

## IMPROVING STUDENTS' MATHEMATICAL PROBLEM SOLVING SKILLS USING THE LEARNING CYCLE 5E LEARNING MODEL

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Received March 12, 2025; Received in revised form March 18, 2025; Accepted March 28, 2025

### ABSTRACT

This study aims to examine the effectiveness of the Learning Cycle 5E learning model in improving students' mathematical problem solving skills. This quantitative research uses the Quasi Experimental Research method with an experiment approach. The research subjects consisted of two classes, namely the experimental class and the control class, which were selected from the population of class X students of SMK Negeri 1 Batanghari using the Cluster type random sampling technique. Data were collected through pretest-post test, observation sheet, and students' math daily test scores. Data analysis was conducted using Independent Sample t Test, focusing on pretest, post-test, and N-Gain Score. The results showed significant differences between the Learning Cycle 5E and Direct Instruction models in improving mathematics problem solving skills. In the experimental class, the average pretest score was 36.62, post-test 79.77, and the average increase was 43.15. In the control class, the pretest score was 32.92, post-test 66, and the average increase was 33.08. The higher score increase in the experimental class proves the effectiveness of the Learning Cycle 5E model in improving students' math problem solving skills. This model is proven to be effective and good to use in learning mathematics.

**Keywords:** direct instruction; learning cycle 5e; problem solving ability.

### ABSTRAK

Penelitian ini bertujuan menguji efektivitas model pembelajaran Learning Cycle 5E dalam meningkatkan kemampuan pemecahan masalah matematika siswa. Penelitian kuantitatif ini menggunakan metode Quasi Experimental Research dengan pendekatan eksperimen. Subjek penelitian terdiri dari dua kelas, yaitu kelas eksperimen dan kelas kontrol, yang dipilih dari populasi siswa kelas X SMK Negeri 1 Batanghari menggunakan teknik Random sampling jenis Cluster. Data dikumpulkan melalui pretest-posttest, lembar observasi, dan nilai ulangan harian matematika siswa. Analisis data dilakukan dengan uji Independent Sample t Test, dengan fokus pada nilai pretest, posttest, dan N-Gain Score. Hasil penelitian menunjukkan perbedaan signifikan antara model Learning Cycle 5E dan Direct Instruction dalam meningkatkan kemampuan pemecahan masalah matematika. Pada kelas eksperimen, rata-rata nilai pretest adalah 36,62, posttest 79,77, dan kenaikan rata-rata 43,15. Di kelas kontrol, nilai pretest adalah 32,92, posttest 66, dan kenaikan rata-rata 33,08. Peningkatan nilai yang lebih tinggi di kelas eksperimen membuktikan efektivitas model Learning Cycle 5E dalam meningkatkan kemampuan pemecahan masalah matematika siswa. Model ini terbukti efektif dan baik untuk digunakan dalam pembelajaran matematika.

**Kata kunci:** direct instruction; kemampuan pemecahan masalah; learning cycle 5e.



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## **Introduction**

Mathematics is one of the fields of knowledge that contribute greatly to the advancement of science and technology. Mathematics as the Regina Scintiarum or the queen of science has led humans to the modern, sophisticated era that we live in today. Many fields whose development is influenced by mathematics, such as science, economics, medicine and other general sciences. Mathematics is a compulsory subject and must be mastered by students from elementary school to high school and college at least as a general course.

In KBBI, mathematics is defined as the science of numbers and operational procedures used in solving problems regarding numbers. Clapham & Nicholson (2021), state that mathematics is a branch of science that involves the study of numbers, quantities, data, shapes and spaces and their relationships, especially generalizations and abstractions as well as their application in real world situations. Mathematics cannot be separated from mathematical problems, according to Wahyudi & Anugraheni (2017), mathematical problems are situations that can be in the form of questions/ questions or even statements about mathematical concepts that are fully realized by students and become challenges that cannot be solved immediately with a certain routine procedure.

Suryawan (2020), problems in the context of mathematics are different from exercise problems. In the same statement, (Suryawan, 2020; Oktaviana, Jazim & Vahlia, 2017) also added that mathematical problems are questions that require more thought and a large collection of mathematical theories and techniques that we have, before we can finally determine the correct strategy for solving the question. This statement is in line with Isro'il & Supriyanto (2020), saying that mathematical problems cannot be solved immediately through routine procedures that students already know. Based on this definition, it is concluded that students need problem solving skills in solving a math problem. According to Permendikbud No. 59 of 2014, problem solving ability is one of the objectives of learning mathematics at school, namely so that students have the ability to solve problems in the context of mathematics and outside of mathematics (real life, science, and technology) which includes the ability to understand problems, build mathematical models, solve models and interpret the solutions obtained (Kemendikbud, 2014).

According to Cahyati & Kharisudin (2020), problem solving is a process of applying knowledge to solve problems that can be obstacles, difficulties, challenges, or new situations that require a plan or solution strategy first to get a solution to the problem. According to Polya (1985), problem solving is an attempt to find a way out of difficulties to achieve goals that cannot be achieved immediately. Wahyudi & Anugraheni (2017), define problem solving as an attempt to find a way out of a non-routine problem so that the problem is no longer a problem. Polya (1985), states that there are four stages in solving math problems, namely understanding the problem, making a solution plan, implementing the solution plan, and re-examining the process and results. Wilandari (2018), mentioned that problem solving ability is very important in the process of learning mathematics so that it becomes the general goal of learning mathematics. This is because problem solving ability is one of the benchmarks in solving mathematical problems and is also the focus of mathematics learning at all levels.

The results of observations at SMK Negeri 1 Batanghari show that the mathematical problem solving skills of class X students, especially in story problems, are still low. Based on direct observations made by researchers during the learning process, where two factors were found to cause students' low mathematical problem solving skills, namely the learning process that still applies the lecture method; the use of problems in the learning process tends to be routine problems that do not lead students to improve their problem solving skills.

In line with Fauza et al. (2020), where there are several factors that cause students' low mathematical problem solving skills, including the learning process that has not been able to give students enthusiasm and desire to learn, so that learning is still one-way, there is no strong interaction between teachers and students in the learning process and students have never been taught how students should solve problems so that students are not accustomed to solving problems in the form of problem solving.

In an effort to improve students' mathematical problem solving skills, an innovation is needed in the learning process, one of which can be the application of a learning model. The learning model applied should be student-centered which must be interesting and can arouse students' enthusiasm to be able to play an active role (Ma'arif et al., 2020). One of the learning models that can be applied is the Learning Cycle 5E learning model, which is a learning model based on constructivism in learning, with the basic assumption that "knowledge is built in the mind of the learner" (Muryadi et al., 2024).

Learning Cycle 5E is an integration of various teaching methods because it presents a concept through five stages that facilitate learning. The Learning Cycle 5E model is based on Jean Piaget's theory of knowledge, as well as from the constructivism paradigm learning which is part of Vygotsky's social constructivism and Ausbel's meaningful learning theory (Okafor, 2019). The 5E Learning Cycle learning model relates to the sequence of learning presentation which consists of: Engage, Explore, Explain, Extend or Elaborate, and Evaluate (Tuna & Kacar, 2013). The phases of the Learning Cycle 5E learning model are arranged as Figure 1. as follows:

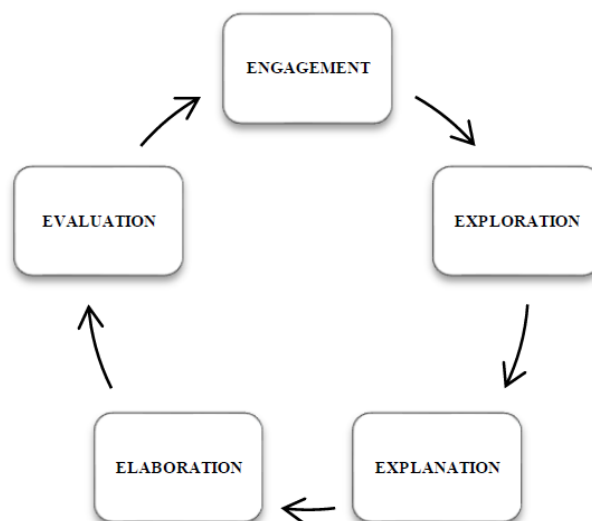


Figure 1. The Phases of Learning Cycle 5E

Figure 1. shows the 5E learning cycle phases starting from the stages of engagement, exploration, explanation, elaboration, evaluation, and returning to the initial phase of engagement, and so on. However, in reality, there is still an application of Direct Instruction, which is one of the models oriented towards the active role of the teacher, either as a mediator, motivator or facilitator (Hunaepi et al., 2019). According to Fadly (2022), the Direct Instruction learning model is the delivery of learning directly by directing students to gain insight and skills gradually according to their level.

Some previous studies that are relevant to the research to be conducted are according to Habibie et al., (2018), which states that the mathematical problem solving ability taught with the learning cycle learning model is higher than the direct learning model received. The results of the study are also in line with Ma'arif et al., (2020), which states that there is an effect of the learning cycle 5E learning model on mathematical problem solving skills. That is, students who take part in learning with the Learning Cycle 5E model have higher results than students who take part in learning with conventional learning models (Direct Instruction).

Based on this description, the researcher is interested in conducting research related to improving students' mathematical problem solving skills using the 5E learning cycle learning model with the main objective of this study is to find out whether the 5E Learning Cycle learning model can provide a significant improvement in students' mathematical problem solving skills and the difficulties faced by students in solving mathematical problems.

### Research Methods

This research was conducted at SMKN 1 Batanghari at the beginning of the even semester of the 2023/2024 school year. This research is quantitative research with an experimental approach. Experimental research method, which is a research method used to seek the effect of certain treatments on others in controlled conditions (Sugiyono, 2013). The research design used is Quasi Experimental Design with the form of Pretest-Post test Control Group Design. There are two classes, namely the experimental class and the control class, each of which is given a pretest and post-test. The experimental class was treated with the Learning Cycle 5E learning model, while the control class used the Direct Instruction model. The details of the treatment of the control class and the experimental class are presented in Table 1 below:

Table 1. Distribution of control class and experimental class treatment

	<b>Direct Instruction</b>	<b>Learning Cycle 5E</b>	<b>Pretest</b>	<b>Posttest</b>
Control Class	✓		✓	✓
Experimental Class		✓	✓	✓

Based on Table 1. Above, it is known that in this study, the experimental class is the class treated with the Learning cycle 5E learning model and the control class is the class treated with the Direct instruction learning model. In this study, the population was all X students of SMK Negeri 1 Batang hari, while the sample consisted of two classes, namely class X MP 1 (control class) and class X TKJ

(experimental class). The two sample classes were obtained based on Random sampling technique with Cluster sample type or referred to as random sampling based on area (Cluster random sampling). To determine the two sample classes, a permutation technique was taken with formula (1) as follows:

(1) 
$$P_r^n = \frac{n!}{(n-r)!}$$

Description:  
 n : Number of samples in the population  
 r : Many samples to be selected

Then the sampling group was taken by lottery technique with the provisions that the first drawn class served as the experimental class and the second drawn class served as the control class. When viewed from the data source, data collection can use primary sources and secondary sources. The data in this study is quantitative data obtained from the test results of students' mathematical problem solving skills in the two sample classes as well as data from the observation sheet of learning implementation in experimental and control classes.

Data collection techniques in this study were in the form of tests and non-tests. For the test used is to use a math problem solving test (essay) before the learning begins (Pretest) and after the end of a series of learning (Post-test) conducted in the experimental class and control class. Meanwhile, the non-test used is observation of the implementation of the Learning cycle 5e learning model in terms of teacher and student activities. The problem solving test instrument consists of 3 description questions that measure four aspects of problem solving based on Polya (1985), namely understanding the problem, planning a solution, implementing the plan, and re-examining the results.

To determine the final score of the problem solving ability test that has been carried out, formula (2) is used as follows:

(2) 
$$S = \frac{R}{N} \times 100$$

Description:  
 S : Expected value (sought)  
 R : Number of scores of correctly answered items or questions  
 N : The maximum score of the test

The problem solving ability score obtained from the calculation is then classified according to Table 2. below:

**Table 2. Problem solving ability score**

Score Range	Category
$85 \leq S \leq 100$	Very Good
$70 \leq S < 85$	Good
$55 \leq S < 70$	Fair
$40 \leq S < 55$	Less
$0 \leq S < 40$	Very Less

(Mawaddah & Anisah, 2015)

Based on Table 2. above, it can be seen the range of categories in the problem solving test assessment. The observation sheet used consists of two kinds, namely the teacher activity observation sheet used to monitor teacher activities and measure the quality of the teaching and learning process and the student activity

observation sheet with the observed aspects, namely student enthusiasm in learning, student response during learning and student activeness in learning. To determine the percentage value obtained through the teacher activity observation sheet and student activity observation sheet, formula (3) is used as follows:

$$(3) \quad \text{Percentage value} = \frac{\text{total score obtained}}{\text{total maximum score}} \times 100\%$$

The teacher and student activity scores that have been obtained are categorized into the success category of student activity as in Table 3:

Table 3. Teacher and student activity criteria

<b>Aktivity (%)</b>	<b>Category</b>
$86 \leq NP \leq 100$	Very Good
$75 \leq NP < 86$	Good
$60 \leq NP < 75$	Fair
$55 \leq NP < 60$	Less
$NP < 55$	Very Less

(Modifikasi Nurpratiwi et al., 2015)

Based on Table 3 above, it is known that the criteria for teacher and student activities are categorized into several criteria with their respective value vulnerabilities. The learning process in the experimental and control classes was carried out for 4 meetings, with details of each meeting lasting 120 minutes. as for the stages of the Learning Cycle 5E model applied to the control class, namely Engage, Explore, Explain, Elaborate, and Evaluate which are applied at each meeting. Data analysis in this study was carried out with the help of SPSS using validity test techniques, reliability, normality test, homogeneity test, N-Gain score test, and hypothesis testing.

The validity test technique uses the Product moment correlation formula proposed by Pearson, which correlates the score of each item with the total score (Susanto et al., 2015). The reliability test in this study was carried out using Cronbach's Alpha. The method used to analyze the data in this study is the inferential statistical method, which analyzes data in the form of numbers (quantitative) statistically and the results of the calculations are used as guidelines in making conclusions.

The normality test in this study was carried out with the Kolmogorov Smirnov test using the SPSS program. With the hypothesis tested is as follows:

- $H_0$  : Pretest Posttest score means are normally distributed
- $H_1$  : Average Pretest Posttest scores are not normally distributed

The Default value for the significant level ( $\alpha$ ) in SPSS is 5% or 0.05. So the test criteria are as follows:

1. If the p-value or (sig.)  $> 0,05$  then  $H_0$  is accepted
2. If the p-value or (sig.)  $< 0,05$  then  $H_0$  is rejected

The homogeneity test was carried out with the levene test using the SPSS program. With the hypothesis tested is as follows:

- $H_0$  : The average score of Pretest Posttest is homogeneous
- $H_1$  : The average Pretest Posttest score is not homogeneous

The way to interpret the levene test on SPSS is if the levene statistic value  $> 0,05$  it can be said that the data variance is homogeneous. So the test criteria are as follows:

1. If the levene statistic value  $> 0,05$  then  $H_0$  is accepted
2. If the levene statistic value  $< 0,05$  then  $H_0$  is rejected

The N-Gain Score test was conducted with the aim of seeing how much improvement occurred from the Pretest Posttest results of experimental and control class students. The N-Gain test was carried out with the aim of seeing the effect of the implementation of learning by applying the Learning cycle 5E learning model on students' mathematical problem solving skills.

As for the hypothesis test, the Independent sample test is used which is formulated in the hypothesis of two-party test statistics (Two tail test).

## Results and Discussion

### *Application of Learning Cycle 5E Learning Model*

Based on the research that has been done, the calculation of the observation sheet of the implementation of the experimental class teacher's activity and the control class teacher's activity is contained in Table 4. as follows:

Table 4. Results of Teacher Activity Observation Sheet

Meeting	Experiment Class				Control Class			
	Max Score	Score Acquisition	Percentage	Criteria	Max Score	Score Acquisition	Percentage	Criteria
1	24	22	91,67 %	Very good	10	9	90 %	Very good
2	24	23	96 %	Very good	10	9	90 %	Very good
3	24	22	91,67 %	Very good	10	9	90 %	Very good
4	24	21	87,50 %	Very good	10	8	80 %	Very good
	<b>Average</b>		<b>91,71 %</b>	<b>Very good</b>	<b>Average</b>		<b>87,5 %</b>	<b>Very good</b>

The observation sheets for the implementation of experimental class students and control class students' activities are contained in Table 5. as follows:

Table 5. Results of student activity observation sheet

Meeting	Experiment Class				Control Class			
	Max Score	Score Acquisition	Percentage	Criteria	Max Score	Score Acquisition	Percentage	Criteria
1	96	83	81,46 %	Very good	40	35	90 %	Very good
2	96	86	90 %	Very good	40	30	90 %	Very good
3	96	80	83,33 %	Very good	40	34	90 %	Very good
4	96	80	83,33 %	Very good	40	30	80 %	Very good
	<b>Average</b>		<b>84,53 %</b>	<b>Good</b>	<b>Average</b>		<b>87,5 %</b>	<b>Very good</b>

Table 4. and Table 5. show the implementation of teacher and student activities which are categorized as very good with the average score obtained

ranging from 84% – 92%. The results obtained are in line with Nurpratiwi et al. (2015), which states that for the implementation score of teacher and student activities in the range of  $86 \leq NP \leq 100$  is categorized as well implemented and in the range of  $75 \leq NP \leq 86$  is categorized as very good.

*Data Description of Pretest Results*

Pretest was conducted before the learning took place which aims to determine the initial conditions between the experimental class and the control class. The results obtained from the Pretest that have been carried out in improving students' mathematical problem solving skills can be seen in Table 6. below:

Table 6. Pretest result data

Class	$x_{max}$	$x_{min}$	Measure of central tendency			Measure of group variance	
			$\bar{x}$	$M_o$	$M_e$	$R$	$Sd$
Experiment	75,34	8,22	36,62	23,28	33,56	67,12	18,65
Control	73,97	2,74	32,92	20,54	32,88	71,23	14,89

Based on Table 6. above, it can be seen that in the experimental class the average student Pretest score is 36.62, while in the control class the average student Pretest score is 32.92.

After testing the two averages using the Independent sample t-test assisted by the SPSS program, the results were obtained as in Table 7. below:

Table 7. Pretest hypothesis test

Class	$\bar{x}_{pretest}$	$t_{count}$	$t_{table}$	$\alpha$	Conclusion
Experiment	36,62	0,905	1,668	0,05	$H_0$ accepted
Control	32,92				

Based on Table 7. above, it can be seen that the average Pretest of the experimental class and control class is the same. This is based on the acquisition of hypothesis testing where  $t_{count} \leq t_{table}$  is  $0,905 \leq 1,668$ . So that  $H_0$  is accepted, which means that there is no difference in the average pretest scores of experimental and control class students. So it can be concluded that students have the same average initial problem solving ability.

*Data Description of Posttest Results*

The posttest was conducted to see how much the Learning cycle 5e learning model in the experimental class and the Direct instruction learning model in the control class had an effect on students' mathematical problem solving ability. The results of the Posttest that have been carried out in improving students' mathematical problem solving skills can be seen in Table 8. below:

Table 8. Posttest result data

Class	$x_{max}$	$x_{min}$	Measure of central tendency			Measure of group variance	
			$\bar{x}$	$M_o$	$M_e$	$R$	$Sd$
Experiment	100	53,42	79,77	100	80,14	46,58	13,57

Control	100	27,40	66	71,23	68,49	72,60	18,54
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Based on Table 8. above, it is known that the average Posttest value in the experimental class is 79.77, while the average Posttest value in the control class is 66.

After testing the two averages using the Independent sample t-test test assisted by the SPSS program, the results are shown in Table 9. as follows:

Table 9. Posttest hypothesis test

Class	$\bar{x}$ posttest	$t_{count}$	$t_{table}$	$\alpha$	Conclusion
Experiment	79,77	3,496	1,668	0,05	$H_0$ rejected
Control	66				

Based on Tebel 9. above, it is known that the hypothesis test on the average Posttest obtained that the average Posttest of the experimental class is greater than the control class. This is based on the acquisition of a hypothesis test where  $t_{count} > t_{table}$  namely  $3,496 > 1,668$ . So  $H_0$  is rejected, which means there is a significant difference between the average Posttest scores of experimental and control class students. So it can be concluded that the average Posttest of mathematical problem solving skills of students who received Learning cycle 5E learning is greater than the average Posttest of mathematical problem solving skills of students who received Direct instruction learning.

#### Data Description of N-Gain Score Results

Based on the Pretest and Posttest data that has been carried out, the N-Gain result data is obtained in Table 10. as follows:

Table 4. Description of n-gain result data

Class	$x_{max}$	$x_{min}$	Measure of central tendency			Measure of group variance	
			$\bar{x}$	$M_o$	$M_e$	$R$	$Sd$
Experiment	1,00	0,30	0,70	1,00	0,71	0,70	0,204
Control	1,00	0,15	0,51	1,00	0,46	0,85	0,228

Based on Table 10. above, it is known that the average N-Gain obtained from the experimental class is 0.70 while in the control class the average N-Gain value obtained is 0.51.

After testing the two averages using the Independent sample t-test assisted by the SPSS program, the results are obtained in Table 11. as follows:

Table 5. N-Gain hypothesis test

Class	$\bar{x}$ N - Gain	$t_{count}$	$t_{table}$	$\alpha$	Conclusion
Experiment	0,70	3,557	1,668	0,05	$H_0$ rejected
Control	0,51				

It can be seen in Table 11. above that the hypothesis test on the average N-Gain of the two sample classes found that the average N-Gain of the experimental class was higher than the average N-Gain of the control class. This is based on the

acquisition of hypothesis testing where  $t_{count} > t_{table}$  is  $3,557 > 1,668$ . So that  $H_0$  is rejected, which means that there is a significant difference between the average N-Gain scores of experimental and control class students. So it can be concluded that the average increase in mathematical problem solving ability of students who received Learning cycle 5E learning is greater than the average increase in mathematical problem solving ability of students who received Direct instruction learning.

The results of the analysis show that the problem solving ability of experimental class students is superior to the control class after receiving the learning treatment. This means that the application of the Learning cycle 5E learning model is able to provide a significant increase in students' mathematical problem solving skills better than the Direct instruction learning model. These results are in line with research conducted by Ma'arif et al., (2020), which states that the Learning cycle 5E learning model can have an influence in terms of improving students' mathematical problem solving skills better than the Direct instruction learning model.

According to Kumalasari (2020), the Learning cycle model is one of the appropriate learning models to be applied so that students can understand mathematics better, by instilling mathematical concepts through a guided process in finding these concepts. Djadir et al (2021), explained that Learning cycle 5E is a learning model based on a structured inquiry approach with students as the center of learning (Student centered) and in accordance with the constructivism approach, so that in the process students act as subjects and not merely objects who only receive information from the teacher.

Djadir et al (2021), added that the learning desired by students is learning that provides opportunities for debate and discussion, in other words, students prefer learning that engages them. Thus, the Learning cycle 5E learning model can be said to be good for use in the mathematics learning process, especially in teachers' efforts to improve students' mathematical problem solving skills.

Based on the results of the tests done by students, several shortcomings were found which indicated the difficulties that students still experience in solving math problem solving ability test questions. To describe these difficulties, it will be seen from the students' test answers according to the indicators of problem solving ability according to Polya (1985), namely understanding the problem, making a solution plan, implementing the solution plan and re-examining the results and processes.

Based on the results of completing the mathematical problem solving ability test questions that have been done by students, the following deficiencies are found:

1. Students still do not write what is known and what is asked in the problem. This statement is emphasized by Midawati (2022), which states that this can be said to be difficulty understanding the problem.
2. Students do not write the formula to be used in solving the problem. Midawati (2022), mentioned that this can be said to be difficulty making a solution plan. Students make calculation errors or are mistaken and incomplete in solving the problem. The errors faced by students are caused by students' inability to carry out the solution plan (Midawati, 2022).

3. Students do not write the conclusion of the solution or the results obtained. This deficiency means that it can be said to be difficulty re-examining results and processes (Midawati, 2022).

The number of student errors has been reduced after getting Learning cycle 5E learning, this still must be considered to maximize student learning outcomes. According to Midawati (2022), in an effort to overcome these difficulties, students are advised to read repeatedly the problems given, teachers can also train students to work on varied problem solving problems so that students are trained to face new and different problems.

### Conclusion and Suggestion

Based on the hypothesis that has been proposed in this study, the decision is obtained, namely reject  $H_0$  ya which means that there is a significant difference between the Learning Cycle 5E learning model and the Direct Instruction model in improving students' mathematical problem solving skills. These results were obtained because the average pretest, posttest and N-Gain Score results generated from both experimental and control classes were different. In the experimental class, the average student Pretest score was 36.62 and the average Posttest score was 79.77 which means there was an increase in the average score of 43.15. While in the control class, the average student Pretest score was 32.92 and the average Posttest score was 66, which means there was an increase in the average score of 33.08. So it can be said that the Learning Cycle 5E learning model is better than the Direct Instruction model. This can be seen from the average gain of the Learning Cycle 5E learning model of 0.70 which is higher than the Direct Instruction model gain of 0.51.

In this study, there are several errors that are still caused by students in solving math problem solving ability test questions. It is known that students experience errors in each step of problem solving proposed by Polya, namely (a) The step of understanding the problem, students still do not write what is known and what is asked in the problem; (b) The step of making a solution plan, students do not write the formula to be used in solving the problem; (c) The step of implementing the solution plan, students make calculation errors or are mistaken and incomplete in solving the problem; (d) The step of re-examining the results, students do not write the conclusion of the solution or the results obtained.

Other researchers are expected to be able to apply research on different materials and or measure other mathematical abilities. It is also recommended to combine with other methods or strategies in learning and can make comparisons of these differences. In addition, it is also suggested that teachers can consider using the Learning Cycle 5E learning model in the learning process, because this learning model is quite effective in improving students' problem solving skills.

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