

THE INFLUENCE OF GUIDED TRAINING METHODS ON STUDENT LEARNING OUTCOMES IN LEARNING MATERIAL SYSTEMS OF TWO VARIABLE LINEAR EQUATIONS

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Abstract

This study aims to determine the effect of guided exercise methods on student learning outcomes in the material system of two-variable linear equations. This study used a quasi-experimental research method on Tondano 1 Public High School students in class XI in the odd semester of the 2022-2023 academic year. The study's results revealed that because $t_{count} > t_{table}$ ($8.441 > 1.694$), H_0 was rejected, and H_a was accepted. Therefore, the learning outcomes of students who are taught using guided practice methods in learning mathematics on the topic of systems of linear equations of two variables are higher than those of students who are taught using conventional learning.

Keywords: Guided learning models, learning outcomes, SPLDV

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh metode latihan terbimbing terhadap hasil belajar siswa materi sistem persamaan linier dua variabel. Penelitian ini menggunakan metode penelitian eksperimen semu terhadap siswa SMA Negeri 1 Tondano pada siswa kelas XI semester ganjil tahun ajar 2022-2023. Hasil penelitian mengungkapkan bahwa karena $t_{hitung} > t_{tabel}$ ($8.441 > 1.694$) maka H_0 ditolak dan H_a diterima. Oleh karena itu, dapat disimpulkan bahwa hasil belajar siswa yang diajarkan menggunakan metode latihan terbimbing dalam pembelajaran matematika topik sistem persamaan linear dua variabel lebih tinggi dari hasil belajar siswa yang diajarkan menggunakan pembelajaran konvensional.

Kata Kunci: Model pembelajaran terbimbing, Hasil Belajar, SPLDV

INTRODUCTION

Education is important in increasing the quality and quantity of strong and qualified human resources. One of the goals of Indonesian independence is to educate the nation's life (Mangelep, 2017; Makahenggeng *etc.*, 2018; Runtu *etc.*, 2023). To achieve this goal, it is necessary to increase the ability and quality of human beings through a learning process (Mangelep 2017; Domu *etc.*, 2020; Rompas *etc.*, 2023). The teacher's ability to carry out various interesting innovations in classroom learning is a requirement that must be met for the smooth running of the learning process, including learning mathematics (Domu & Mangelep 2019; Masrikat *etc.*, 2023).

Mathematics is an abstract concept arranged hierarchically, and its reasoning is deductive. Mathematics learning plays a role in the development of character education for students (Mangelep 2013; Domu *etc.*, 2023). In mathematics, the real world is only used to apply concepts without understanding these concepts (Manambing *etc.*, 2018; Domu & Pesik, 2020). Mathematics is one of the subjects in the school curriculum and determines the quality of education worldwide (Mangelep 2013; Domu *etc.*, 2022).

The lack of success or decreased student learning achievement is caused by the failure to learn in class. One is the need for more use of learning models that match the learning materials (Sulistyaningsih & Mangelep, 2019; Nangon *etc.*, 2022). Word problems are a form of problem that is often found, and these problems are usually taken from everyday life. In line with Turmudi's opinion (Yeti and Luvy, 2020; Boham & Domu, 2021; Tiwow *etc.*, 2022) that mathematics is closely related to problems in everyday life so that mathematics can be quickly applied by students. in life or the world of work in the future. In learning the System of Two Variable Linear Equations (SPLDV) in class, XI SMA students are required to understand and practice SPLDV concepts (Mangelep *etc.*, 2020; Londa & Domu, 2020).

Based on initial observations at SMA NEGERI 1 TONDANO, story problems are one of the problems that students often encounter in learning mathematics, especially SPLDV material. This is shown in students' mistakes in solving existing story problems.

According to Raharjo and Astuti in Katon and Arigayati 2018 (Yeti and Luvy, 2020) that the form of word problems in math problems are questions that are usually related to problems that exist in students' daily lives where the solution uses mathematical sentences that contain operations as follows: ($>$, $<$, \leq , \geq).

The form word problems in this research are mathematical description problems related to everyday life. It can be solved using mathematical sentences, and the word problems given to students in this study are related to the material of a system of two-variable linear equations (Kelung *et al.*, 2018; Kalengkongan, 2021).

When the researchers interviewed one of the mathematics tutors at SMA Negeri 1 Tondano, it was found that, especially in class XI IPA, student mastery related to learning mathematics was still very low, and one of the learning materials was considered very difficult material related to SPLDV. Alternatively, a two-variable linear equation system can be seen from the test scores where the material related to SPLDV almost all students in class XI IPA get grades brought by the KKM or the minimum requirement criteria determined by the school is 60 where the average SPLDV material exam score is still a score 55.

The low understanding of students regarding SPLDV material is evidenced by the average score of the SPLDV material test below the KKM determined by the school of 60. This is since in SMA 1 Tondano, most teachers still use conventional or general learning methods, namely the lecture method, without innovative learning methods. Behaviourism theory states that learning is a behaviour change that can be observed, measured and assessed concretely. In this theory, learning is carried out by providing a stimulus to students so that it causes the right response as desired. This stimulus and response relationship, if repeated, will lead to habits. Certain responses or behaviours are obtained using training or habituation methods, where if students have difficulties or problems, the teacher can tell them to try and try again (Bernadet *et al.*, 2018).

One of the learning methods that researchers consider capable of improving mathematics learning outcomes in SPLDV material is the guided practice method. According to Djamarah (Sari *et al.*, 2018; Tiwow *et al.*, 2022), the guided training method is a good way of teaching to instil certain habits, but it can also be used to gain dexterity, determination, opportunities and skills. This was also reinforced by the results of research conducted by Nilafatma (2020), which found that the use of the guided practice method could improve the mathematics learning outcomes of class XII IPS 2 students of SMA Negeri 1 Cdungung with an average score of 95 after the guided exercise method was applied.

Based on the description above, the authors conducted more in-depth research on using guided practice methods. Hence, the authors conducted research titled Use of Guided Exercise Methods in Mathematics Learning Materials of Two-Variable Linear Equation Systems at SMA Negeri 1 Tondano.

METHOD

The method used in this study is a quasi-experimental research method. This research was conducted at SMA Negeri 1 Tondano in class XI students in the odd semester of the 2022-2023 academic year. The population in this study were all students of class XI SMA Negeri 1 Tondano in the odd semester of the 2022-2023 academic year. The sample in this study was students of class XI who were randomly taken from two homogeneous classes, namely class XI IPA 6 as the experimental class and class XI IPA 5 as the control class. This study has two forms of variables: the independent variable and the dependent variable. The independent variable in this study is the guided practice method in learning mathematics on the topic of Linear Equations of Two Variables. In contrast, the dependent variable is student learning outcomes.

The research design used is the Pretest-Posttest Control Group Design as follows:

Table 1. Pretest-Posttest Control Group Design

Class	Pretest	Treatment	Posttest
Experiment (B)	Y_1B	X_1	Y_2B
Control (A)	Y_1A	X_2	Y_2A

Information:

Experiment (B) : Experimental class using guided practice methods

Control (A) : Control class without using the guided practice method (lecture method)

Y_1B : Preliminary test scores for the experimental class

Y_1A : Preliminary test score for the control class

Y_2B : Final test scores for the experimental class

Y_2A : Final test score for the control class

X_1 : Use of the Guided Exercise Method on the material of two-variable linear equations.

X_2 : Did not receive treatment (lecture method).

Based on the picture above, it can be explained as follows: from several equivalent classes, the classes are divided into two groups: the experimental and the control groups. Before this experimental research was carried out, a pretest was first held in the experimental and control classes to determine student achievement before being given treatment, and in the experimental class, applied learning using the Guided Exercise Method method. In the control group, learning was applied using the method that teachers usually use when teaching in class, namely the lecture method. After a certain period, a post-test is held to measure the acquisition of Mathematics Education learning outcomes, both in the control and experimental classes. The data analysis technique begins with submitting analysis prerequisites, namely normality and homogeneity tests. They are followed by hypothesis testing using the t-test (t-test).

RESULT AND DISCUSSION

1. Description of the research place

This research was conducted in the odd semester of the 2022/2023 school year at SMA Negeri 1 Tondano, located at Jl. G. Agung, Rinegetan, Kec. Tondano Bar., Minahasa Regency, North Sulawesi. This research was conducted in classes Class XI IPA 6 and Class XI IPA 5, where Science Class 6 is the Experimental group. At the same time, Science 5 is the Control group using the Guided Exercise Method in Learning Material System of Two Variable Linear Equations (SPLDV).

2. Description of the data on the results of student scores

a. Experiment Group (Class XI IPA 6)

This research was conducted at SMA Negeri 1 Tondano in class XI where Class XI IPA 6 was represented by the experimental group, which consisted of 17 students and Class XI IPA 5, which was the control group with 18 students.

Furthermore, based on the results of the statistical calculation output, the frequency of the pretest scores of students in the experimental group (Class XI IPA 6) can be seen in the table below:

Table 2. Statistics Frekuensi Pretest Experiment

				Valid	Cumulative
	Frequency	Percent		Percent	Percent
Valid	55	2	11.8	11.8	11.8
	60	6	35.3	35.3	47.1
	65	5	29.4	29.4	76.5
	70	2	11.8	11.8	88.2
	75	2	11.8	11.8	100.0
Total	17		100.0	100.0	

Based on the table above, it is known that the total number of students in the experimental class was 17 people, of which 6 students got a 60 score, 5 students got a 65 score, while students got a 55, 70, and 75 for every 2 students. Furthermore, the value of each student on the Posttest can be seen in the table below:

Table 3. Posttest Class Experiment Frequency Statistics

				Valid	Cumulative
	Frequency	Percent		Percent	Percent
Valid	80	6	35.3	35.3	35.3
	85	4	23.5	23.5	58.8
	90	3	17.6	17.6	76.5
	95	4	23.5	23.5	100.0
Total	17		100.0	100.0	

Based on the output of the posttest score table above, it is known that most students get a score of 80 with a total of 6 students, while students who get a score of 85 and 95 are 4 people each, for students who get a score of 90 are 3 students.

b. Control Group (Class XI IPA 5)

The results of the pretest and posttest scores carried out in Class XI IPA 5 (Control Group) can be seen in Table 4. Furthermore, based on the output results of the Statistics Frequency calculation, the Pretest scores of students in the Control group (Class XI IPA 5) can be seen in the table below:

Table 4. Statistics of Control Class Pretest Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	50	2	11.1	11.1	11.1
	55	3	16.7	16.7	27.8
	60	3	16.7	16.7	44.4
	65	7	38.9	38.9	83.3
	70	3	16.7	16.7	100.0
Total	18		100.0	100.0	

Based on the output of the table above, it can be seen that the pretest value of the control group is where the value of 65 is the highest score obtained by students in the pretest with a total of 7 people. In contrast, for values of 55, 60, and 70 each, there are 3 students, and a value of 50 is 2 students, with a total number of students in the control group of 18 students. Furthermore, the Posttest scores of students in the control group can be seen in the table below:

Table 5. Posttest Frequency Statistics for Control Class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	65	5	27.8	27.8	27.8
	70	10	55.6	55.6	83.3
	75	1	5.6	5.6	88.9
	80	1	5.6	5.6	94.4
	85	1	5.6	5.6	100.0
Total	18		100.0	100.0	

Based on the output table above, it is known that 10 students got a score of 70, while for grades 75, 80, and 85, each student, and a score of 65, as many as 5 students.

3. Results of data analysis

a. Normality test

The normality test was carried out on two data, namely the Pretest and Posttest data for the experimental group and the control group. This study performed the data normality test using the Kolmogrov-Smirnov test or Shapiro-Wilk data table.

Kolmogorov-Smirnov is used to determine whether the data is normally distributed or not, with the following conditions:

- If the significant value is > 0.05 , then the data is normally distributed otherwise,
- If the significant value < 0.05 , the data is not normally distributed. The following is the normality test for research data:

Table 6. Liliefors Normality Test

		Kolmogorov-					
		Smirnov ^a			Shapiro-Wilk		
		Statisti			Statisti		
	Class	c	df	Sig.	c	df	Sig.
Student Learning Outcomes (Posttest)	SPLDV Experiment	.210	17	.055	.834	17	.006
	Control	.354	18	.060	.763	18	.000
Student Learning Outcomes (Pretest)	SPLDV Experiment	.232	17	.065	.859	17	.015
	Control	.245	18	.056	.833	18	.005

Based on the normality test table above, it can be seen that the control and experimental groups, both pretest and posttest, have all numbers greater than 0.05, meaning the data is normally distributed.

- Posttest experimental group sig. $0.055 > 0.05$ normally distributed data.
- Posttest control group sig. $0.060 > 0.05$ normally distributed data
- Pretest experimental group sig. $0.065 > 0.05$ normally distributed data.
- Pretest control group sig. $0.056 > 0.05$ normally distributed data.

b. Homogeneity Test

Before carrying out the Independent Test (T-test) in both classes, namely, the experimental group and the control group, Homogeneity testing was carried out to find out that the data being tested was homogeneous (same), which was a prerequisite before carrying out the Independent test, namely the data must be homogeneous to find out that the data is homogeneous with see the Based On Mean value in the Homogeneity Of Variance table with the conditions where:

- If the Based On Significant Mean value > 0.05 , then the data is considered homogeneous but vice versa
- If the Based On Significant Mean value < 0.05 , then the data is not homogeneous.

The following is the homogeneity test of research data using Levene's test:

Table 7. Homogeneity Test

			Levene			
			Statistic	df1	df2	Sig.
Student	SPLDV	Based on Mean	2.921	1	33	.097
Learning Outcomes		Based on Median	2.152	1	33	.152
		Based on Median and with adjusted df	2.152	1	31.956	.152
		Based on trimmed mean	2.955	1	33	.095

Based on the table above, the sig value based on the mean is $0.097 > 0.05$, so it can be concluded that the variance of the experimental group and control group data is homogeneous (same) so that the prerequisites for conducting hypothesis testing using the independent test (T-test) on this research data can be carried out.

c. Hypothesis testing

After all the data prerequisites were fulfilled, namely, the research data were normally distributed, and the data was homogeneous (same), a hypothesis test was carried out to find the difference in the average of the two groups of students using the independent test (T-test). An independent test (T-test) was conducted to determine whether there were differences in the results of the learning model using the Guided Exercise Method and learning outcomes without using the Guided Exercise Method.

The hypothesis testing was carried out, namely hypothesis testing using the independent test (T-test) on the posttest of the experimental group (Class XI IPA 6) and the control group (Class XI IPA 5). With the decision-making criteria using sig 2-tailed 0.05, namely:

- If the sig (2-tailed) value is < 0.05 , there is an effect of the Guided Exercise Method on the learning outcomes of SPLDV Class XI students of SMA Negeri 1 Tondano
- If the sig (2-tailed) value is > 0.05 , then the Guided Exercise Method has no effect on the learning outcomes of SPLDV Class XI students at SMA Negeri 1 Tondano.

Hypothesis testing can also be done by looking at the t count and t table where the decision-making criteria are:

- If t count > t table, then the Guided Exercise Method has an effect on the learning outcomes of SPLDV Class XI students at SMA Negeri 1 Tondano.
- If t count < t table, then there is no Guided Training Method on the learning outcomes of SPLDV Class XI students at SMA Negeri 1 Tondano.

Table 8. Hypothesis Testing (Independent Samples Test)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2- tailed)	Mean Differ ence	Std. Error Differ ence	95% Confidence Interval of the Difference	
									Lower	Upper
Student SPLDV	Equal variances assumed	2.92 1	.097	8.441	33	.000	16.19 3	1.918	12.290	20.09 6
Learning Outcomes	Equal variances not assumed			8.406	31.77 8	.000	16.19 3	1.926	12.268	20.11 7

Based on the Independent Samples Test table output, the calculated T value is 8,441 with $df = 33$. T table is obtained from the t table distribution with the formula $(df) = n - 2$, where (n) is the number of students = 35 (experimental group and control) with degrees of freedom = $n - 2$ or $35 - 2 = 33$. The results obtained for the T table are 1,694 (see the attached T table distribution). Because in this test, the t count > t table ($8,441 > 1,694$) with a sig (2-tailed) value of $0.000 < 0.05$ means that H_0 is rejected and H_a is accepted where it can be said that there is a significant difference in the average learning outcomes of the experimental group and the control group or there is an influence Guided Exercise Method on SPLDV learning outcomes for Class XI students of SMA Negeri 1 Tondano.

4. Discussion

This research was conducted to determine whether there was an effect of using guided practice methods on student learning outcomes on the material system of two-variable linear equations (SPLDV) Class XI SMA Negeri 1 Tondano. This study used two classes, namely Class XI IPA 6 (experimental group) and Class XI IPA 5 (control group), using a quantitative research design, namely One-Group Pretest-Posttest. Data was collected using a data collection technique in the form of a test (pretest-posttest).

In the Lillieford normality test, the research data obtained that the values for the pretest and posttest of the experimental group (Class XI IPA 6) obtained values of 0.055 and 0.065 were greater than the probability values of 0.05 ($0.055 > 0.05$) and ($0.065 > 0.05$) meaning that the data for pretest and posttest experimental class (Class XI IPA 5) is said to be normal because it is more than the probability value. While the results of the normality test for the control group (Class XI IPA 5) obtained a pretest value of 0.060 and a posttest of 0.056 of the two values, all of which were greater than the probability values of 0.05 ($0.060 > 0.05$) and ($0.056 > 0.05$) so that the data is said to be normal, from both the experimental group represented by Class XI IPA 6 and the control group represented by Class XI IPA 5 all research data based on the results of the Lillieford normality test were all normal so that the research requirements could be continued by carrying out the homogeneity test.

In the homogeneity test of the research data, by looking at the sig value based on the mean, the value of 0.097 is greater than the probability value of 0.05 ($0.097 > 0.05$). It can be concluded that the data from the results of this study are homogeneous or the same, which is a further requirement in testing the hypothesis using an independent test (t-test).

In testing the hypothesis, this study used an independent test (t-test) by looking at comparing the t count and t table values and looking at the significance value after testing using a statistical application, namely, SPSS obtained a t count value of 8,441 and t table 1,694 based on the t table distribution which Yes, by comparing the t count and t table where the t count is greater than t table ($8,441 > 1,694$) with a significantly smaller than the probability value of 0.05 ($0,000 < 0.05$) means that there is a significant effect of the use of the Guided Exercise Method on learning outcomes two-variable linear equation system (SPLDV) material for Class XI IPA SMA Negeri 1 Tondano.

CONCLUSION

Metode Latihan Terbimbing berpengaruh terhadap hasil belajar SPLDV siswa Kelas XI SMA Negeri 1 Tondano. Ini dapat dibuktikan hasil analisis dengan uji statistik menggunakan SPSS 23, dimana dari hasil perhitungan nilai T hitung sebesar 8.441 dengan dengan T tabel 1.694 ($8.441 > 1.694$) dan tingkat signifikan (2 tailed) 0.001 lebih kecil dari nilai probabilitasnya 0.05 ($0.000 < 0.05$) maka dapat disimpulkan bahwa terdapat perbedaan yang signifikan antara kelompok eksperimen dan kelompok kontrol.

Hal ini berarti sesuai hipotesis yang peneliti ungkapkan di BAB 2 yaitu ada pengaruh yang signifikan penggunaan Metode Latihan Terbimbing terhadap hasil belajar materi SPLDV siswa Kelas XI SMA Negeri 1 Tondano artinya bahwa rata-rata perbedaan skor siswa kelompok Eksperimen tidak sama dengan skor siswa kelompok kontrol

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