing interview transcripts, observation notes, and documentation records relevant to the research focus. Coding identified patterns and themes related to differentiated assessment planning, implementation, and evaluation. The second stage, data display, involved organizing the reduced data into descriptive narratives, matrices, and thematic categories to facilitate interpretation and comparison across data sources. The final stage consisted of drawing conclusions and verifying findings through continuous comparison of evidence from interviews, observations, and documentation. To ensure the trustworthiness of the findings, triangulation techniques were employed by comparing information from multiple participants and data sources. This analytical process enabled the researcher to develop a comprehensive understanding of science teachers' strategies for implementing differentiated assessment for students with basic literacy difficulties and to interpret the findings within the context of science learning at SMP Negeri 1 Larangan.

3. RESULTS

3.1 Assessment Planning Strategies

The findings indicate that assessment planning was the initial and fundamental stage in implementing differentiated assessment for students with basic literacy difficulties. Data from semi-structured interviews, classroom observations, and document analysis revealed that science teachers at SMP Negeri 1 Larangan began the assessment process by identifying students' learning readiness and literacy characteristics through a diagnostic assessment conducted at the start of the learning period. The diagnostic assessment enabled teachers to identify students who had difficulty reading, understanding written instructions, expressing ideas in writing, and performing basic numeracy tasks. These initial findings served as the basis for determining appropriate assessment strategies without altering the intended learning objectives or competency standards. In addition to diagnostic assessment, teachers reviewed students' classroom participation, previous learning records, and daily learning performance to gain a more comprehensive understanding of individual learning characteristics. The collected information was then used to design assessment activities accessible to students with basic literacy difficulties while maintaining the same competency indicators as those applied to other students. The planning process also involved preparing assessment instruments with flexible formats, selecting suitable assessment techniques, and anticipating possible learning barriers before classroom implementation. Consequently, assessment planning was not merely an administrative activity but a systematic process that enabled teachers to provide equitable assessment opportunities for all learners. These findings demonstrate that differentiated assessment began with a comprehensive

understanding of students' learning needs, allowing teachers to design assessment activities that accurately measured science competencies rather than students' literacy limitations.

The findings emphasize that careful assessment planning is essential to implementing differentiated assessment effectively. According to Tomlinson, (2017), differentiated assessment should be grounded in teachers' understanding of students' readiness, interests, and learning profiles so that assessment activities can accommodate learner diversity while maintaining common learning goals. Similarly, Herwina, (2021) argues that assessment planning should be responsive to students' individual characteristics to ensure that assessment reflects actual competence rather than external learning barriers. The present findings also support Ariani et al., (2024), who reported that differentiated assessment requires teachers to identify students' characteristics before selecting appropriate assessment techniques and instruments. However, unlike previous studies that primarily discussed differentiated assessment in a general educational context, this study specifically demonstrates how diagnostic assessment is used to identify students with basic literacy difficulties within science classrooms. The results indicate that teachers considered literacy barriers during assessment planning without modifying competency standards, thereby ensuring that assessment remained both equitable and academically rigorous. This finding extends previous literature by illustrating the practical implementation of differentiated assessment in a real classroom context involving students with basic literacy difficulties. Nevertheless, this study was conducted in a single junior secondary school with a limited number of participants. Therefore, differences in school policies, teacher experience, and student characteristics may influence the implementation of similar planning strategies in other educational settings. Future studies involving multiple schools and broader participant groups are recommended to strengthen the transferability of these findings while enriching empirical evidence regarding differentiated assessment practices in science education.

3.2 Assessment Adaptation Strategies

The findings revealed that science teachers implemented differentiated assessment by adapting assessment procedures to accommodate students with basic literacy difficulties while maintaining the same learning objectives and competency standards. Based on interviews, classroom observations, and document analysis, teachers simplified the language used in assessment questions by replacing complex scientific terms with more familiar vocabulary and breaking lengthy instructions into shorter, clearer steps. When students had difficulty understanding written instructions, teachers provided additional oral explanations to ensure that assessment tasks were interpreted correctly. Furthermore, teachers adapted the assessment format by allowing students to demonstrate their understanding through various response modes. Rather than requiring all students to complete written responses, students with basic literacy difficulties were permitted to answer orally, produce simple drawings, or demonstrate scientific concepts through practical activities. These adaptations enabled teachers to evaluate students' conceptual understanding without being constrained by their reading and writing limitations. Classroom observations also indicated that teachers integrated visual media, including pictures, presentation slides, and illustrations, to support students in comprehending scientific concepts and assessment instructions. The use of multiple assessment formats and visual representations created a more accessible assessment environment while preserving the intended learning outcomes. Overall, these findings demonstrate that differentiated assessment was implemented through flexible adaptations that reduced language barriers without modifying the expected competencies, allowing students with basic literacy difficulties to participate more actively and demonstrate their understanding of science concepts.

The findings indicate that assessment adaptation is an essential component of differentiated assessment because it enables teachers to evaluate students' competencies without allowing literacy limitations to obscure their conceptual understanding. These results support Tomlinson, (2017) argument that differentiated assessment should provide multiple pathways for students to demonstrate learning according to their readiness and learning profiles. Likewise, Ariani et al., (2024) emphasized that differentiated assessment in science education should involve adjustments to assessment techniques, task presentation, and response formats while maintaining identical learning objectives. The present findings are also consistent with Hackemann et al., (2022), who

reported that simplifying scientific language and providing visual representations significantly improve students' comprehension of science tasks, particularly for learners experiencing language-related difficulties. Furthermore, Wulandari et al., (2023) found that offering alternative assessment formats, including oral responses and performance-based assessment, allows teachers to obtain a more authentic representation of students' conceptual achievement. Unlike previous studies that generally examined differentiated assessment across diverse classrooms, this study specifically demonstrates how science teachers adapt assessment for students with basic literacy difficulties by integrating simplified language, flexible response formats, and visual media. Nevertheless, these findings should be interpreted within the context of a single case study involving one junior secondary school. Consequently, differences in school policies, teacher expertise, and student characteristics may influence the implementation of similar assessment adaptations in other educational settings. Despite this limitation, the study provides practical evidence that flexible assessment adaptations can promote equitable and inclusive assessment practices in science education without compromising academic standards.

3.3 Assessment Supports Strategies

The findings revealed that, in addition to adapting assessment formats, science teachers provided various forms of instructional support during assessments to ensure that students with basic literacy difficulties could participate meaningfully. Data from interviews, classroom observations, and document analysis indicated that teachers offered individual guidance whenever students had difficulty understanding assessment instructions or completing assigned tasks. Rather than providing answers, teachers clarified unfamiliar vocabulary, explained assessment procedures, and guided students through each stage of the assessment process to encourage independent task completion. Classroom observations further showed that teachers continuously monitored students' progress and provided assistance only when necessary, allowing students to demonstrate their understanding independently while minimizing frustration. In addition to teacher guidance, peer support was used to facilitate students' participation during assessment activities. Teachers encouraged classmates to explain task procedures or clarify instructions without revealing the correct answers, enabling students with basic literacy difficulties to complete assessment tasks more confidently while maintaining academic integrity. Another important support strategy identified in this study was the provision of extended assessment time. Teachers recognized that these students required additional time to read questions, understand instructions, organize their thoughts, and formulate responses. Consequently, flexible time allocation was provided to ensure that assessment outcomes reflected students' science competencies rather than their reading and writing speed. Collectively, these support strategies demonstrate that differentiated assessment extends beyond modifying assessment instruments to creating an inclusive assessment environment that enables students with basic literacy difficulties to participate equitably and demonstrate their actual learning achievements.

The findings demonstrate that instructional support during assessment is an essential element of differentiated assessment because it enables students with diverse learning needs to participate without compromising assessment integrity. Providing individual guidance reflects instructional scaffolding, in which teachers offer temporary assistance that gradually decreases as students develop greater independence. This finding aligns with Putri et al., (2023), who reported that scaffolding strategies, including peer tutoring, help students complete learning tasks while maintaining learner autonomy. Similarly, Hoe et al., (2024) emphasized that peer-assisted assessment promotes collaborative learning and helps students better understand assessment requirements without diminishing individual accountability. Providing extended assessment time also aligns with Willis et al., (2023), who argued that accessible assessment should include reasonable accommodations, such as additional time and simplified procedures, to ensure that students' competencies are measured fairly. Furthermore, Bartolo et al., (2023) suggested that assessment accommodations should be viewed as efforts to achieve educational equity rather than as preferential treatment. Unlike previous studies, which often examined these accommodations separately, the present study demonstrates how teacher guidance, peer support, and extended time function as complementary strategies within differentiated assessment for science learning. Nevertheless, the implementation of these strategies depended considerably on classroom conditions, teacher workload, and the number of students requiring support. Consequently, the

effectiveness of assessment support strategies may vary across different educational contexts. Despite these limitations, the findings provide practical evidence that adaptive support during assessment contributes to more inclusive, equitable, and meaningful science assessment practices for students with basic literacy difficulties.

3.4 Assessment Evaluation Strategies

The findings indicated that assessment was conducted as a continuous process to monitor students' learning progress and improve subsequent instruction. Based on interviews, classroom observations, and document analysis, science teachers not only assigned scores after assessment activities but also analyzed students' performance to identify learning difficulties and determine appropriate follow-up actions. Students with basic literacy difficulties received constructive feedback through oral explanations and individual discussions to help them understand their strengths and areas for improvement. When students had not achieved the expected learning objectives, teachers provided remedial activities using simpler learning materials, additional practice, and more individualized guidance. The evaluation results were also used to revise assessment strategies and instructional approaches in subsequent lessons. These findings demonstrate that assessment served not only as a tool for measuring learning outcomes but also as a means of supporting students' continuous learning and ensuring that differentiated assessment effectively addressed their individual learning needs.

The findings highlight that evaluation is an integral component of differentiated assessment because it provides meaningful information to improve both student learning and instructional practices. This finding aligns with Tomlinson, Carol A., (2017), who emphasizes that assessment should be used continuously to inform instructional decisions rather than merely to measure student achievement. Likewise, Brown et al., (2023) argue that effective feedback enables students to recognize their learning progress and supports teachers in designing appropriate follow-up instruction. The provision of remedial instruction and individualized feedback also reflects the formative function of assessment, which encourages continuous improvement rather than focusing solely on final achievement. Compared with previous studies, this research demonstrates that evaluation in differentiated assessment extends beyond grading by integrating feedback, remedial instruction, and instructional reflection to accommodate students with basic literacy difficulties. However, the implementation of these evaluation strategies depends on teachers' available time and classroom conditions, which may limit their application in larger classes. Despite this limitation, the findings provide practical evidence that continuous evaluation and individualized feedback contribute to more inclusive and equitable science assessment practices.

4. CONCLUSIONS

This study concludes that implementing differentiated assessment for students with basic literacy difficulties in science learning requires comprehensive strategies that encompass assessment planning, adaptation, instructional support, and continuous evaluation. Science teachers at SMP Negeri 1 Larangan implemented differentiated assessment by first identifying students' learning readiness and literacy characteristics through diagnostic assessment, which served as the foundation for designing appropriate assessment activities. During implementation, teachers adapted assessment procedures by simplifying language and instructions, providing flexible response formats, and using visual media without altering the intended learning objectives or competency standards. Furthermore, teachers supported students throughout the assessment process by providing individual guidance, encouraging peer support, and allowing additional time when necessary. Assessment evaluation was conducted continuously through constructive feedback, remedial learning, and instructional reflection to improve subsequent teaching and learning practices. These strategies enabled teachers to assess students' science competencies more fairly while minimizing the influence of literacy barriers on assessment outcomes.

The findings underscore the importance of differentiated assessment as an inclusive approach that accommodates learner diversity while upholding academic standards in science education. This study provides empirical evidence on the practical implementation of differentiated assessment for students with basic literacy difficulties, particularly in junior secondary science classrooms. The

findings may serve as a practical reference for teachers, school leaders, and policymakers as they develop more equitable and responsive assessment practices. However, this study was limited to a single case study at one junior secondary school with a relatively small number of participants. Therefore, future research is recommended to involve multiple schools, broader participant groups, and diverse educational contexts to examine the implementation of differentiated assessment more comprehensively. Further studies may also investigate the effectiveness of differentiated assessment in improving students' learning achievement, scientific literacy, and learning motivation through mixed-methods or quantitative research designs.

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