

## The Influence of Differentiated Learning in the Discovery Learning Model on Learning Motivation

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### ABSTRACT

This study aims to describe (1) the learning motivation of students in classes using Differentiated Learning in the Discovery Learning Model, (2) the learning motivation in classes using the Discovery Learning Model, and (3) analyze the effect of differentiated learning in the Discovery Learning Model on the learning motivation of class XI students at SMAN 2 Bantaeng. This study used a quasi-experimental design with a quantitative approach and a Posttest Only Control Design. The study population consisted of two classes (64 students) selected through random sampling. Data were analyzed using Excel and IBM SPSS Statistics applications. The results showed that the learning motivation in the experimental class was in the very high category, while the control class was in the moderate category, and there was a significant effect of differentiated learning on students' learning motivation.

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## INTRODUCTION

The Independent Curriculum is an educational curriculum development program in Indonesia that focuses on the needs of students. This approach places students at the center of curriculum development, so that it is more in favor of meeting the needs of individual students (Fitriyah & Wardani, 2022). Each class has diversity that requires a learning approach that is tailored to those needs. Therefore, it is important for teachers to understand the differences in student needs and adjust teaching strategies to achieve success in learning. One strategy that can be applied is differentiated learning, which allows teachers to meet the needs of each student individually (Pebriyanti, 2023).

Chemistry, although important for students to master, often causes difficulties due to abstract and complex concepts (Rachman et al., 2017). The problems faced by students in understanding chemistry are often caused by difficulties in connecting concepts, as well as the need to utilize logic, mathematics, and language skills effectively (Zakiyah et al., 2018). In addition, difficulties in learning chemistry are also influenced by internal factors such as lack of learning motivation and external factors such as the teaching methods used (Priliyanti et al., 2021). The results of observations in class XI SMAN 2 Bantaeng showed that many students were less enthusiastic, not actively involved in learning, and often did not do the assignments given, which illustrates the low learning motivation of students.

Learning motivation is an important factor that influences the success of the teaching and learning process. Students who have high learning motivation will be more active and try to understand the material better. Differentiated learning, where students' needs and interests are considered, has been shown to increase students' learning motivation (Annisah et al., 2023). In addition, the Discovery Learning model provides opportunities for students to be active in the learning process and understand the material in a deeper way. This active involvement has the potential to increase learning motivation compared to a teacher-centered approach (Sahnam, 2021; Trisnawati, 2021).

The combination of differentiated learning and the Discovery Learning model is expected to create an effective synergy in improving students' learning motivation. Differentiated learning provides a flexible basis to adjust to individual needs, while the Discovery Learning model encourages students to solve problems independently. Thus, these two approaches can complement each other to create a learning environment that is more supportive of student competency development. Although both have great potential in improving learning motivation, there has been no research that specifically explores the effect of the combination of these two methods, especially in Chemistry subjects at SMAN 2 Bantaeng. Therefore, this study aims to investigate the effect of the application of differentiated learning in the Discovery Learning model on students' learning motivation in class XI of SMAN 2 Bantaeng.

## THEORETICAL REVIEW

### *Merdeka Curriculum*

The Independent Curriculum is the latest policy from the Indonesian government that gives schools and teachers more freedom in managing

learning. The main objective of the Independent Curriculum is to adapt learning to the needs and potential of students, as well as to strengthen 21st-century competencies, such as critical thinking skills, creativity, collaboration, and communication. With this approach, learning becomes more flexible, student-centered, and allows students to have more autonomy in choosing and managing their own learning (Fitriyah & Wardani, 2022). This leads to the development of each student's potential to the maximum, as well as providing opportunities for students to be more actively involved in the learning process.

### *Differentiated Learning*

Differentiated instruction is a learning strategy that focuses on adjusting materials, processes, products, and learning environments based on students' needs, interests, and learning styles (Pebriyanti, 2023). According to Tomlinson (2001), differentiated instruction allows teachers to provide a variety of learning methods that are accessible to all students, taking into account existing individual differences. This allows each student to develop at their own pace and in their own way. Differentiated instruction focuses not only on academic outcomes, but also on the development of students' character and social skills. Research by Annisah et al. (2023) shows that this approach can increase students' learning motivation, because they feel that their needs and interests are being considered by the teacher. Thus, differentiated learning has the potential to improve learning outcomes and student engagement in the learning process.

### *Discovery Learning Learning Model*

Discovery Learning is a learning model that emphasizes active learning where students directly discover concepts or principles through exploration and practical experience. This model was first introduced by Jerome Bruner in 1961 and aims to provide a learning experience that can improve understanding of concepts in depth through self-discovery (Bruner, 1961). According to Sahnani (2021) and Trisnawati (2021), Discovery Learning encourages students to engage in exploratory activities that stimulate critical thinking, creativity, and problem-solving skills. With this model, students are not only given information, but also given the opportunity to explore their own ideas, thus helping them develop deeper skills about the concepts being learned.

### *The Influence of Differentiated Learning and Discovery Learning on Learning Motivation*

Learning motivation is an important factor that influences academic achievement and student engagement in learning. According to Ryan and Deci (2000), learning motivation is divided into two types: intrinsic motivation (from within the student) and extrinsic motivation (influenced by external factors). Learning that gives students the freedom to learn according to their interests and needs, as is done in differentiated learning, can increase students' intrinsic motivation (Annisah et al., 2023). On the other hand, the Discovery Learning model encourages students to be actively involved in learning and face

challenges that stimulate their curiosity, which can increase their motivation to learn. Research by Hidayah et al. (2020) shows that active learning models that involve students in solving real problems, such as Discovery Learning, can increase students' learning motivation.

### ***The Role of Differentiated Learning in Improving Science Process Skills (SPS)***

Differentiated learning, which allows learning to be tailored to students' various needs, also has a significant impact on students' science process skills (SPS). According to Suryani et al. (2021), science process skills include the ability to observe, classify, predict, and conclude, which are essential in understanding natural phenomena and scientific principles. Learning that provides students with opportunities to develop these skills through relevant and challenging activities can help students become more active in conducting scientific research. Differentiated learning can provide various ways to engage students in these scientific activities according to their ability levels and learning styles (Adiningsih et al., 2019).

### ***The Relationship Between Differentiated Learning and Discovery Learning in Increasing Learning Motivation***

The combination of differentiated learning and Discovery Learning offers a very effective approach to increasing students' learning motivation. Differentiated learning provides space for students to learn according to their pace and interests, while Discovery Learning facilitates them in seeking and finding solutions through practical experiences and independent exploration. Research by Lianti & Zuhra (2021) shows that these two approaches complement each other in creating a learning environment that can increase active student engagement. By providing flexibility in learning and encouraging students to become discoverers, these two approaches can significantly increase students' intrinsic motivation and academic achievement. Differentiated Learning and Discovery Learning have great potential in improving students' learning motivation, especially in complex chemistry subjects. The combination of these two models not only supports student-centered learning but also develops critical and creative thinking skills, which are essential in the 21st century. Therefore, this study focuses on the effect of differentiated learning on the Discovery Learning model on students' learning motivation at SMAN 2 Bantaeng, especially in chemistry lessons.

## **METHODOLOGY**

This type of research is a quasi-experimental research (quasi-experiment) with a quantitative approach involving two groups, namely the experimental group and the control group. Both groups were selected using random sampling techniques. The experimental group was treated with Differentiated Learning on the Discovery Learning Model, while the control group used the pure Discovery Learning Model. At the end of the study, both groups will be given the same test related to learning motivation.

This research was conducted in the Odd Semester of the 2024/2025 Academic Year at SMA Negeri 2 Bantaeng, located at Jl. Hasanuddin No. 8,

Bonto Atu Village, Bissappu District, Bantaeng Regency. The research design used was Posttest Only Control Group Design, where the experimental group and the control group were given different treatments, then the results were analyzed through tests conducted after the treatment. The population of this study were grade XI students at SMA Negeri 2 Bantaeng who took Chemistry. The total population was 64 students, consisting of two classes, each class containing 32 students.

Differentiated Learning is a strategy applied to chemistry learning of Chemical Bonding material, with the aim of meeting the diverse needs of students, both in terms of content, process, and learning products. The Discovery Learning model is a learning process that requires students to discover new concepts through observation and research on problems given by the teacher, with the aim of making students active subjects in the learning process. When combined, differentiated learning in the Discovery Learning model is adjusted to the diversity of student characteristics in the class, so that it can increase student learning motivation.

Learning motivation is measured as a drive from within the learner, which is influenced by intrinsic and extrinsic factors to participate in learning. The purpose of this learning is to meet the indicators of learning motivation, such as the desire to succeed, drive in learning, hope for the future, appreciation in learning, and a conducive learning environment. Learning motivation is measured using a learning motivation questionnaire with a Likert scale.

Data collection was carried out by processing the results of filling out the learning motivation questionnaire given to each student. The collected data were then analyzed descriptively and inferentially. Data analysis was carried out using the Excel 2020 application and IBM SPSS Statistics version 26 for Windows for hypothesis testing, namely using the t-test to determine significant differences between the experimental group and the control group.

## RESULTS

The learning motivation of students in both the Control Class and the Experimental Class was measured after the class was given treatment, namely the application of the Discovery Learning model (Pure) in the Control Class and differentiated learning in the Discovery Learning model in the Experimental Class. The learning motivation data was then analyzed using IBM SPSS Statistics version 26 for Windows and the Excel 2020 application to obtain a descriptive picture of the student's learning motivation score which contains the ideal score, maximum score, minimum score, number of samples, average score and standard deviation as shown in Table 1.

Table 1. Statistics of Learning Motivation Scores of Experimental and Control Class Students

Descriptive	Experimental Class	Control Class
Ideal Score	120	120
Maximum Score	114	86

Minimum Score	79	64
Number of samples	32	32
Average Score	102.06	75.06
Standard Deviation	7,556	4,944

Table 1 shows that the Experimental Class has a higher average learning motivation score than the Control Class, namely the average learning motivation score of the Experimental Class is 102.06 while the average learning motivation score of the Control Class is 75.06.

Categorization of learning motivation using a five-point scale, namely very low, low, medium, high and very high. The score of students' learning motivation is made in a frequency distribution to determine the categorization of students' learning motivation can be seen in Table 2.

Table 2 shows that in the Experimental Class the highest frequency and percentage are in the score interval 103-120 or the Very High category with a frequency of 16 with a percentage of 50% not much different from the interval 85-102 or the high category, namely a frequency of 15 with a percentage of 46.875%; while in the Control Class, the highest frequency and percentage are in the score interval 67-84 or the Medium category with a frequency of 30 and a percentage of 93.75%.

Viewed from the aspect of each indicator of learning motivation (desire and desire to succeed, drive and need in learning, hopes and aspirations for the future, appreciation in learning, interesting activities in learning and a conducive learning environment), the comparison of student achievement scores shows a difference between the Experimental Class and the Control Class, as shown in Table 3.

Table 3. Comparison of Student Achievement Scores for Each Learning Motivation Indicator in the Experimental Class and Control Class

Indicator	Percentage Score (%)	
	Experimental Class	Control Class
Desire and desire to succeed	85,125	69.5
Motivation and need in learning	84.75	70,375
Hopes and aspirations for the future	85.25	69,375
Rewards in learning	89,625	69,375
Interesting activities in learning	92,875	71.5
Conducive learning environment	90,625	70,125

Table 2 shows that in the Experimental Class the highest percentage score is in the Indicator "Interesting activities in learning" with a percentage of 92.875%, while the Control Class on the indicator is 71.5%. The Lowest Percentage in the Experimental Class is shown in the Indicator "Motivation and needs in learning", which is 84.75; while in the Control Class the lowest is in the indicators "hopes and ideals for the future" and "Appreciation in learning",

which is 69.375%. The Difference in Percentage Scores for Learning Motivation for each Indicator is clearly shown in Figure 1.

Furthermore, inferential analysis was carried out with hypothesis testing, namely parametric inferential statistics (independent sample t-test) which was first tested with prerequisites in the form of a Normality test using the Shafiro-Wilk Sig Test which showed that the data obtained were normally distributed and a Homogeneity test with Levene's Test which showed that the data obtained were homogeneous data. The results of the hypothesis test showed that there was an effect of differentiated learning on the Discovery Learning model on students' learning motivation.

Table 2. Categorization of Learning Motivation in Control Class and Experimental Class

Score Interval	Category	Experimental Class		Control Class	
		Frequency	Percentage (%)	Frequency	Percentage (%)
31 - 48	Very Low	0	0	0	0
49 - 66	Low	0	0	1	3.125%
67 - 84	Currently	1	3.125%	30	93.75%
85 - 102	Tall	15	46.875%	1	3.125%
103 - 120	Very high	16	50%	0	0

The difference in the percentage of learning motivation scores for each indicator between the control class and the experimental class is shown in Figure 1.

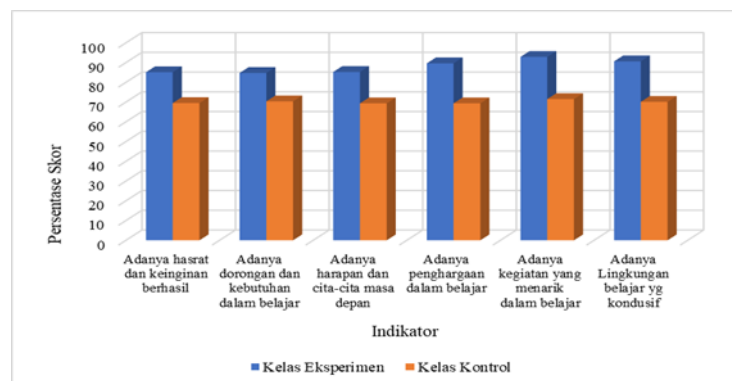


Figure 1. Comparison of Percentage of Learning Motivation Scores for Each Indicator of the Experimental Class and Control Class.

## DISCUSSION

This study was conducted to determine the effect of differentiated learning on the Discovery Learning model on the learning motivation of class XI students at SMAN 2 Bantaeng. Differentiated learning begins with the provision of diagnostic tests, both cognitive and non-cognitive. Non-cognitive diagnostic tests are conducted when students first enter school, or as an initial test when

they are new students, so that in this study no non-cognitive diagnostic tests were conducted. For cognitive diagnostic tests, we conducted them by providing tests before learning was carried out and the results showed that they had insufficient initial knowledge about chemical bonds, so the author made a learning mapping as planned in this study.

Differentiated learning that we do in the Experimental Class, namely in the Discovery Learning syntax when providing stimulus, students are given material presentations according to their learning style, namely students are divided into three groups: (1) groups of students are given material in the form of handouts; (2) groups of students who are given material in the form of videos and (3) groups of students who are given material in the form of ppt, this is a process differentiation, namely students based on their groups will get different material presentations. In the data collection syntax, students collect data from various sources (books and the internet). In the data processing syntax, students process their data on the LKPD that has been provided and create presentation presentations according to their abilities, namely in the form of written delivery, making videos or ppts and in the form of oral delivery. In the verification syntax, students will convey the results of their group discussions in a form that is in accordance with what they made in their data processing, this is a product differentiation, namely students present presentations in different forms. Then, at the end of the syntax, the teacher and students conclude the material that has been studied.

In the Control Class, learning is carried out in accordance with the syntax of the Discovery Learning model, the provision of stimulus/material is carried out by the teacher by giving handouts to all students in one class. The presentation of the material does not vary, students are randomly grouped into four groups, they work on LKPD as a means of processing data from the results of data collection through textbooks that have been prepared by the teacher and when presenting the results of their group discussion they present by reading the results of their work on the LKPD provided. At the end of the syntax, the teacher and students conclude the lesson material that has been studied.

Based on the data presented previously, it can be explained that differentiated learning provides opportunities for students to learn according to their needs, interests, and level of readiness. In the context of the Discovery Learning model, students in the Experimental Class can explore the material more independently, with the support of strategies that are tailored to the characteristics of each individual. This allows them to feel more comfortable and challenged in learning, thereby increasing their learning motivation. In addition, in differentiated learning, the strategies used are more flexible and adjusted to the abilities of students. This strategy includes differentiation of processes and products that allow students to understand the material better. Thus, students become more active in finding their own concepts according to the principles of Discovery Learning, which ultimately increases their involvement and motivation in the learning process. Then in the Control Class it indicates that the Discovery Learning model without differentiation is less than optimal in meeting individual learning needs, so it is unable to significantly encourage learning

motivation, in addition in the Control Class, the application of the Discovery Learning model without differentiation can cause some students to have difficulty understanding the material. This has the potential to make them less motivated in participating in learning, because not all students can optimally follow the same concept discovery process as other students.

Judging from the learning motivation indicators (Desire and desire to succeed, drive and need in learning, hopes and future ideals, appreciation in learning, interesting activities in learning and a conducive learning environment) based on the data presented previously that the highest learning motivation indicator in the Experimental Class is "The existence of interesting activities in learning", which is 92.875% while in the Control Class it is 71.5% indicating that the learning activities carried out in the Experimental Class are more interesting than the Control Class. Differentiated learning in the Discovery Learning model provides a variety of activities that are more in accordance with the needs of students, so that they are more enthusiastic in participating in learning. In addition, other learning motivation indicators such as desire and desire to succeed, drive and need in learning, hopes and future ideals, and appreciation in learning also show a higher percentage in the Experimental Class. This shows that a more personal approach to learning can improve all aspects of student learning motivation.

The results of this study provide implications that the application of differentiated learning in the Discovery Learning model is more effective in increasing students' learning motivation. Therefore, in subsequent learning, educators should consider the application of differentiated strategies to adjust the learning approach to the characteristics of students. Thus, learning can be more optimal in increasing student involvement and learning motivation. Therefore, it can be concluded that the application of differentiated learning in the Discovery Learning model has a positive impact on students' learning motivation, compared to the application of the Discovery Learning model without differentiation.

The results of previous studies that are in line with the research conducted by D. Etikamurni and A. Istyowati (2023), stated that there was an increase in learning motivation in students after the Discovery Learning-differentiated learning model was implemented; Likewise, what was done by Annisa et al. (2020), stated that learning using the Discovery Learning Model can increase student learning motivation; and also research conducted by Firman & Rahayu (2020), which found that the application of the Discovery Learning model with a differentiated strategy can increase student motivation in understanding learning materials more deeply. The results of this study are also reinforced by a study conducted by Slavin (2019), which revealed that learning methods that allow students to be active in discovering their own concepts have a positive impact on their learning motivation.

## CONCLUSIONS AND RECOMMENDATIONS

Based on the results of data analysis and discussion, it can be concluded that the average learning motivation of students in classes using Differentiated

Learning in the Discovery Learning model is in the Very High category, while the average learning motivation of students in classes using the Discovery Learning Model is in the Medium category. This shows that there is an influence of differentiated learning in the Discovery Learning model on the learning motivation of class XI students at SMAN 2 Bantaeng

Differentiated learning in the Discovery Learning model can be applied by teachers in chemistry learning to improve students' learning motivation so that it can foster students' enthusiasm for learning. There needs to be further research on the application of Differentiated learning in learning models other than Discovery Learning on specific differentiated aspects and for researchers who are interested in developing this research, it is hoped that they will pay attention to the limitations in this research so that they can perfect the results obtained and can provide a positive contribution to the world of education, especially in the field of chemistry.

### **FURTHER STUDY**

This study has several limitations that need to be considered for further research. First, the sample used was limited to two classes in one school, so the results of this study may not be generalizable to other schools with different student characteristics. Therefore, further research can expand the sample by involving more schools to get a more representative picture. Second, this study only focused on chemistry material, so further research can test the effect of differentiated learning on the Discovery Learning model in other subjects to see how effective it is in increasing learning motivation in various learning contexts. Furthermore, this study did not explore external factors that can influence learning motivation, such as family support or environmental factors, which should be considered in further research.

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