

## **Analysis of the Implementation of Differentiated Learning in the Implementation of the Independent Curriculum in Middle School Mathematics Lessons**

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### **Abstract**

*Differentiated learning is a form of addressing the diverse learning needs of students paying close attention to readiness, learning profiles, interests, and aptitudes. This study aims to find out (1) the planning stage (plan) carried out by the mathematics teacher in implementing differentiation learning, (2) the (do) stage, the differentiation learning process applied in class, (3) the (see) stage, the form of assessment (evaluation). ) carried out by the teacher in the implementation of learning. The research method used is qualitative by collecting data through observation (learning videos) and interviews. The results of the research are that at the planning stage, the teacher does it by preparing everything that supports differentiation learning; at the do stage, the teacher implements the learning that has been designed at the planning stage and the see stage, the teacher evaluates the learning process that has been carried out at the see stage both in terms of using the learning method as well as in terms of student understanding which is carried out to improve the learning stage in the future. In differentiation learning, this is adapted to the school's circumstances and the student's abilities; one school may be different from another but has the same goal, and in differentiation learning, It must contain 3, namely differentiation of content, process, and product.*

**Keywords: Differentiation, Implementation Independent Curriculum, Application Of Mathematics Learning**

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## **INTRODUCTION**

The independent curriculum is a program that emphasizes independence and freedom for teachers and students to be creative and innovative to maximize potential by discovering their full potential (Nurhayati et al., 2022), (Elihami, 2021). Education is a process that aims to develop the individual potential to fulfill life as a whole, aiming both cognitively and emotionally (Gohivar et al., 2021). Education is vital in preparing strong developing skilled human beings with global competitiveness. The fact that students do their best at school will have a massive impact on the development of significant students' potential student's national processes (Hariyanto, Amin M, 2022), (Dimmock et al., 2021), (Harriss, 2019). The role of a teacher is not only as a messenger for students, but more than that, the role of a teacher is as an educator who provides the best and most meaningful education for students. The importance of education in educating the nation's life is stated in the 1945 Constitution.

Various kinds of policies the government has carried out to experience changes or improvements. One of the policies in the education sector that have changed to Research, Technology, and Higher Education policy number 37/M/2021 concerning the driving school program. The ambitious school program is carried out through an independent curriculum. The curriculum applied to driving schools is a refinement of the independent curriculum prioritizing student learning outcomes based on Pancasila student profiles. Strengthening the profile of Pancasila students in the independent curriculum program provides a solution for cultivating a Pancasila-based personality. In Mobilizing Teacher Education, material related to learning strategies is obtained to increase effective learning activities; practical is a differentiation learning strategy (Zerai et al., 2023).

Differentiated learning is motivated by the diverse learning needs of students, in line with Kihajar Dewantara's philosophy which states that the purpose of education is to: "Guide all the qualities that exist in children so that they can achieve the highest level of safety and well-being as human beings and members of society. Teachers can only guide the development of natural and life forces to improve behavior (not fundamental). Developing children's natural for strengths instruction (DI) is proposed as a pedagogical approach to creating an inclusive class and is considered a teaching philosophy and teaching practice. Differentiated learning involves constructive responses to what students know. This means providing multiple learning paths so students can access the most relevant learning opportunities based on their academic abilities (Munro, 2012).

Differentiation learning is a form of effort in a series of learning that pays attention to students' needs in terms of academic readiness, academic profile, interests, and talents (Tomlinson & Imbeau, 2011). There are three different learning approaches: content, process, and product. 1) Differentiation of content is content that students learn related to curriculum and learning materials. 2) Process differentiation is how students process ideas and information, including how students choose to learn 3) Product differentiation, namely, students demonstrate what they have learned (Tomlinson, 1999).

Before implementing differentiation learning, teachers and schools also have access to information about how to apply differentiation procedures. For example (Chien, 2019) notes that teachers often vary teaching by changing one or more of the following: what students learn (content), how to learn (process) and how to demonstrate what has been known (product). To do this, educators, for example, recommend that teachers consider the knowledge, interests, and abilities provided by students, given the learning context, critical or essential ideas, and skills from the content and area, how students will be grouped or organized for learning (flexible group abilities based on interests, subject matter, or similar skills and essential features of the assessment process used (these characteristics often include meaningful and ongoing assessment embedded in the learning process) (Turner et al., 2017) (Rizqi et al., 2021).

Therefore, this article discusses the stages that the teacher must prepare in carrying out differentiation learning which consists of three stages, steps do, see. The fundamental importance of discussing this is to provide information to teachers about things that need to be prepared in carrying out the differentiation learning process using the lesson study stages, etc., to help teachers prepare differentiation learning for class.

## **RESEARCH METHODS**

The research method uses a qualitative approach with descriptive methods. According to (Moleong, 2013) qualitative research is research that focuses on the activities of identifying documents and then interpreting the meaning, symptoms, processes, and characteristics of both individuals and groups (Hiver et al., 2022), (Mayring, 2014). The research was conducted based on the Lesson Study (LS) stages with three stages, namely plan (plan), Do (implement), and See (observe, and after that, reflect on the results of observations) expressed by Sato in (Lewis & Perry, 2014), (Koskinen & Pitkaniemi, 2022) (Rusiyanti et al., 2022). The subjects in this study were eight mathematics teachers who had implemented differentiation learning. Data collection techniques used are observation and interview. Statements are used in two ways: video recordings and student activities during learning. They collect data in two ways: direct interviews with teachers and through Google Forms.

## RESULT AND DISCUSSION

The real purpose of Lesson Study is to gain new knowledge for the teaching and learning process, not to perfect lesson plans (Takahashi & McDougal, 2016). Lesson study is a learning model that aims to increase educators' professionalism, which is carried out together to make educators work better (Rahmi et al., 2020). Studying individual lessons is not a learning method or strategy. Still, Lesson Study activities can apply learning methods or techniques appropriate to students' circumstances, conditions, and problems. The form of differentiation learning carried out by mathematics teachers consists of three stages, namely.

### Plan stage

In the first stage, planning (plan) aims to produce learning designs that are believed to teach students effectively and generate student participation in learning. Lesson planning can be divided into three stages. First, the teacher must identify the desired outcome. Next, the teacher determines acceptable evidence. Finally, teachers plan learning and teaching experiences (Dee, 2011). Talking about planning means we also talk about preparation. In differentiated learning, readiness becomes one of the learning needs of students. As for the results of interviews conducted with eight mathematics teachers regarding the planning carried out in differentiation learning. The questions asked during the interview can be seen in Figure 1:



Figure 1 . List of stage plan questions

Based on the results of interviews that have been conducted with the relevant respondents asked in Figure 1, it can be explained: The effects of interviews with respondent 1 explained: "The learning objectives to be achieved through this RPP with the differentiation learning model are so that learning is structured according to the mapping of the educational background and abilities of students so that students more easily understand learning material. Further added by respondent 2: "The learning strategy used by the teacher with the needs of students and learning standards in differentiation learning is to identify strategies with the needs of students, the teacher makes observations through direct observation in the daily learning process of students when they complete their learning assignments. Providing diagnostic tests to

students and mapping achievement competencies and initial potential according to their talents and character." This was confirmed by respondent 3: "As a teacher, of course, preparing lesson plans that meet students' needs in differentiation learning is analyzing Basic Competencies, mapping, determining learning strategies, making learning activities, reflecting. In differentiation learning, it must have content, processes, and products and facilitate instruments that can accommodate students' needs.

Furthermore, the answers from respondent 4: "Efforts made by teachers in preparing appropriate teaching materials and learning resources to support differentiation learning are steps to prepare appropriate teaching materials and learning resources to support education, namely, determining learning objectives, mapping student learning needs (student learning readiness, student interest in carrying out learning), choose strategies and assessment tools to be used, and create learning media for the lessons to be taught. Furthermore, the answers from respondent 5: "Efforts made by the teacher in planning learning and identifying students' needs and abilities, how to plan education is to analyze learning outcomes to develop learning objectives and learning objectives, develop teaching modules, and adapt learning to the stages of achievement and student characteristics. Meanwhile, the way to identify students' needs and abilities is to observe student behavior, determine a student's initial knowledge, read student report cards from the previous class, and exchange information with the last teacher's homeroom.

Based on the results of the interviews, it can be understood that the planning (plan) carried out by the teacher in producing learning designs that are believed to be able to teach students effectively and arouse student participation in learning is to make and compile lesson plans, identify student needs, make direct observations in the daily learning process -days when completing their learning assignments, giving diagnostic tests to students, mapping achievement competencies and initial potential according to their talents and character (König et al., 2016), (Frerejean et al., 2019), conducting Basic Competency analysis, determining strategies learning, making learning activities, reflection, having content, processes, and products, as well as facilitating instruments that can accommodate student needs, making assessment tools to be used, making learning media, reading student report cards in previous classes, exchanging information with the homeroom earlier teacher.

The method used by the teacher at the planning stage is differentiation learning. This aligns with the opinion (Awofala & Lawani, 2020). By paying attention to interests, teachers provide opportunities for students to develop skills and concepts through mathematics subjects that students like. Student readiness insights allow teachers to consider students' learning needs. In contrast, learning styles enable teachers to view images and sounds, think and act logically and intuitively, and analyze and visualize student preferences. An overview of the results of the discussions that the mathematics teacher has carried out is contained in the form of a lesson plan which can be seen in Figure 2:

The implementation process carried out by the teacher can be seen in the following RPP:

E. Learning steps Initial Activity (10 minutes)	Core Activities (60 minutes)
<ul style="list-style-type: none"><li>The teacher prepares students physically and psychologically to take part in learning (the teacher reads greetings and continues to read prayers together, <i>amand belajar</i> and read the Qur'an, checks attendance, class cleanliness and tidiness, as well as the readiness of students' books and stationery).</li><li>Teacher's appreciation by asking questions about last week's meeting material</li><li>The teacher invites students to do the activity "Self Checking" so they can express how they are feeling today and make sure they are ready to learn. 1) Students are asked to write down their condition, both physically and emotionally. What is he physically feeling? What are you thinking? What is he feeling in his heart? Then stick the paper in front of the class (PSE: Recognition of Emotions and Management of Emotions and Focus)</li><li>Motivation: the benefits of learning the area of a ball is one of the corners of making a mosque dome, a mosque where we worship Se, Ananda, who did the dawn prayer earlier? Alhamdulillah, everyone has prayed, yes, prayer is the pillar of our religion</li><li>The teacher explains about basic competencies, learning objectives are: Finding the area of the ball with practice, Calculating the area of the ball and Solving everyday problems based on observations related to the surface area of the ball The assessment that will be carried out today is an attitude assessment with observation, description knowledge, namely questions in worksheets and performance appraisal skills in group work.</li><li>The teacher conveys the learning process by dividing students into 5 groups A, B, C, D and E.</li></ul>	<ul style="list-style-type: none"><li>The teacher asks the students to listen and see a presentation about the area of balls with PPT and videos about balls</li><li>students are given the opportunity to ask questions about the material that has been explained</li><li>The teacher divides students into 5 small groups namely groups A, B, C, D and E according to the results of the mapping that was done before learning</li><li>The teacher distributes material in the form of teaching materials, PPT, and learning videos and then students are asked to choose which teaching materials to use to find the formula for the area of a ball and determine the area of the ball</li><li>The teacher gives worksheets (LK) which contain how to find the area of a ball and assignment questions according to their respective levels of understanding. The LK given is different for each group according to the mapping. Group A was given worksheets containing questions with high difficulty, group B was given worksheets containing intermediate level questions, group C was given worksheets containing questions that had a low level of difficulty to be worked on. (process differentiation) (KSE: Empathy)</li><li>Learners and their groups determine and select worksheets/work results in the form of writing, audio recordings and in video form (product differentiation) (KSE: Responsible Decision Making)</li><li>Students and their groups collaborate in completing good worksheets (process differentiation) (KSE: Ability to work together and conflict resolution)</li><li>The teacher goes around providing guidance according to the needs of the student group (process differentiation)</li><li>The teacher builds self-awareness using the STOP method, namely: well Ananda, it seems Ananda is starting to get tense, so let's do all the STOP technique (pause for a moment, take a breath, close your eyes, imagine what will be ok, then continue with the next activity) well, when it's done, let's we continue to study the group again, are all ready</li><li>when everything is ready we will present the results of the group's work, which group will present first.</li><li>Students present the results of their group work (product differentiation) (KSE: Empathy)</li></ul>

When the teacher applies the learning process at school, it can be seen that it consists of content, processes, and products in differentiation learning. The content differentiation learning can be seen in Figure 4:



Figure 4. The teacher performs process differentiation

Figure 4 shows that the teacher is carrying out process differentiation learning, distributing material through teaching materials, PPTs, and learning videos. Then students are asked to choose which teaching material to use to find the formula for the area of a ball and determine the size of the ball. This is by what is stated in the RPP contained in Figure 2

The process differentiation learning process carried out by the teacher here is to provide worksheets (LK) that contain how to find the area of a ball and assignment questions according to their levels of understanding. The implementation of differentiation learning in class is by the steps in the lesson plan by grouping students in working on worksheets according to student groups. The description of the worksheet given by the teacher can be seen in Figure 4.

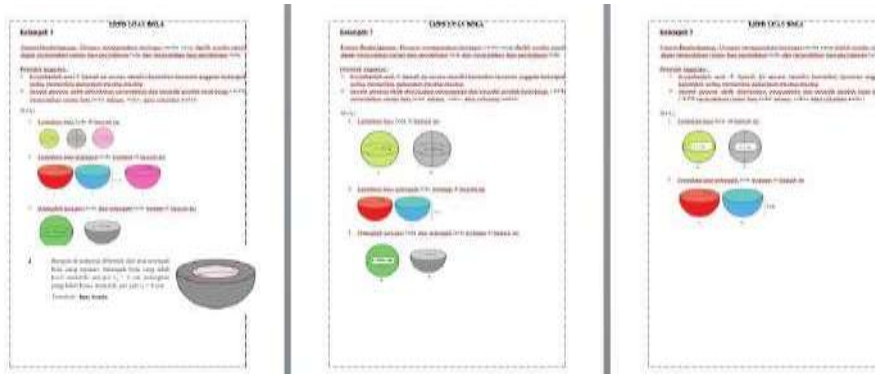


Figure 5. Example of worksheets

According to the mapping, the worksheets (LK) provided are different for each group. Group A is given worksheets containing questions with great difficulty; Group B is given worksheets containing intermediate-level questions; Group C is given worksheets containing questions with a low difficulty level to be worked on; this can be seen in Figure 5.



Figure 5. students work in groups

In the third stage of product differentiation learning, the activities carried out at this stage are students presenting the results of their group work in front of the class. This can be seen in Figure 6.



Figure 6. Group work presentation

A student presenting their work using power points to determine the ball formula. In principle, the differentiation learning that is carried out has many things that the teacher must prepare and requires an assessment. This aligns with Tomlinson & Moon (2014) that implementing a differentiated learning assessment that focuses on student needs allows students to feel more acknowledged, valued, and taught according to learning needs (Heredia, 2020).

However, differentiation learning positively impacts students because, in this case, the teacher reflects on students in carrying out differentiation learning, and students answer that with differentiation learning, they find it easy to learn mathematics. Differentiated learning impacts teacher self-reflection, and collaboration with other colleagues plays a significant role in teacher conceptual changes and in increasing teacher efforts to deconstruct the curriculum according to the needs of their students. This will improve student learning, self-efficacy, and confidence in learning (Stavrou & Koutselini, 2016).

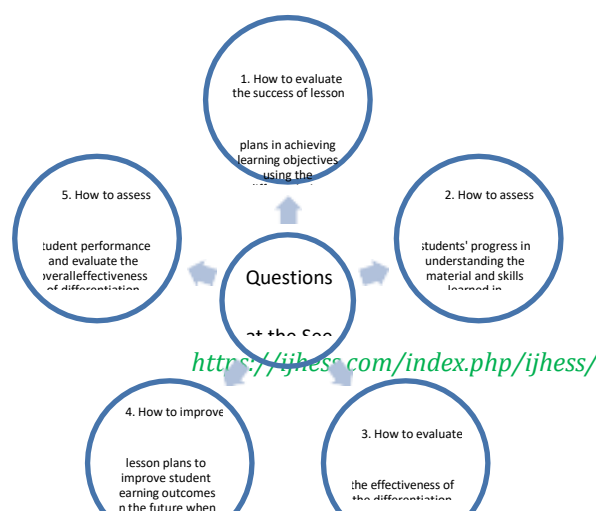
This is supported by the fact that differentiation learning positively affects students (Al-lawati & Hunsaker, 2007). At the same time, student-centered assessment can improve education and student motivation. In addition, when students are involved in creating learning processes, setting personal goals for learning, participating in self-monitoring, monitoring progress, and actively seeking ways to fill their gaps in learning (Andrade et al., 2012)

The three main problems regarding the ineffective implementation of differentiation learning in the classroom are: the first challenge to implementing differentiation learning is related to time: the planning time required for teachers to assess students' needs, interests, and level of readiness, to define key concepts and organize questions and to design appropriate activities for each learner. The second relates to classroom management and the changing role of the teacher from imparting knowledge to becoming a learning facilitator. Third is the teacher's need to acquire and use possible strategies (Corley, 2005); the key to successful differentiation may be placing students in groups and adapting teaching to the needs of different ability groups (Geel et al., 2019). Students' mathematics learning achievement increases, and students are more motivated through differentiated learning (Awofala & Lawani, 2020).

Based on the results of interviews with teachers, information was obtained that implementing differentiation learning in the class had a positive impact on students, but implementing this learning required a long time, and in this case, differentiation learning was suitable for all students; what was demanded here was teacher professionalism in the learning process. Carrying out differentiation learning, the teacher also carries out variations; that is, some divide groups heterogeneously, and some divide them based on the abilities of their students, and the questions given to students are the same for all abilities. There are different things this happens depending on the student's abilities at the school taught. Suppose, based on interviews conducted, this shows a difference between schools in urban and rural areas. In that case, this is in line with research conducted by (Zhao et al., 2017) (Brownell & Leko, 2018), which argues that there are differences in cognitive abilities between students in urban and rural areas.

### See stage

The observation and reflection (See) stage is intended to find the advantages and disadvantages of implementing learning. Educators who served as model teachers started the discussion by conveying their impressions and thoughts regarding implementing learning. The research interview questions at the seed stage can be seen in the following figure:



### Figure 7. Questions at the seed stage

The respondents' answers related to these questions are as follows: Interview results from respondent one can be described that: "As a teacher, what I do in evaluating the success of lesson plans in achieving learning goals using the differentiation learning model is by analyzing needs, determining assessment objectives, identifying competency learning outcomes, compiling grids, developing instrument drafts, testing and analyzing questions, revising as well as assembling questions, as well as whether or not the RPP is implemented in teaching and learning activities and whether or not the steps that have been made and the expected targets are appropriate or not." Furthermore, from the results of interviews with the second respondent, it was explained that: "The method used by the teacher in assessing student progress in understanding the material and skills learned in differentiation learning is to assess and see the results of the assignments that have been given from the teacher to students during the lessons that have been taught and provide assessments and compare them with initial diagnoses (holding pre and posttest)."

Furthermore, the results of interviews with the third respondent explained that: "What the teacher does in evaluating the effectiveness of the differentiation learning strategy used is setting goals, determining evaluation designs, developing evaluation instruments, gathering information, analyzing, and interpreting and following up and observing activities in class during teaching and learning activities take place and through repetition." Furthermore, the results of interviews with the 4th respondent explained that: "The method used by the teacher in improving lesson plans to enhance student learning outcomes in the future when using the differentiation learning model is a reflection and seeing the results achieved by students, the teacher needs to see whether the learning carried out is successful or not. Suppose the success is less than 50%. In that case, the teacher needs to revise the lesson plan by looking at the learning needs of students and evaluating the various deficiencies and weaknesses encountered while implementing teaching and learning activities related to applied differentiation learning. Respondent 5 added, "One assessing student performance and evaluating the effectiveness of differentiation learning as a whole is by determining the results of student learning and observing student activities in-class learning whether their involvement is active or not in the learning process as well as during activities around, in the middle of teaching and learning activities correcting student learning outcomes one by one at least once a week.

Based on the results of the interviews that have been carried out, this is also by the observation and reflection (See) stage in finding the advantages and disadvantages of implementing learning, it can be concluded that the teacher evaluates the success of lesson plans in achieving learning objectives, assessing students' progress in understanding the material and skills learned in differentiation learning as well as seeing the results of the assignments that have been given from the teacher to students during the learning that has been taught as well as providing assessments and comparing them with initial diagnoses (holding pre and post-tests). Suppose the success is less than 50%. In that case, the teacher needs to revise the lesson plan by looking at the learning needs of students and evaluating the various deficiencies and weaknesses

encountered while implementing teaching and learning activities related to applied differentiation learning.

The increasing diversity of today's educational population is so vital to student academic success that educators begin by implementing and perfecting differentiation learning. Increasing diversity places students with different cultural differences and ability levels in educator classes (Chao & Moon, 2005).

## CONCLUSION

The implementation of differentiation learning in the classroom has many things that need to be prepared by the teacher. The purpose of differentiation learning is for students to understand the subject matter of mathematics more efficiently. Differentiation learning positively impacts teachers and students because students learn based on their abilities and learning styles. Based on the lesson study, it is expected to assist teachers in teaching differentiation at school. At the planning stage, what is done by the teacher is to prepare everything that supports differentiation learning; at the do stage, the teacher implements the teaching that has been designed at the planning stage; and in the seed stage, the teacher evaluates the learning process that has been carried out at the seed stage, both in terms of using the learning method. as well as in terms of student understanding which is carried out to improve the learning stage in the future. In differentiation learning, this is adapted to the school's circumstances and the student's abilities; one school may be different from another but has the same goal, and differentiation learning must contain 3, namely differentiation of content, process, and product

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