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The Effect of the Use of Differentiated Learning, Expository and Learning Motivation on Learning Outcomes in Grade 11 Mathematics Subjects at SMA

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Abstract: This study aims to examine the effect of the use of differentiated learning and learning motivation on student learning outcomes in Mathematics class XI at SMA GIKI – 1 Surabaya. The focus of the problems raised includes: (1) whether there is a significant influence between the use of differentiated learning compared to expository learning on Mathematics learning outcomes; (2) whether high and low levels of learning motivation affect student learning outcomes; and (3) whether there is an interaction between learning strategies and learning motivation on Mathematics learning outcomes. This study uses a quantitative approach with quasi experiment methods and 2x2 factorial design. The research sample consisted of students in grade XI of SMA GIKI-1 Surabaya who were selected through purposive sampling techniques. The instruments used include learning outcome tests to measure students' academic achievement and learning motivation questionnaires to classify students' motivation levels. The data obtained was analyzed using two-way ANOVA to determine the influence of each variable and its interactions. The results showed that: (1) there was a significant influence between the use of differentiated learning strategies on students' Mathematics learning outcomes compared to expository learning; (2) students with high learning motivation have better learning outcomes compared to students with low motivation; and (3) there is a significant interaction between learning strategies and the level of learning motivation on student learning outcomes. These findings indicate the importance of applying adaptive learning approaches and strengthening motivation in improving Mathematics learning achievement at the secondary education level.

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INTRODUCTION

Character education has indeed become the main concern in the 2013 curriculum, but it is not specifically mentioned as a profile of Pancasila students. The character that is realized is specifically the goal to be achieved in the independent curriculum. The Independent Curriculum is basically a form of optimizing the development of education that is adjusted to various developments that occur in the community (Marisa, 2021). The Independent

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Curriculum also directs efforts to improve the quality of education based on the outputs produced (Suryaman, 2020). The independent curriculum focuses more on learning that develops freedom of thought and independent attitude.

When the Merdeka curriculum is used, teachers are allowed to choose different teaching sources that students need to learn. This aims to ensure that education can adapt to the needs of students. The main and most important learning resource is teaching materials, which are needed in the classroom which aims to increase the effectiveness of teachers in improving student learning outcomes. Learning becomes more interesting, practical, and applicable when teaching materials are used. There are various kinds of teaching resources, one of which is that modules are learning tools or resources that students can use to understand teachings, which is one of the educational resources that can help students. Teacher modules must be created taking into account the needs of students and the current curriculum, in particular, the Merdeka curriculum. Teachers must create an Independent curriculum module that meets the needs of the unit in the teaching unit and the characteristics of the school. Differentiated learning should be used in the modules created because the curriculum mandates teachers to do so.

Teaching strategies that allow success for all students in groups or from different classes in understanding new material in different ways are called differentiated learning. This diversity can be observed through a variety of ways, including content acquisition, management, construction, or execution of the reasoning process of an idea, the creation of learning products, and the administration of tests to ensure that students of different skill levels in a classroom can learn efficiently. Simply put, differentiated learning is a series of realistic decisions that can be digested by reason that has been created by teachers who have been oriented to the needs of students (Kusuma & Luthfah, 2020). In differentiated learning, there is a student learning profile that is based on various methods or techniques, as good individuals in the learning process. The identification process is carried out by providing opportunities for students to learn according to the learning needs of students, so that students have opportunities for natural and effective learning. Learning profiles are influenced by a number of elements, particularly the learning environment that students prefer, cultural influences, and learning styles—whether kinesthetic, visual, or auditory. Learning preferences, student interests, and preparations made to help students achieve better learning outcomes are just a few variables that can be adapted to different teaching materials. Instead of being individualized, differentiated learning is the process of using autonomous learning techniques to meet the needs of each student.

To achieve learning goals and critical thinking skills, it is necessary to design a learning process that can lead students to achieve these goals, namely by implementing differentiated learning. Because the students in each class are different and varied. It can be difficult for teachers to make different efforts to ensure that each student in the class succeeds during the learning process due to the diversity of students.

One of the main elements that affects student learning outcomes is their learning motivation. Learning motivation is an internal drive that encourages students to engage in the learning process. This includes the desire to understand the lesson, achieve academic goals, and overcome challenges (Suprihatin, 2015). In situations like this, many things can affect students' motivation to learn. This includes students' interest in learning, their perception of their chosen major, and support from parents and peers (Jumiarti, 2020; Kusumaningrini & Sudibjo, 2021). Interest in learning is an important component of motivation to learn. A high interest in learning can make students more engaged in lessons. This can lead to better learning outcomes. Students who have a strong interest in the subject tend to achieve exceptional

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learning outcomes (Halawa, 2023; Ricardo & Meilani, 2017). In addition, teachers' creativity in the use of learning media and teaching approaches is also very important to increase students' interest in learning (Ramadhani, 2023; Mufatikhah et al., 2023). Thus, innovative teaching strategies can contribute to the development of a more engaging and enjoyable learning environment, thereby increasing students' motivation to learn. The school's curriculum can also influence a student's desire to learn. For example, research shows that the implementation of an independent curriculum in primary schools increases student engagement and their motivation to learn. This suggests that a flexible and relevant curriculum can help students feel more engaged and motivated to learn (Rahmah, 2023; Suparman, 2023).

Support from parents and peers is also very important to arouse students' desire to learn. Parental involvement in their children's education can improve students' learning discipline and motivation (Kusumaningrini & Sudibjo, 2021; Mariam et al., 2023). Peer support also increases students' interest in learning and creates a supportive social environment (Oktaviani & Perianto, 2022). Therefore, it is important for parents and schools to work together to create an environment that supports students' desire to learn.

Overall, many factors affect a student's motivation to learn; including learning interests, social support, and teaching approaches used. By understanding and optimizing these elements, it is hoped that student learning outcomes will be greatly improved.

METHOD

The design in this study used an experimental type of research because the control group could not fully control the external variables that affected the experiment. Researchers chose pseudo-experimental research because the purpose of educational experiments is to assess the influence of an action on behavior or test whether it has an effect. In experiments, the action is called a treatment, which means it provides conditions for assessing the effects. This study uses a quantitative approach. Sugiyono stated that research data in a quantitative approach is in the form of numbers and statistics used to analyze it (Sugiyono 2017). Researchers use a quantitative approach because they want to eliminate the subjective element in the research. The research place is in class XI of SMA Giki – 1 Surabaya. The research time was carried out in semester 2, the 2024 – 2025 academic year for 4 months, namely: January 2024 to April 2025. This research is organized according to the educational calendar for the 2024 – 2025 academic year.

The research design carried out by the researcher is the influence between variables X1 and X2 on Y. Therefore, the researcher uses a quantitative approach with the following model as the basis of their research:

Tabel 1. Desaint Eksperimen Nonequivalen Control Group Design

Kelompok	***Pretest***	**Treatment**	***Posttest***
Experiment	O_1	X_1	O_1
Kontrol	O_2	X_2	O_2

The data collection technique used by the author is Field Research , which is a data collection method used by the author by going directly to the field or research location to record the necessary things. This research prioritizes appropriate techniques so that the data produced is of high quality. The data to be obtained in this study are learning motivation and student learning outcomes using differentiated learning strategies.

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The data collection techniques used in this study are: Learning Motivation Data collection about learning motivation using questionnaires and used in the form of student learning motivation questionnaires is distributed to students who participate in learning with differentiated learning strategies. There are five possible answers to each statement or question: strongly agree, agree, disagree, disagree, and strongly disagree. To tabulate the data as follows, which will be shown in the assessment guidelines. Learning Outcomes In the learning outcomes of data collection techniques, namely tests, and the tests used are mastery tests. The mastery test is a test given to students after participating in differentiated learning. This test will be carried out twice, namely before (Pretest) and after (Posttest) which applies differentiation learning strategies to mathematics subjects in grade 11.5 in the experimental group, and the control group uses the expository learning strategy in class 11.1. This technique is used to measure student learning outcomes in the Mathematics subject of circle material.

To test the data that have been taken and collected from field research on the influence of differentiated learning and learning motivation on learning outcomes in mathematics subjects, then an analysis was carried out using the SPSS 26.0 For Windows Evaluation Version program in this case for the Normality, Homogeneity and Analysis Test. Specifically for the analysis test, the researcher used an independent sample t test (t-test for two independent samples) which was used to test the 1st hypothesis and the 2nd hypothesis and the two-path/directional ANOVA test to test the 3rd hypothesis.

RESULT

Description of the research results.

The research was conducted at two different research locations, namely GIKI-1 Surabaya Senior High School can be described according to the data from the analysis results that have been carried out and have found several findings according to the conditions in the field when the research was carried out. The research aims to examine the differences in learning outcomes in students in the use of differentiated learning methods and expository learning methods. This research was carried out using 2 (two) data collection techniques, namely (1) questionnaire to determine the level of student learning motivation, and (2) test method used to determine learning outcomes in mathematics subjects. To find out the level of student motivation for mathematics subjects, it is carried out by giving a questionnaire to students who are respondents, whether the questionnaire used is feasible that meets the propriety of validity and regularity of an instrument, the questionnaire will be tested for validity and reliability. The results of the validity and reliability test can be shown in table 4.1 below:

Validity Test

Validity is a test tool to find out the accuracy of a measuring instrument, whether the measuring instrument has measured about what is in accordance with what will be measured. The high validity value provides the understanding that the measuring tool is said to have measured the real thing, In this study, the learning motivation variable is one of the moderator variables that accompany the free and bound variables. The learning motivation instrument is made according to the applicable provisions to determine the level of student motivation in mathematics subjects which is prepared with 20 questions related to mathematics learning motivation. The results of the validity test using product moment correlation will be compared with the rtable N = 50 at the significance level $\alpha = 0.05$ with a rtable value of 0.266, The results of the learning motivation instrument test are as follows:

Table 2. Motivation Variable Validity Test Results

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Item	R_{count}	R_{Table}	Information
Item 1	0.466	0.266	Valid
Item 2	0.549	0.266	Valid
Item 3	0.855	0.266	Valid
Item 4	0.794	0.266	Valid
Item 5	0.512	0.266	Valid
Item 6	0.709	0.266	Valid
Item 7	0.459	0.266	Valid
Item 8	0.640	0.266	Valid
Item 9	0.694	0.266	Valid
Item 10	0.720	0.266	Valid
Item 11	0.697	0.266	Valid
Item 12	0.415	0.266	Valid
Item 13	0.624	0.266	Valid
Item 14	0.737	0.266	Valid
Item 15	0.828	0.266	Valid
Item 16	0.824	0.266	Valid
Item 17	0.503	0.266	Valid
Item 18	0.567	0.266	Valid
Item 19	0.549	0.266	Valid
Item 20	0.611	0.266	Valid

Based on table 4.1 above, it shows that at a significant level of 5%, a number of instruments used in this study obtained a correlation coefficient value greater than the Product Moment rtable value of 0.266. If the value of the calculation of the analysis results is greater than the rtable, then the instrument of each question can be said to be valid (rcalculus>rtable) Thus, it can be said that the instrument in the results of this study is valid or can measure the variables being studied.

Reliability Test

Reliability is intended to find out about the level of reliability of the measuring instrument used, the higher the reliability value or the data is reliable, then the measuring instrument used is also better (reliable) to be used in future research or different places (locations). Reliability can be said to be able to see how much sharpness of an instrument can be used and last for a certain time. The method used is to use the Alpha formula. The results of the reliability testing of the research data are as shown in table 4.2 below.

Table 3. Reliability Test Results

Variabel	r	Information
Student learning motivation	0.920	Reliabel

The results of the reliability test in table 4.2 above show that the value of the reliability coefficient of the variable used in the variable (rcalculated is greater than the rtable value, which is 0.6. then the results of the respondent's answer are reliable, in other words if the same

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research is carried out at different times, the respondent will give the same answer and the measuring tool is said to be reliable>. rtable= 0.6. After conducting a validity test and reliability test on the learning motivation questionnaire, a 2-path variance analysis test will be carried out to test the hypothesis that has been proposed. Some of the important requirements of the research results include carrying out prerequisite tests, including normality tests and homogeneity tests The results of the prerequisite tests are presented as follows

Prerequisite Test

Before the 2-path Variance Analysis test was carried out, to determine the interaction between the use *of differentiated* learning methods and the use of *expository learning methods* with students who had high or low motivation, a prerequisite test, namely normality and homogeneity, was previously carried out.

Normality Test

To detect the normality of the data, it can be done in various ways, namely: (1) By looking at the *Skewnesss/Kurtosis* ratio, (2) By using Graphs, and (3) By using *the Kolmogorov-Smirnov* test.

In this study, to detect the normality of data was carried out using *the Kolmogorov-Smirnov* test, with the following hypothesis:

Ho : data is distributed normally

Hi: data is not distributed normally

Table 4. Results of the Normality Test of Differentiated Learning Methods

One-Sample Kolmogorov-Smirnov Test

		Differentiated
N		50
Normal Parameters [a,b]	Mean	80.9000
	Std. Deviation	9.66637
Most Extreme Differences	Absolute	.117
	Positive	.117
	Negative	-.108
Kolmogorov-Smirnov Z		.828
Asymp. Sig. (2-tailed)		.499

a. Test distribution is Normal.

b. Calculated from data.

The K-S value for data on *differentiated Learning Methods* was obtained with a value of 0.828 with a probability of significance of 0.499 and the value above $\alpha = 0.05$. This means that the hypothesis is zero accepted or the learning outcome data using the learning method with *differentiated* treatment is distributed normally.

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Table 5. Results of the Normality Test of Expository Learning Methods

One-Sample Kolmogorov-Smirnov Test

		Expository
N		50
Normal Parameters [a,b]	Mean	76.6200
	Std. Deviation	10.56542
Most Extreme Differences	Absolute	.164
	Positive	.164
	Negative	-.119
Kolmogorov-Smirnov Z		1.162
Asymp. Sig. (2-tailed)		.134

a. Test distribution is Normal.

b. Calculated from data.

The K-S value for the discussion learning method data was obtained with a value of 1.162 with a significance probability of 0.134 and the value above $\alpha = 0.05$, this means that the zero hypothesis is accepted or the learning outcome data using the *expository* learning method is normally distributed. Based on the description above, it can be explained that both classes that use *the differentiated learning method and* the expository *learning method* have normally distributed data.

Homogeneity Test

The results of the homogeneity calculation can be found from the following table.

Table 6. Homogeneity Calculation

Levene's Test of Equality of Error Variances[a]

Dependent Variable: Mathematics Learning Outcome

F	df1	df2	Sig.
.153	3	96	.927

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept+Faktor_A+Faktor_B+Faktor_A * Faktor_B

With decision-making:
1. if the probability < 0.05 is not homogeneous
2. if the probability > 0.05 is homogeneous

Based on the table above, it can be seen that the probability value of the data above is 0.927, meaning that the probability > 0.05, this gives the meaning that the data for treatment using *Differentiated* learning and those using *the Expository* learning method are homogeneous. From the description above, it can be seen that the two research sites have the same mathematical learning ability, where the two samples have the same or homogeneous properties. After the learning process is carried out in each class, where the class is treated with the *Differentiated* learning method, and the class is treated with *the Expository* method. From the learning process in 100 research samples, it will be seen that some students like

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Differentiated learning which is called having high motivation, and who do not like the *Differentiated* learning method or said to be students who have low motivation, as well as in the treatment with *the Expository* learning method It will appear that students who are happy or motivated to participate in learning are said to be high motivation groups, and the rest are low motivation. After the implementation of learning in each predetermined learning, where classes are carried out using *the Differentiated* learning method while the class uses *the Expository* learning method. The implementation of learning carried out in each treatment produces data, in which case the data is known to be distributed normally and homogeneously, the next test is a significance test or hypothesis using 2-path variance analysis.

Uji Hypothesis

The hypothesis test in this study used the 2-Lane Anava test, with the following results. The descriptive results of the two classes are as follows.

Table 7. Descriptive Results of Mathematics Achievement

Descriptive Statistics

Dependent Variable: Mathematics Learning Outcomes

Factor_A	Factor_B	Mean	Std. Deviation	N
Differentiated	High Motivation	86.3600	7.35912	25
	Low Motivation	75.4400	8.63172	25
	Total	80.9000	9.66637	50
Expository	High Motivation	82.6000	9.02774	25
	Low Motivation	70.6400	8.47978	25
	Total	76.6200	10.56542	50
Total	High Motivation	84.4800	8.36962	50
	Low Motivation	73.0400	8.80853	50
	Total	78.7600	10.30163	100

From the table above, it can be seen that there is a difference in the average mathematics learning outcomes in each class, both those who use and are treated using *differentiated* learning methods or using or being treated with *expository* learning methods in students with high motivation and low motivation. Based on the table above, it can be seen that students who are treated using the *differentiated* learning method with high motivation have greater learning outcomes when compared to students who are treated with *the expository* learning method in students with low motivation. Likewise, treatment using *the expository* learning method with high motivation has greater learning outcomes compared to students who are treated using the *expository* learning method with low motivation. In this case, students who were treated with *differentiated* learning methods had better learning outcomes compared to students who were treated using *the expository learning method*. However, to ensure its significance, it is tested with an average difference test or a t test, with the following results. Further details can be seen in the following table.

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Table 8. On average, *Differentiated* and *Expository* learning methods and with high and low motivation

4. Faktor_A * Faktor_B

Dependent Variable: Mathematics Learning Outcomes

Factor_A	Factor_B	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Differentiated	High Motivation	86.360	1.679	83.026	89.694
	Low Motivation	75.440	1.679	72.106	78.774
Expository	High Motivation	82.600	1.679	79.266	85.934
	Low Motivation	70.640	1.679	67.306	73.974

Based on the table above, it can be explained that students with treatment using the *Differentiated* learning method are better when compared to students with treatment using *the Expository* learning method in students who have high motivation and low motivation. However, to ensure its significance, it is tested with an average difference test or a t test, with the following results.

Table 9. Differentiation Test of Differentiation Learning Methods *and* Expository *Learning Methods*

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Mathematics Learning Outcomes	Equal variances assumed	.362	.549	2.113	98	.037	4.28000	2.02518	.26110	8.29890
	Equal variances not assumed			2.113	97.235	.037	4.28000	2.02518	.26071	8.29929

From the table above, a significance value below 0.05 ($\alpha < 0.05$) was obtained, so it can be explained that there was a difference in mathematics learning outcomes in grade XI students at GIKI-1 Surabaya Senior High School in students who used the treatment using the *Differentiated* learning method and students who used the *treatment using the Expository* learning method. Furthermore, to test the significance of the average difference between students with high motivation and low motivation, the following results were obtained.

Table 10. Difference Test of the average of students with high motivation and low motivation in *differentiated learning*

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Mathematics Learning Outcomes	Equal variances assumed	.020	.889	4.814	48	.000	10.92000	2.26860	6.35868	15.48132
	Equal variances not assumed			4.814	46.829	.000	10.92000	2.26860	6.35573	15.48427

From the table above, the significance value is below 0.05 ($\alpha < 0.05$), so that it can be explained that there is a difference in student learning outcomes in Mathematics subjects in

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grade XI students at GIKI-1 Surabaya Senior High School who have high learning motivation and those who have low learning motivation in students with treatment using *the Differentiated* learning method. Meanwhile, for students with treatment using *the Expository* learning method , it is then presented as follows.

Table 11. Difference Test of the average of students with high motivation and low motivation on *Expository Learning*

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Mathematics Learning Outcomes	Equal variances assumed	.014	.907	4.828	48	.000	11.96000	2.47715	6.97936	16.94064
	Equal variances not assumed			4.828	47.813	.000	11.96000	2.47715	6.97886	16.94114

From the table above, a significance value of less than 0.05 ($\alpha < 0.05$) was obtained, so it can be explained that there was a difference in Mathematics learning outcomes in grade XI students at GIKI-1 Surabaya Senior High School who had high learning motivation and those who had low learning motivation in students with treatment using *the Expository* learning method. After the prerequisite test is carried out, then a 2-path Anava test is carried out, to find out the interaction of learning methods and motivation owned by students. The results of the two-path Anava test are as follows.

Table 12. Anava 2 Track Test Results

Tests of Between-Subjects Effects

Dependent Variable: Mathematics Learning Outcomes

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3736.560[a]	3	1245.520	17.663	.000
Intercept	620313.760	1	620313.760	8796.593	.000
Faktor_A	457.960	1	457.960	6.494	.012
Faktor_B	3271.840	1	3271.840	46.398	.000
Faktor_A * Faktor_B	6.760	1	6.760	.096	.758
Error	6769.680	96	70.518		
Total	630820.000	100			
Corrected Total	10506.240	99			

a. R Squared = .356 (Adjusted R Squared = .336)

Based on the table above, it can be explained that

1. The ratio of FA (Fcal value in the learning method used) = 6.494 with a significance value smaller than $\alpha < 0.05$ which is 0.012, with df1 = 1 and df2 = 96 obtained a value of Ftable = 3.98 so that it can be explained that FA calculates > Ftable, meaning that there is an influence of learning outcomes between students with treatment using *differentiated learning methods* and students with treatment using learning methods *Expository* applied to students in mathematics subjects in grade XI at GIKI-1 Senior High School Surabaya.
2. The ratio of FB (Fcal value at the level of student learning motivation) = 46,398, with a significance value smaller than $\alpha < 0.05$ which is 0.000, with df1 = 1 and df2 = 96 obtained a value of Ftable = 3.98 so that it can be explained that Fcal > Ftable, meaning that there is

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a difference in learning outcomes between students who have high learning motivation and students who have low motivation in students in mathematics subjects in the classroom XI at GIKI-1 Senior High School Surabaya.

3. Meanwhile, the FAB value was used to determine the significance of the interaction between factor A (students with treatment using the *differentiated learning method* and students with treatment using *the Expository* learning method and factor B (high student learning motivation and low learning motivation), a FAB value of 0.096 with a significant level of 0.758 was obtained, compared with Ftabel and level significant $\alpha = 0.05$; ($0.96 < 3.94$), so it can be explained that factor A (students with treatment using *the Differentiated* learning method and students with treatment using *the Expository learning method*) and factor B (high learning motivation and low learning motivation) do not interact with each other on learning outcomes in mathematics subjects. This means that there is no interaction between students and treatment using *differentiated learning methods*, students with treatment using *expository* learning methods and learning motivation to student learning outcomes in mathematics subjects in grade XI at GIKI-1 Surabaya Senior High School.

Based on the results of the calculation above, it can be explained that the hypothesis proposed by Ho is accepted or H1 is rejected. This means that there is no significant difference in learning outcomes and test results as well as significant interaction between student learning outcomes and treatment using differentiated *learning methods* and students with treatment using *expository* learning methods and students who have high learning motivation and those who have low learning motivation in mathematics subjects in the classroom XI at GIKI-1 Senior High School Surabaya

DISCUSSION

In the modern era of education, an effective learning approach is the main key to improving student learning outcomes, especially in mathematics subjects that are often considered challenging. Two approaches that are often compared are differentiated learning and expository learning. Recent research shows that differentiated learning can provide better outcomes compared to expository learning.

Differentiated Learning: Adapting to Student Needs is an approach that adapts learning content, processes, and products according to students' needs, interests, and ability levels. A study by Padmore & Ali (2023), Bahurudin et.al. (2025), Tegar et.al. (2021) showed that students who received differentiated learning had better mathematical problem-solving skills compared to students who followed conventional learning. The results of the statistical test showed significant differences between the two groups. In addition, research by Jayantika & Santhika (2020) at SMP Negeri 8 Denpasar also supports this finding. They reported a significant improvement in students' math learning outcomes after the implementation of differentiated learning, with the percentage of graduation increasing from 50% to 77.5% in two cycles. The same thing was produced by Akmal et.al Research. (2025) and Aida et.al. (2024) to differentiate to improve learning outcomes.

Expository Learning: Direct Delivery of Material. Expository learning is a method in which teachers deliver material directly to students, usually through lectures. This method emphasizes on conveying information verbally and does not provide space for students to actively interact. A study by Chintya and Efendi (2021) shows that although the expository method has a positive influence on the mathematics learning outcomes of grade III elementary

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school students, it is not as effective as learning that is more interactive and adaptive to the needs of students.

Comparison of Learning Outcomes between the Two Approaches. A comparison between these two approaches shows that differentiated learning is more effective in improving students' math learning outcomes. This is in line with a meta-analysis by Globio (2024) which concluded that differentiated learning has a significant positive impact on students' mathematical achievement at the secondary school level.

Implications for SMA GIKI-1 Surabaya. Based on these findings, SMA GIKI-1 Surabaya can consider implementing differentiated learning in mathematics subjects. This approach can not only improve student learning outcomes, but it can also adapt to a variety of learning styles and individual needs of students. Thus, it is expected to create a more inclusive and effective learning environment.

The conclusion is that differentiated learning has been shown to be more effective in improving students' mathematics learning outcomes compared to expository learning. By tailoring learning to students' needs and abilities, this approach can create a more meaningful learning experience and improve students' academic achievement. For SMA GIKI-1 Surabaya, the implementation of differentiated learning in mathematics subjects can be a strategic step in improving the quality of education and student learning outcomes.

Learning motivation is a psychological factor that affects the intensity and quality of students' efforts in the learning process. In the context of mathematics learning at SMA GIKI-1 Surabaya, learning motivation is one of the important elements that can affect student learning outcomes. Recent studies show that there is a significant relationship between the level of learning motivation and the achievement of students' mathematics learning outcomes.

The Effect of Learning Motivation on Mathematics Learning Outcomes from a study by Arsyantika et.al. (2021), Prasetyo et.al. (2023) showed that learning motivation has a positive influence on the mathematics learning outcomes of grade X students. The determination coefficient of 68% shows that learning motivation explains the variance in students' mathematics learning outcomes significantly. Another study by Nugroho and Warmi (2022) at SMP Negeri 2 Tirtamulya also supports these findings. They found that learning motivation had a significant influence on students' mathematics learning outcomes, with an influence rate of 95.84%.

Implications for SMA GIKI-1 Surabaya. Based on these findings, it can be concluded that learning motivation has an important role in determining students' mathematics learning outcomes. To improve mathematics learning outcomes at SMA GIKI-1 Surabaya, it is important for educators to understand and motivate students to have high learning motivation. This can be done through engaging learning approaches, providing constructive feedback, and creating a supportive learning environment.

The conclusion is that students' high and low motivation to learn has a significant impact on their mathematics learning outcomes. Therefore, efforts to increase student learning motivation must be a priority in the learning strategy at SMA GIKI-1 Surabaya. Thus, it is hoped that students' mathematics learning outcomes can increase optimally.

At SMA GIKI-1 Surabaya, improving mathematics learning outcomes is the main focus in efforts to achieve high academic standards. Two factors that play a significant role in this achievement are the learning strategies implemented by teachers and the level of student learning motivation. Recent research shows that there is an interaction between these two factors that affect students' mathematics learning outcomes.

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The Influence of Learning Strategies on Mathematics Learning Outcomes. The learning strategies used by teachers have a direct impact on students' understanding of mathematics material. Methods that are innovative and appropriate to the characteristics of students can increase their interest and understanding. For example, research by Wahyuningsih (2020) shows that the use of active, creative, effective, and fun learning methods (PAKEM) can increase students' motivation to learn in mathematics subjects. In the study, the average student motivation increased from 62.4% to 84.6% after the implementation of the PAKEM strategy.

The Effect of Learning Motivation on Mathematics Learning Outcomes. Students' motivation to learn is an internal factor that encourages them to learn and strive to achieve academic goals. Research by Nugroho and Nugroho & Attin (2022), Asrah & Suasteri (2020), Adriani et.al. (2024) shows that learning motivation has a significant influence on students' mathematics learning outcomes. Other research also states that learning motivation can significantly improve ability in learning achievement, so that learning motivation has a very important role to pay attention to in the learning process, especially maa maa math lessons (Arsyantika & Hajeniati (2022), Prasetyo & Sugeng (2023), Okta et.al. (2023), Slamet & Slamet (2023), Hikmal et.al. (2025), Laely et.al. (2022), Dewi et.al. (2024)).

Interaction between Learning Strategy and Learning Motivation. Not only individual factors, but the interaction between learning strategies and learning motivation also affects mathematics learning outcomes. Research by Ardianik (2022) and Wahyuningsih (2017) (reveals the influence of interaction between learning methods and students' learning motivation on mathematics learning outcomes. The mathematics learning outcomes of students who have high learning motivation are higher compared to students who have low learning motivation with the same method.

Implications for SMA GIKI-1 Surabaya. Based on these findings, SMA GIKI-1 Surabaya can consider implementing active and fun learning strategies, such as the PAKEM method, in mathematics subjects. In addition, it is also important to increase students' motivation to learn through a relevant and engaging approach. Thus, it is hoped that students' mathematics learning outcomes can increase significantly.

Conclusion The high and low mathematics learning outcomes of students at SMA GIKI-1 Surabaya are influenced by the interaction between the learning strategies applied and the level of student learning motivation. The implementation of appropriate learning strategies and increased student learning motivation can significantly improve mathematics learning outcomes.

CONCLUSION

Based on the results of the study on the effect of the use of differentiated learning and learning motivation on learning outcomes in grade 11 mathematics subjects at SMA GIKI-1 Surabaya, it can be concluded that: 1) Differentiated Learning has a significant positive influence on students' mathematics learning outcomes. This approach is able to tailor the material to the individual needs and abilities of students, thereby increasing their understanding and involvement in learning. 2) Learning Motivation also plays an important role in improving student learning outcomes. Students with high learning motivation tend to have more effort to understand the material and achieve their academic goals, which leads to better learning outcomes. 3) The interaction between Differentiated Learning and Learning Motivation shows that the combination of these two factors can have a greater impact on students' math learning outcomes. Students who receive differentiated learning and have high learning motivation

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show better learning outcomes compared to students who receive only one of these factors. Practical implications for SMA GIKI-1 Surabaya are the importance of implementing differentiated learning strategies that are tailored to student characteristics, as well as efforts to increase learning motivation through various approaches that are interesting and relevant to students' daily lives.

Thus, the application of differentiated learning followed by increasing student learning motivation can be an effective strategy in improving mathematics learning outcomes in grade 11 of SMA GIKI-1 Surabaya.

REFERENCES

Aida Aisyah, Luluk Ifadah,Zaidatul Arifah, (2024), The Influence of Differentiated Instruction on the Learning Outcomes of Islamic Religious Education Subject at SMP Negeri 1 Bansari, International Journal of Post Axial: Futuristic Teaching and Learning, Vol. 2, No. 1, P.41-50, https://journal.amorfati.id/index.php/postaxial

Akmal Rijal, Aswarliansyah, Budi Waluyo, (2025). Effectiveness of differentiated learning in mathematics: insights from elementary school students, Journal of Education and Learning (EduLearn), Vol. 19, No. 1, pp. 241~248, DOI: 10.11591/edulearn.v19i1.21806

Arsyantika, N., Hermanto, & Hajeniati, N. (2022). Pengaruh motivasi belajar terhadap hasil belajar matematika siswa kelas X SMA Negeri 1 Meluhu. *Jurnal Pendidik Indonesia*, *4*(1), 27-35. https://doi.org/10.61291/jpi.v2i1.39

Asrah, A., Halimah, A., & Sulasteri, S. (2020). Meningkatkan Motivasi dan Hasil Belajar Matematika Siswa Melalui Model Pembelajaran Team Assisted Individualization (TAI). Alauddin Journal of Mathematics Education, 2(1), 10-21. https://doi.org/10.24252/ajme.v2i1.13642

Andriani, A., Wulandari, P., & Mawaddah, F. (2024). Hubungan Motivasi Belajar Terhadap Prestasi Belajar Matematika Siswa SMA Negeri 1 Sunggal Kelas XI5. Innovative: Journal Of Social Science Research, 4(5), 7993–7999. https://doi.org/10.31004/innovative.v4i5.15859

Ardianik (2022). Pengaruh Motivasi Dan Kemandirian Belajar Terhadap Hasil Belajar Matematika Siswa Kelas VIII SMP Dr. Soetomo Surabaya Selama Pembelajaran Daring, Wahana : Tridarma Perguruan Tinggi, Volume 74 No 2, p. 166-178, http://jurnal.unipasby.ac.id/index.php/whn

Bahurudin Setambah, M. A., Mat Saad, M. I., Che Md Ghazali, N. H. binti, & Adnan, M. (2025). A comprehensive synthesis of differentiated instruction approaches in mathematics. *LUMAT: International Journal on Math, Science and Technology Education*, *12*(4), 3. https://doi.org/10.31129/LUMAT.12.4.2371

Dewi Safitri S. NL, Sutji Rochaminah, Muh Hasbi, Baharuddin, (2024). PENGARUH MINAT DAN MOTIVASI BELAJAR TERHADAP HASIL BELAJAR MATEMATIKA SISWA, Jurnal Pendidikan Matematika: Judika Education, Volume 7, Nomor 1, p. 106-123, DOI : https://doi.org/10.31539/judika.v7i1.10162

Globio, Erwin, (2024) A Meta-Analysis and Systematic Review of the Impact of Differentiated Instruction on Student Achievement in Mathematics. Available at SSRN: https://ssrn.com/abstract=4897167 or http://dx.doi.org/10.2139/ssrn.4897167

Halawa, F., & Malaisari, F. I. (2023). MINAT BELAJAR BERDASARKAN AMSAL 4: 1-27 UNTUK MENINGKATKAN HASIL BELAJAR. Jurnal Excelsior Pendidikan, 4(1), 55–67. https://doi.org/https://doi.org/10.51730/jep.v4i1.42

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 669-684

Hikmal Akbar, Rahmat, La Ndia, (2025). Pengaruh Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa SMP, Jurnal Penelitian Pendidikan Matematika Volume 13 No. 1, p. 37-53, DOI: http://dx.doi.org/10.36709/jppm.v13i1.50098

Jayantika, I. G. A. N. T. ., & Santhika, K. Y. (2023). IMPLEMENTATION OF DIFFERENTIATE LEARNING TO IMPROVE STUDENT LEARNING OUTCOMES IN MATHEMATICS SUBJECT. Indonesian Journal of Educational Development (IJED), 4(1), 67-75. https://doi.org/10.59672/ijed.v4i1.2687

Jumiarti, D. (2020). Kontribusi Persepsi Siswa tentang Jurusan Terhadap Motivasi Siswa dalam Belajar serta Implikasinya pada Program Bimbingan dan Konseling. Tarbawi: Jurnal Ilmu Pendidikan, 16(1), 81–94. https://doi.org/https://doi.org/10.32939/tarbawi.v16i01.559

Kusuma, O. D., & Luthfah, S. (2020). Memenuhi Kebutuhan Belajar Murid melalui Pembelajaran Berdifeerensiasi. Kementerian Pendidikan Dan Kebudayaan.

Kusumaningrini, D. L., & Sudibjo, N. (2021). Faktor-faktor yang mempengaruhi motivasi belajar siswa di era pandemi covid-19. Akademika, 10(01), 145–161. https://doi.org/https://doi.org/10.34005/akademika.v10i01.1271

Laely Rizki Amalia, Tri Saptuti Susiani, Moh Salimi, (2022). Pengaruh Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa Kelas IV SDN se-Kecamatan Gebang Kabupaten Purworejo Tahun Ajaran 2021/2022, Kalam Cendekia: Jurnal Ilmiah Kependidikan, Volume 10 Nomor 3, p. 659-667.

Mariam, R. S., Prasetyo, T., & Kholik, A. (2023). Keterlibatan Orang Tua Terhadap Disiplin Belajar Siswa Dalam Mengerjakan Tugas Di Rumah Selama Pandemi. Jurnal Penjaminan Mutu, 9(01), 24–34. https://doi.org/https://doi.org/10.25078/jpm.v9i01.1980

Marisa, M. (2021). Inovasi kurikulum Merdeka Belajar di era society 5.0. Santhet (Jurnal Sejarah Pendidikan Dan Humaniora), 5(1), 66–78. https://doi.org/https://doi.org/10.36526/js.v3i2.e-ISSN

Mufatikhah, N., Rondli, W. S., & others. (2023). Strategi guru dalam motivasi belajar PPKn siswa SD. Jurnal Educatio FKIP UNMA, 9(2), 465–471. https://doi.org/https://doi.org/10.31949/educatio.v9i2.4667

Nugroho, R., & Attin Warmi. (2022). PENGARUH MOTIVASI BELAJAR TERHADAP HASIL BELAJAR MATEMATIKA SISWA DI SMPN 2 TIRTAMULYA. EduMatSains : Jurnal Pendidikan, Matematika Dan Sains, 6(2), 407–418. https://doi.org/10.33541/edumatsains.v6i2.3627

Nugroho, R., & Attin Warmi. (2022). PENGARUH MOTIVASI BELAJAR TERHADAP HASIL BELAJAR MATEMATIKA SISWA DI SMPN 2 TIRTAMULYA. *EduMatSains : Jurnal Pendidikan, Matematika Dan Sains*, *6*(2), 407–418. https://doi.org/10.33541/edumatsains.v6i2.3627

Okta Dia Wati, Zulyadaini, Harman, Sri Dewi, (2023). PENGARUH MOTIVASI BELAJAR SISWA TERHADAP HASIL BELAJAR MATEMATIKA PADA PEMBELAJARAN KURIKULUM MERDEKA SISWA KELAS X SMA NEGERI 8 KOTA JAMBI, Jurnal Pendidikan Matematika, Volume 7 Nomor 2, p. 209-218, DOI 10.33087/phi.v7i2.319

Oktaviani, D. O. D., & Perianto, E. (2022). Pengaruh dukungan teman sebaya terhadap minat belajar siswa. TERAPUTIK: Jurnal Bimbingan Dan Konseling, 6(1), 127–134. https://doi.org/https://doi.org/10.26539/teraputik.611093

Oktober 2025 Vol. 10 No. 4
E-ISSN: 2656-1417
P-ISSN: 2503-0602
pp. 669-684

Padmore, E., & Ali, C. (2023). Exploring Effective Differentiated Instruction in The Teaching and Learning of Mathematics. *ASEAN Journal* https://ejournal.bumipublikasinusantara.id/index.php/ajsed/article/view/320

Prasetyo, P., Kukuh, K., & Sugeng, S. (2023). Pengaruh Motivasi Belajar Terhadap Hasil Belajar Matematika Siswa Kelas X di SMA Negeri Penajam Paser Utara. *Prosiding Seminar Nasional Pendidikan Matematika, Universitas Mulawarman*, *3*, 218–223. Retrieved from https://jurnal.fkip.unmul.ac.id/index.php/psnpm/article/view/2487

Rahmah, I. Z. (2023). Pengaruh Kurikulum Merdeka Terhadap Motivasi Belajar Siswa di UPT SPF SD Negeri Bontoramba Kota Makassar. Jurnal Guruan Dasar, 8(1), 363–374. https://doi.org/https://doi.org/10.52208/embrio.v8i1.690

Ramadhani, W. A., Assasanaim, H., Resanti, A. A., Ariyanto, S. R., & Rozi, F. (2023). ANALISIS PEMINATAN KOMPETENSI TEKNOLOGI INFORMASI DAN KOMUNIKASI SISWA SEKOLAH MENENGAH PERTAMA. Research and Development Journal of Education, 9(2), 648–657. https://doi.org/https://doi.org/10.30998/rdje.v9i2.15884

Ricardo, R., & Meilani, R. I. (2017). Impak Minat dan Motivasi Belajar terhadap Hasil Belajar Siswa (The impacts of students learning interest and motivation on their learning outcomes). Jurnal Pendidikan Manajemen Perkantoran, 1(1), 79–92. https://doi.org/https://doi.org/10.17509/jpm.v2i2.8108

Slamet Rijanto, Slamet Boediono, (2023). PENGARUH MOTIVASI BELAJAR MATEMATIKA SISWA TERHADAP PRESTASIBELAJAR MATEMATIKA, EduMath: Jurnal Program Studi Matematika, Vol. 6, No. 1, h. 7-15.

Suprihatin, S. (2015). Upaya guru dalam meningkatkan motivasi belajar siswa. Jurnal Pendidikan Ekonomi UM Metro, 3(1), 73–82. https://doi.org/https://doi.org/10.24127/ja.v3i1.144

Suparman, S., & Junaidin, J. (2023). Upaya Sekolah dalam Meningkatkan Motivasi Belajar Siswa di Sekolah Dasar. Jurnal Basicedu, 7(6), 3950–3958. https://doi.org/https://doi.org/10.31004/basicedu.v7i6.6469

Suryaman, M. (2020). Orientasi pengembangan kurikulum merdeka belajar. Seminar Nasional Pendidikan Bahasa Dan Sastra, 1(1), 13–28. https://doi.org/https://ejournal.unib.ac.id/index.php/semiba/article/view/13357

Tegar Noprizal M, Anwar Sadat, Muhammad Iqbal Harisuddin, (2021) PENERAPAN PEMBELAJARAN BERDIFERENSIASI DALAM PEMBELAJARAN MATEMATIKA UNTUK MENINGKATKAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS SISWA, JouME: Journal of Mathematics Education, P.1-1, https://ejournal.universitasmandiri.ac.id/index.php/joume/issue/view/8

Wahyuningsih, Endang., 2017. METODE PEMBELAJARAN DAN MOTIVASI BELAJAR DALAM MENINGKATKAN HASIL BELAJAR MATEMATIKA. Jurnal Penelitian dan Penilaian Pendidikan. 2(2). 189-206. https://doi.org/10.22236/jppp.v2i2.1276

