



DIFFERENTIATED AND ENJOYABLE LEARNING TO FACILITATE MATHEMATICS SUBJECT ASSESSMENT

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ABSTRACT

This research aims to find problems from the results of educators' observations regarding anxiety in determining approaches/models/methods that are appropriate for differentiated learning. This article was written with the flow of finding a problem, getting relevant data, discussing it in detail, and then getting the best conclusions and suggestions for the reader. Differentiated learning is divided into 3 stages, namely Content, Process and Product. Based on its function, assessment is divided into 3, namely Formative, Summative, Initial Assessment. Learning models/methods that can be used as references for making differentiated learning plans are Cooperative Learning, Project Learning, Task Based Learning, Problem Based Learning, Flipped Classroom, Online Learning, Learning Stations.

Keywords: *Differentiated Learning, Assessment, Mathematics*

INTRODUCTION

Learning is an activity undertaken by students to acquire new knowledge, skills, understanding, or attitudes through study, experience, or their surroundings (Mashuri, 2021). It is a complex process that occurs throughout an individual's life. Learning encompasses observable changes in behavior, knowledge, skills, or attitudes (Sasomo & Rahmawati, 2022). The results of learning can be seen in actions, new abilities, or changes in attitude. Students learn through interaction with various sources of information, including books, teachers, peers, direct experiences, technology, and their environment. Learning is not merely passive reception of information but involves an active process where individuals are cognitively, emotionally, and physically engaged. It can involve problem-solving, reflection, or discussion. Learning involves the individual's ability to integrate new knowledge or skills into previously acquired knowledge or skills. This integration helps in understanding the relationships between different concepts.

Differentiated learning is planned according to the diverse learning needs of students in a classroom with varying levels of understanding, interests, or learning styles (Nefianthi et al., 2023). Differentiated learning aims to create an inclusive learning environment where each student can



optimally reach their potential. Teachers understand the needs and characteristics of individual students, including their ability levels, interests, learning styles, and special needs. This involves collecting relevant data and information. Teachers create a flexible learning environment, allowing for adjustments in materials, teaching methods, and assessments according to student needs.

Students can be grouped based on their abilities or interests. These groups can then receive assignments or levels of difficulty appropriate to their abilities. Teachers provide various learning resources and materials, including books, videos, games, or projects, so students can choose the approach that best suits their learning style and give students options to assess their understanding, such as through projects, presentations, oral exams, or other choices. Teachers can provide individual attention to students who need it, whether through extra guidance, individual learning plans, or other support.

The curriculum is designed as best as possible to meet the students' needs, including removing or adding material, changing the level of difficulty, or different teaching approaches. Differentiated learning helps create a better learning atmosphere for students, motivates high learning, and allows each individual to develop according to their potential. The implementation of an independent curriculum can vary depending on the local educational context, national policies, and the needs of students and the local community. For more specific information, it is recommended to refer to official guidelines and policies.

To make learning mathematics more interesting, teachers can try approaches that focus on understanding concepts, integrating practical applications, using interactive teaching methods, and encouraging student participation in activities relevant to real-world contexts (Sasomo, 2021). Additionally, creating a supportive and motivating classroom environment can help change students' perceptions of mathematics. Therefore, a literature review on approaches or models or methods of learning suitable for an independent curriculum with differentiated learning is necessary.

Educators aiming to implement differentiated learning by combining models/methods appropriate to students' characteristics face internal challenges. Therefore, this research aims to provide an overview of designing learning using approaches or models or methods of learning that fit differentiated learning. The goal is to achieve learning objectives and create a more meaningful and enjoyable learning environment.

RESEARCH METHOD

This research design is descriptive, identifying issues based on educators' observations regarding their concerns in determining appropriate approaches/models/methods for differentiated learning. The researcher then seeks relevant data, discusses it in detail, and derives the best conclusions and recommendations for the readers. The data collection technique employs a Traditional Review method,

gathering data through relevant literature reviews, including books and articles published in recent years.

The obtained data is presented in detail and analyzed comprehensively according to the problem topic concerning the need for appropriate approaches/models/methods for differentiated learning. Thus, the solutions to the issues will be clearly and thoroughly described. Subsequently, conclusions from this research can be utilized by relevant parties. Recommendations are provided for teachers who will conduct learning and for researchers who will examine its implementation.

RESULTS AND DISCUSSION

1. Differentiated Learning

Learning is a process where an individual acquires new knowledge, skills, understanding, or experiences through study, practice, or experience. It involves the reception of new information and changes in one's knowledge or behavior. Learning is a process in which individuals gain knowledge, skills, understanding, or behavioral changes through interaction with information or experiences. This can involve various methods, including formal education in schools or educational institutions, informal learning through daily experiences, and self-directed learning through reading and observing. Learning is an effort made by someone to achieve a behavioral change to reach an educational goal, relying on the learning and teaching process in the school, family, or community environment.

Here are the principles of learning that can guide teachers in their teaching:

1. The Learning Process Encourages the Development of Students' Competencies and Character
Holistic learning is an educational approach emphasizing the development of the whole individual, not just intellectual aspects but also emotional, social, physical, and spiritual (Sunusi, 2020). This approach involves integrating knowledge and skills through comprehensive learning experiences, promoting deeper understanding, and relating concepts to everyday life. The following are characteristics and applications of holistic learning:
 - a. Integration of Material: Learning is conducted by combining several disciplines with everyday contexts. For example, cycling involves sports, physics, mathematics, and biology.
 - b. Development of the Whole Individual: The focus is not only on academic development but also on non-academic aspects such as social skills, emotional skills, and creativity. For instance, in solving math problems, students are trained in social-emotional skills and encouraged to show creativity in constructing answers.



- c. **Practical Experience:** Holistic learning emphasizes direct and practical experiences through project-based problem-solving activities, field trips, and other practical activities. This can be done by engaging students in case studies with real objects.
 - d. **Appreciation of Diversity:** Holistic learning recognizes individual diversity and respects various learning styles. This happens when a child solves a math problem with a different systematic approach but arrives at the same answer.
 - e. **Student Empowerment:** Students are empowered to take an active role in the learning process by encouraging them to ask questions, express opinions, and take responsibility for their learning.
 - f. **Involvement of Parents and Community:** Holistic learning involves parents and the community in supporting students' development. Holistic learning aims to create more empowered learners, critical thinkers, and individuals capable of facing everyday challenges.
2. **Future-Oriented Learning** This type of learning prepares students to tackle all challenges and emphasizes sustainability (Kaha et al., 2020). Sustainable education aims to develop a deep understanding of global, environmental, social, and economic sustainability issues and encourages positive actions in addressing these problems. This approach connects education with sustainability, helping students become positive change agents in a complex global society.
3. **Lifelong Learning** Lifelong learning refers to the concept that education and learning are not confined to school or a certain stage in life (Sudrajat & Hariati, 2021). The importance of lifelong learning is increasingly recognized in a constantly changing and evolving society. The ability to continue learning is key to remaining relevant and successful in various fields of life.
4. **Learning Designed to Be Meaningful and Enjoyable** Meaningful and enjoyable learning is an approach designed to enhance understanding, information retention, and student engagement (Dewi, 2021). When learning is considered meaningful, students are more likely to understand concepts deeply and relate them to their personal experiences. Meanwhile, enjoyable learning experiences can boost motivation, participation, and creativity. Active student involvement, providing meaningful context, and creating a fun atmosphere can improve the effectiveness of learning and build students' interest in new knowledge.
5. **Relevant Learning** Relevant learning is an approach specifically designed to create strong connections between learning material and students' daily lives and experiences (Ghufron et al., 2017). The goal is for students to see the significance and practical application of what they learn, making learning more meaningful and relevant to them. By creating strong connections

between learning material and students' real lives, learning becomes more meaningful, relevant, and has a greater impact on their development.

Differentiated learning is designed to meet children's needs to learn according to their developmental milestones (Nefianthi et al., 2023). The process of teachers' thinking in planning differentiated learning and assessment includes:

1. Understanding Learning Outcomes (CP) Learning Outcomes (CP) are benchmarks for students' achievements in learning at each phase. CP is provided by the government to be used according to the child's developmental phase without the need for schools to create their own, and it is available on the website.
2. Formulating Learning Objectives (TP) Writing TP consists of two important elements: competencies and material. Competencies are the skills demonstrated by students. The material is the subject matter that will be discussed in each lesson. Formulating learning objectives considers children's developmental pace, students' characteristics, learning needs, and environmental conditions and involves industry partners for vocational schools.
3. Developing Learning Objective Paths (ATP) from Learning Objectives (TP) Teachers can develop ATP by deriving from TP that aligns with CP, innovating from existing examples, and using ATP provided by the government. ATP is structured as a sequence that is systematic and logical from the beginning to the end of the phase. Principles for structuring ATP include moving from experience to imagination, simple to complex, general to specific content, hierarchical ordering, procedural ordering, and scaffolding (support).
4. Planning Learning and Assessment Learning plans are structured as guidelines for teachers to conduct classroom instruction according to the determined TP. Assessments function as tools to monitor and improve the learning process and evidence of achieving the TP set in the learning plan. This learning plan can be in the form of a lesson plan (RPP) or a teaching module. If teachers use a teaching module, they do not need to create an RPP because the components in the teaching module include or are more comprehensive than those in the RPP. Below is a comparison of the minimum components in RPP and the Teaching Module presented in Table 1.

Table 1. Minimum Components in RPP and Teaching Modules

Minimum Components	
RPP	Teaching Modules
❖ Learning Objectives (TP)	❖ Learning Objectives (TP)
❖ Steps or Learning Activities	❖ Steps or Learning Activities
❖ Assessment plans at the beginning and end of learning to	❖ Assessment plan at the beginning of learning along with the instruments and assessment methods.

check the achievement of learning objectives (TP)	❖ Assessment plan at the end of learning to check the achievement of the learning objectives, along with the instruments and assessment methods.
	❖ Learning media used

In Table 1, the Minimum Components in Lesson Plans and Teaching Modules emphasize that all parts of the lesson plan are included in the teaching module. The teaching module is equipped with instruments and assessment methods to evaluate the achievement of the learning objectives (TP) and the media used for learning.

Differentiated instruction is divided into three stages that must be carried out by a teacher when teaching children in class.

1. Differentiated content or material to be delivered.

Teachers are required to create a lesson plan that meets the needs of the students. This lesson plan may include good models/methods or strategies so that students who are not yet proficient, moderately proficient, and very proficient can be well facilitated.

2. Differentiated process or way of delivering the material.

Students with a basic understanding of the material should receive extra assistance, while those with a moderate understanding can be given material stimulation followed by independent tasks or practice. Students with a high level of understanding can be given thought-provoking questions and then assignments.

3. Differentiated product or the real outcome/action of learning.

For example, the real outcome/action of learning can be seen in students with a basic understanding of the material, who can engage in interactive discussions with their peers. Students with a moderate understanding of the material can explain the steps for solving a problem to find a solution. Students with a high understanding of the material can innovate to find the best way to solve the problems they face.

Planning for differentiated learning requires an understanding of good models/methods or strategies. Here are some learning models/methods that can be referenced for making differentiated lesson plans:

1. Cooperative Learning This method involves collaboration among students in small groups. Students can learn from and support each other according to their skill levels and understanding.
2. Project-Based Learning This method facilitates students to investigate a particular topic or complete a research-based project. Each student can choose a topic according to their interest and skill level.
3. Task-Based Learning Teachers assign tasks with varying difficulty levels according to students' needs. Students can choose tasks that match their readiness levels.

4. Problem-Based Learning Students are presented with real problems or challenges that require solutions. Teachers can provide additional support to students who need it.
5. Flipped Classroom Learning materials are provided at home through videos or reading materials, while class time is used for discussion, problem-solving, and practice. Students can choose their own learning pace.
6. Online Learning Utilizing online learning platforms allows students to learn independently and receive additional guidance when needed. Materials can be tailored to students' readiness levels and interests.
7. Learning Stations The class is divided into small stations with different activities. Students rotate between stations to complete tasks or learn specific topics according to their needs.

Each learning model/method has its own advantages and disadvantages, and the choice depends on the students' needs, learning objectives, and classroom conditions. It is important for teachers to continually monitor students' progress and provide additional support according to their individual needs. Furthermore, the teacher's flexibility and responsiveness to students' needs are key in implementing differentiated instruction.

1. Assessment in Learning

Assessment is the process of evaluating or assessing students to determine their understanding of the material (Anggraena et al., 2017). The general objectives of conducting assessments include performance evaluation to measure the achievement of certain standards, diagnosing problems to design improvement plans, selecting certain criteria to choose someone or something, designing appropriate learning programs, and providing continuous information about development.

Assessment in teaching and learning activities is an action conducted to determine students' progress and learning achievements (Mulyana, 2022). There are five assessment principles that can serve as guidelines for teachers when conducting evaluations: integration, effectiveness, accountability, informativeness, and reflectiveness.

Assessments are carried out through various methods and tools, including tests, interviews, observations, portfolios, and peer assessments (Darwin et al., 2023). It is important to note that assessment results should reflect a holistic and accurate understanding of the condition or individual being evaluated. Assessments are often used to measure student achievement and understand their learning styles.

Below is the difference in Assessment Plans in Lesson Plans (RPP) or Teaching Modules based on their functions as shown in Table 2.

Table 2. Assessment Plans based on their functions

Formative	Summative	Summative
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<ul style="list-style-type: none"> • Conducted during the learning process • Aims to understand student development and provide quick feedback. 	<ul style="list-style-type: none"> • Conducted at the end of the learning process or after two/more learning units. • Aimed at ensuring the achievement of all learning units. 	<ul style="list-style-type: none"> • Conducted at the end/beginning of the learning process. • Aimed at identifying students' learning needs and designing instruction (in specialized educational units, this assessment is known as diagnostic assessment).
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Formative assessment refers to the assessment methods conducted during the learning process to provide feedback that can help students improve their understanding of the learning material (Taqwa et al., 2022). By providing relevant and constructive feedback, students can become more aware of their progress and have the opportunity to continuously improve their understanding and skills throughout the learning process. Unlike summative assessment, which is conducted at the end of the learning period, formative assessment is carried out continuously during the learning process.

Summative assessment can involve various forms, such as final exams, final projects, final assignments, or portfolios that reflect the understanding and skills students have acquired over a certain period (Budiono & Hatip, 2023). The purpose of summative assessment is to evaluate the extent to which students have achieved the established learning objectives. The importance of summative assessment involves not only students but also teachers, the curriculum, and the education system as a whole. Good assessment should objectively detail student achievements and provide an accurate picture of the extent to which competencies and learning objectives have been achieved.

In conducting differentiated learning, initial assessment is necessary. Initial assessment is conducted to gather initial information about material understanding and then used as a basis for planning learning (Antika et al., 2023). Initial assessment is conducted to determine students' readiness and needs for learning a designed competency and material, and helps teachers design and/or make adjustments for some students.

Assessment instruments are tools or means to obtain the latest developments in student learning progress. These instruments are made to measure knowledge, skills, attitudes, or various other aspects of learning. The following are forms of formative and summative assessment instruments:

1. Rubrics

Guidelines used by teachers to provide assessments of student understanding achievements (Suwarno & Aeni, 2021).

2. Checklists

A checklist is a list of items or tasks that must be checked, completed, or recorded. It is a simple yet effective tool to ensure that a task or process has been performed or fulfilled (Islamiah et al., 2022). Checklists can be arranged in a simple format, like a list of items that can be ticked off, or in a more structured format with columns for additional notes or responses. The format can be adjusted to specific needs and usage purposes.

3. Anecdotal Records

Anecdotal records are descriptive and narrative notes regarding an event or behavior (Widyastuti, 2021). In an educational context, anecdotal records are often used by teachers to document behaviors, progress, or special events related to student development. Anecdotal records are usually subjective as they reflect individual observations and assessments. Therefore, it is important to use these notes as an aid in understanding students more holistically and to support decision-making in guiding student learning and development.

4. Observations

Observation is the process of collecting data or information using human senses or tools to observe and record phenomena or behaviors directly (Abdhul, 2022). The aim is to obtain an accurate understanding of a situation, condition, or object.

5. Projects

Project assessment is an evaluation process used to measure the performance, results, and achievements of a project (Nor, 2021). This assessment aims to evaluate the achievement of set goals, the success of the implementation process, and to provide feedback.

6. Performance Assessment

Good performance assessment can provide an in-depth view of an individual or team's skills, expertise, and achievements (Lutasari, 2018). Examples of performance assessments include practical work, product creation, project execution, or portfolio writing.

7. Written Exams

Written exams are conducted to measure and obtain information about student progress achievements (Kurniati et al., 2019). Written exams can be differentiated into short answers, multiple choice, essays, or other formats of written tests. In the design and implementation of written tests, it is important to consider the purpose of the assessment, fairness, and participant engagement. Good question formulation, clear scoring rubrics, and in-depth analysis of participant answers can enhance the validity and reliability of written tests.

8. Oral Exams

Oral assessment is conducted by the teacher directly with students, where students are asked to answer questions verbally (Achmad et al., 2022). The goal is to assess student understanding,



speaking ability, and the ability to convey ideas verbally. In designing oral tests, it is important to provide clear guidelines, ensure that questions or tasks are relevant to the assessment objectives, and consider fairness and diversity in evaluation. The use of transparent scoring rubrics and clear assessment criteria also helps to enhance objectivity and validity in the assessment.

Each type of assessment has its own advantages and disadvantages. Its use should be considered according to the learning objectives, student characteristics, and learning context. Good assessment should provide accurate and useful information to support the improvement and development of the learning process.

CONCLUSION

Differentiated learning is designed to meet the needs of children to learn according to their developmental achievements. The process of teacher thinking in planning differentiated learning and assessment involves understanding Learning Outcomes (CP), formulating Learning Objectives (TP), designing Learning Pathways (ATP) from learning objectives, planning learning, and assessment. Differentiated learning is divided into three stages: Content, Process, and Product.

Assessment in learning is a process of evaluation used to measure students' progress and achievement in achieving learning objectives. Assessment is categorized based on its function into three types: Formative, Summative, and Initial Assessment. Formative assessment is a method of evaluation done during the learning process to provide feedback that can help students improve their understanding of the learning material. Summative assessment can involve various forms, such as final exams, final projects, final tasks, or portfolios that reflect students' understanding and skills acquired during a certain period. Initial assessment is done to obtain initial information about students' understanding of the material and is then used as a basis for planning learning.

RECOMMENDATIONS

For educators who have implemented the Merdeka Curriculum, it is recommended to design differentiated learning using meaningful and engaging learning models/methods/strategies. This will foster lifelong learning. For researchers, it is suggested to conduct research on the implementation of differentiated learning using learning models/methods/strategies, considering students' learning interests.

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