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## Learning Cycle 9E Learning Model: How Does it Affect Students' Problem Solving Skills?

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**Keywords:**

Problem Solving, The 9E Learning Cycle Instructional Model, Islamic Religious Education.

**Abstract:** Problem-solving skills are essential for achieving optimal learning outcomes. However, student participation in activities that develop these skills remains low, with only about 9% of students actively involved. This indicates a lack of self-confidence and a reluctance to express opinions or participate in discussions, which hinders the development of their problem-solving abilities. The Learning Cycle 9E instructional model is considered effective in enhancing these skills due to its clearly structured learning stages. This study aims to examine the effectiveness of the model in increasing student learning engagement at SMA Negeri 15 Bandar Lampung. The study employed a quantitative approach with a quasi-experimental design, involving class XII F1 as the experimental group and class XII F2 as the control group, both of which were randomly selected using the simple random sampling technique. The results of the normality test showed that the data in both groups were normally distributed (significance values of 0.077 for the experimental group and 0.647 for the control group). The t-test revealed a significance value of 0.590, indicating no significant difference between the two groups. However, students who were taught using the Learning Cycle model demonstrated better problem-solving abilities, were more engaged, and were more capable of applying their knowledge in real-life situations compared to those taught using direct instruction.



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## INTRODUCTION

Education is a deliberate endeavor to transmit values and cultivate individuals into becoming better and more humane persons (Ujud et al., 2023)(Rahman et al., 2022). Learning is the process by which an individual actively acquires information and transforms it into new knowledge or skills (Salsabila Salsabila et al., 2024). In the implementation of learning, there is still a tendency for teachers to involve students insufficiently in active participation (Putri et al., 2021). Education can be likened to the foundation of life that must be built properly, as it plays a vital role in human existence (Nurfadillah et al., 2022).

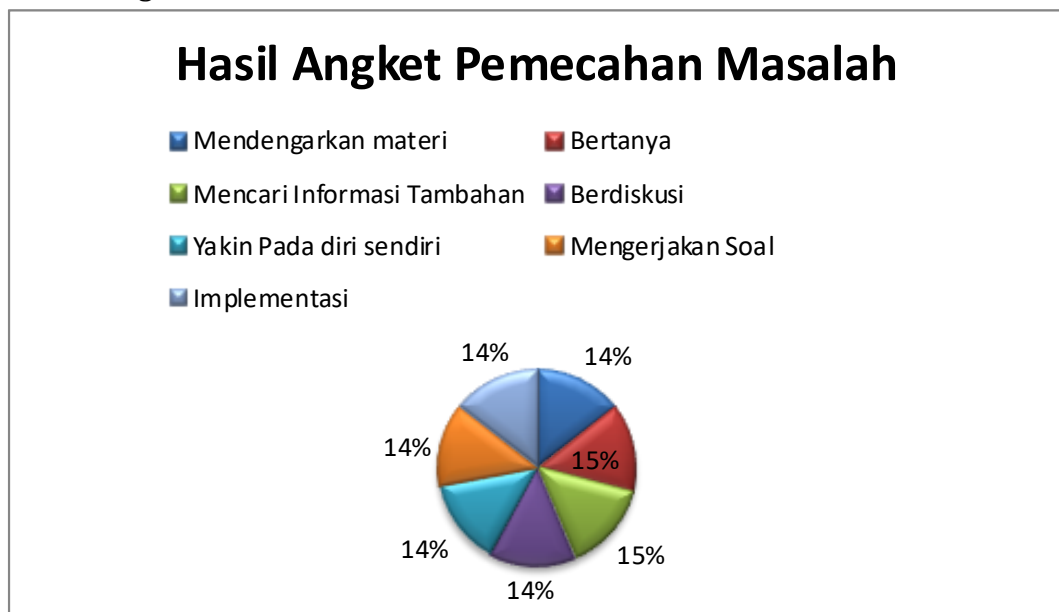
Problem-solving is a cognitive skill that involves gathering facts, analyzing information, exploring multiple solutions, and selecting the most appropriate one (Afifah Nur Zahra et al., 2023). Enhancing the quality of education—particularly in fostering students' problem-solving abilities—requires careful attention and thorough examination by the Indonesian education system (Sonny et al., 2023). To enable students to think more effectively through problem-solving activities, classroom learning must be thoughtfully designed (Marzuqi et al., 2023). Because through this, they can gain experience, apply knowledge, and use the skills they have learned in everyday life (Rosidah et al., 2022)

Therefore, it is advisable to teach problem-solving skills to students from an early age, enabling them to gain experience in handling everyday life situations (Silmi Awalyatun Nisa & Roni Wahyu Wandani, 2023). To address this issue, special attention must be given to efforts aimed at enhancing students' problem-solving abilities through the use of student-centered learning models (Prima Riyani & Muhamad Sofian Hadi, 2023). The 9E Learning Cycle model, according to Kaur Buwono, consists of nine phases: (1) Elicitation, (2) Engagement, (3) Exploration, (4) Explanation, (5) Echo (Exploration and Explanation), (6) Elaboration, (7) Evaluation, (8) Emendation, and (9) E-Search. The 9E Learning Cycle is a teaching model composed of nine interconnected steps, designed to deepen students' conceptual understanding and enhance their engagement in the learning process(Info, 2025). Kaur and Gakhar (2014) describe the 9E Learning Cycle model as a learning process that supports precise and structured analysis to attain more effective and efficient educational results (Hakim et al., 2021).

Aqil explains that problem-solving ability refers to students' capacity to deal with problems, starting from understanding the core of the problem, designing methods or strategies to solve it, and finally applying the strategies they have developed (Widyastuti & Airlanda, 2020). According to Robert L. Solso (Mawaddah, 2015), Problem-solving is a thinking process focused on finding solutions or ways to overcome specific problems (Krisnaningsih, 2021). Saad and Ghani (2008) problem-solving is described as a planned and deliberate process carried out to find solutions to a given problem. In order to solve a problem, students must go through several steps. According to Dewey (1933), the steps in problem-solving include identifying the problem,

analyzing it, formulating hypotheses, gathering data, testing the hypotheses, and drawing conclusions to arrive at a solution (Yanuarisma & Rahaju, 2023).

Based on preliminary research data collected at SMA Negeri 15 Bandar Lampung—which involved observations, interviews, questionnaires, and documentation with students of class XII F1 and the Islamic Education teacher, Mr. Saibani, M.Pd, conducted on November 4, 2024—several issues were identified in the implementation of Islamic Education learning. The identified problems include: (1) students' low problem-solving abilities, due to a lack of motivation to participate in learning; (2) limited student engagement, suggesting that the conventional teaching model used may be ineffective in encouraging student participation, as students are given minimal opportunities to express their opinions; (3) suboptimal use of learning resources, as the instructional model applied by the teacher does not adequately meet students' needs, resulting in difficulties in understanding the material; and (4) inadequate support for students' individual needs, where teachers often struggle to provide sufficient attention and assistance, partly due to underutilization of available educational technology, despite the existence of facilities that could support more innovative learning.



**Figure 1. Results of Problem Solving Questionnaire**

Based on the results of the problem-solving questionnaire presented in the diagram, it is evident that most indicators show relatively equal proportions, around 14%, except for two slightly higher indicators 'Asking Questions' and 'Seeking Additional Information' each reaching 15%. Although the difference is not significant, this suggests that the abilities to ask questions and seek additional information are seen as slightly more prominent needs compared to other indicators. However, attention should be given to indicators such as 'Listening to the Material', 'Participating in Discussions', 'Self-Confidence', 'Solving Problems', and 'Implementation', each of which

only reached 14%, indicating that these essential aspects are still not fully optimized. The main issue lies in the 'Implementation' indicator, which ideally represents the peak of the problem-solving process, yet shows a proportion equal to early-stage indicators such as 'Listening to the Material'. This highlights that, although students may have understood the material, they are still not fully capable of applying the solutions in real-life situations.

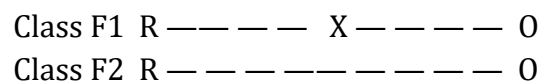
The results of previous research conducted by Rini Husna Azzahra & Heni Pujiastuti, which discusses a similar topic, shows that the problem-solving ability of Grade XII F1 students at SMA Negeri 15 Bandar Lampung is still relatively low. This is due to the following reasons: (1) In the problem comprehension stage, students are not yet fully able to grasp or understand the content of the problems presented; (2) in the planning stage, students struggle to develop appropriate strategies or steps to solve the problems; (3) in the implementation stage, students perform inaccurate calculations, leading to incorrect solutions; and (4) in the review stage, students tend to stop after finding a solution without verifying or drawing conclusions from their work (Nurhayati & , Langlang Handayani, 2020). In general, problem-solving according to Polya consists of four main stages that serve as a reference in addressing a problem: (1) Understanding the Problem, where students are required to identify the given information, existing elements, quantities, relationships, and relevant values, as well as determine what needs to be found; (2) Devising a Plan, the stage at which students must determine the operations or steps needed to solve the problem; (3) Carrying Out the Plan, which involves applying the chosen strategy, translating information into mathematical form, and performing the solution process and calculations; and (4) Looking Back, the stage in which students evaluate the results and review the problem-solving process they have carried out (Silmi Awalyatun Nisa & Roni Wahyu Wandani, 2023).

The study conducted by Anggraeni and Herdiman (2018) revealed that, in terms of gender, female students tend to demonstrate superior problem-solving abilities compared to their male counterparts, which ultimately also affects their critical thinking skills (Ngongo & Efendi, 2021). This difference occurs because females tend to have better time management skills compared to males. However, this contrasts with the findings of Nur and Palobo (2018), which indicate that males actually outperform females in problem-solving abilities. This is attributed to the fact that females often face difficulties in understanding the problems presented to them (Amanaturrahmah & Samsudin, 2022). Female subjects experience difficulty in describing or visualizing the problems they encounter (Hanggara et al., 2022). This study presents a novelty in the application of the Learning Circle 9E model, which is still rarely used in secondary education, particularly in enhancing students' problem-solving skills. Using a quasi-experimental design, the study provides empirical evidence of the model's effectiveness in fostering critical thinking skills and contributes to the development of active and constructivist learning models. Therefore, the aim of this study is to determine the

extent to which the implementation of the 9E Learning Cycle model influences students' problem-solving abilities in Islamic Religious Education at SMA Negeri 15 Bandar Lampung.

## METHODOLOGY

This study employs a quantitative approach, which relies on numerical data and statistical analysis to process information obtained from the field. The aim is to produce accurate and objective results. The type of research used is a Quasi-Experimental Design, specifically the Posttest-Only Control Group Design.



**Figure 2.**  
**The Posttest-Only Control Group Design Scheme**

Keterangan:

- Class F1 : The class that received the treatment (9E Learning Cycle instructional model).
- Class F2 : The class that received the treatment (conventional instructional model).
- X : Treatment (intervention)
- O : Post-test result

This design is utilized to determine the effect of a treatment or intervention on the research subjects. In this study, there are two variables: the independent variable, which is the Question Students Have learning model, and the dependent variable, which is problem-solving ability.

The sampling technique used in this study was simple random sampling, a method in which every member of the population has an equal chance of being selected as a sample. The population consisted of all 279 twelfth-grade students at SMA Negeri 15 Bandar Lampung, distributed across 9 classes. This number and distribution provided a sufficient basis to represent the entire twelfth-grade student body in the study. Through this technique, two classes were selected as research samples: class XII F1 as the experimental group, which was taught using the Learning Cycle model, and class XII F2 as the control group, which received instruction using a conventional learning model. Thus, the population in this study comprised all twelfth-grade students at SMA Negeri 15 Bandar Lampung.

This study utilized a non-test instrument in the form of a Likert-scale questionnaire. The questionnaire was designed to assess students' problem-solving abilities, based on indicators developed by Sudjana. According to Sudjana, there are seven indicators of problem-solving skills: (1) students actively engage in tasks during the learning process, (2) students participate in learning activities that require

problem-solving, (3) students ask questions to the teacher or peers when encountering difficulties or not understanding the material, (4) students seek the necessary information to solve problems, (5) students engage in group discussions as guided by the teacher, (6) students are able to evaluate their abilities and learning outcomes, and (7) students practice solving problems and applying the knowledge they have acquired to complete tasks or overcome challenges.

In this study, the instrument consisted of 21 questionnaire items. Prior to distribution, the questionnaire underwent a validation process by expert validators. Once declared valid, it was administered to a trial class. The data collected from the trial were then tabulated and analyzed using SPSS software to assess the validity of the questionnaire. The analysis revealed that 19 out of the 21 items were valid. These 19 validated items were subsequently used in the main study and administered to both the experimental and control classes. Validity testing was conducted to ensure that the instrument accurately measured what it was intended to measure, using the Pearson Product Moment Correlation formula.

This study also conducted a reliability test to determine the extent to which the measurement results can be trusted. The level of reliability was measured using the Cronbach's Alpha formula. In addition, several prerequisite tests were carried out. A normality test was conducted to examine whether the data were normally distributed, using the Liliefors test method. Furthermore, a homogeneity test was performed to determine whether the variances among populations were equal, using Bartlett's test. To test the hypothesis, this study employed an Independent Sample T-Test, which aims to identify the relationship or effect between the independent and dependent variables. The reliability test results used in this study are presented in Table 1 below:

**Table 1. Reliability Test Results**

Reliability Statistics	
Cronbach's Alpha	N of Items
,895	19

Based on the reliability test results derived from the Cronbach's Alpha value, where  $R_{\text{calculated}} > R_{\text{table}}$ , the instrument is considered reliable. The reliability coefficient obtained was 0.895, indicating that the instrument is sufficiently trustworthy. The data analysis was conducted on students from class XII F1 as the experimental group and class XII F2 as the control group, in order to assess problem-solving abilities in the Islamic Religious Education (PAI) subject.

## RESULT AND DISCUSSION

### Test of Normality

The normality test was conducted to determine whether the collected data were normally distributed. Data are considered normally distributed if the significance value is greater than 0.05. In this study, the Lilliefors test was used. The results of the learning activity of Grade XII students at SMA Negeri 15 Bandar Lampung are presented in Table 2 below:

**Table 2. Description of The Normality Test**

Group	Tests of Normality					
	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Eekperimen (Learning Cycle 9E)	,119	31	,200*	,939	31	,077
Kontrol (Konvensional)	,085	31	,200*	,974	31	,647

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the results of the Shapiro-Wilk test, the experimental group obtained a value of 0.077, which is greater than 0.05. This indicates that the data for this group are normally distributed. The control group also showed a value of 0.647, which is likewise above 0.05. Therefore, it can be concluded that the data from both groups are normally distributed, as their significance values exceed 0.05.

### Test of Homogeneity

The homogeneity test is used to determine whether the data distribution has equal variance (homogeneous) or not (heterogeneous) (Sianturi, 2022). Data are considered homogeneous if the significance value is greater than 0.05. In this study, the test used was the Bartlett test. The results of this test are explained as follows and presented in Table 3 below:

**Table 3. Description of The Homogeneity Test**

		Test of Homogeneity of Variances			
		Levene			
		Statistic	df1	df2	Sig.
Pemecahan	Based on Mean	,293	1	61	,590
Masalah	Based on Median	,342	1	61	,561

Based on Median and with adjusted df	,342	1	60,702	,561
Based on trimmed mean	,318	1	61	,575

Based on the figure, the results of the homogeneity test show a significance value greater than 0.05, specifically 0.590. This indicates that the learning activity data of Grade XII students at SMA Negeri 15 Bandar Lampung are homogeneous or have equal variance.

**Test of Hypothesis**

In this hypothesis testing, the T-test was used to determine whether one variable influences another. (Widiastuti et al., 2022). This study employed a simple independent T-test. The results of the test on the learning activeness of Grade XII students at SMA Negeri 15 Bandar Lampung are presented in Table 4 below.

**Table 4. Description of The Hypothesis Test**

		Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Nilai	Equal variances assumed	,293	,590	4,446	61	,000	10,198	2,293	5,612	14,784
	Equal variances not assumed			4,439	59,935	,000	10,198	2,297	5,602	14,793

Based on Table 4, the results of the T-test using SPSS show a significance value of 0.590, which is greater than 0.05. This indicates that the 9E learning cycle model is not effective in improving students' problem-solving skills in Islamic Education (PAI) at SMA Negeri 15 Bandar Lampung.

The 9E Learning Cycle model aims to encourage students to be more active and to help them improve their problem-solving abilities through social interaction and engagement in learning (Firdiana et al., 2023). However, despite its implementation, the study findings indicate that this model has not had a significant impact on students' problem-solving skills in Islamic Education at SMA Negeri 15 Bandar Lampung (Hutapea et al., 2025). The results of the T-test analysis show a two-tailed significance value of 0.000 which is higher than the significance threshold of 0.05. Therefore, the null hypothesis ( $H_0$ ) is rejected and the alternative hypothesis ( $H_A$ ) is accepted. This means there is no significant difference between the experimental class using the 9E Learning Cycle model and the control class using traditional teaching methods in terms of problem-solving ability (Kusnadi et al., 2021). In conclusion, the 9E Learning Cycle model has not been proven effective in enhancing students' problem-solving skills during the learning process (Nur & Noviardila, 2021)

Several key factors contribute to the ineffectiveness of this model. Students' lack of readiness to engage in more active learning methods has resulted in their low problem-solving abilities (Rofi'ah & Rokhmaniyah, 2024). Based on observations and interviews with teachers and students, it was found that most students are still accustomed to passive, conventional teaching methods, which rarely train them to think critically or independently find solutions (Faidah et al., 2022). A lack of participation in discussions and insufficient exposure to concept introduction have made it difficult for students to identify, analyze, and solve problems encountered during the learning process (Wardani, 2023). In addition, limited experience with exploratory learning has hindered the optimal implementation of innovative instructional models (Khatimah et al., 2025).

The second factor is the limited time available to implement all stages of the 9E Learning Cycle model, which poses a significant challenge. This model consists of nine stages that are ideally meant to be carried out in full (Cahyani et al., 2021). However, certain stages—such as Exchange and Empower—require considerable time, and the limited duration of class periods hinders their optimal implementation (Hakim et al., 2021)

The third factor is an unsupportive classroom environment. Observations revealed that the physical conditions and learning atmosphere in the classroom were not conducive to active learning. The lack of technological facilities (Maritsa et al., 2021). limited teacher training, and insufficient availability of appropriate learning media hinder the development of more exploratory and interactive learning. These limitations make it difficult for students to develop critical and independent thinking skills (Ditha et al., 2025).

Lastly, low student motivation affects their problem-solving abilities. Dan yang terakhir Rendahnya motivasi belajar siswa memengaruhi kemampuan mereka dalam memecahkan masalah (Mawaddah et al., 2023). According to the questionnaire results, only 9% of students actively participated in activities aimed at developing problem-solving skills. This reflects a lack of self-confidence and a reluctance to express opinions or engage in discussions—key barriers to developing their problem-solving abilities (Meidiyanti et al., 2021). As a result, students' critical thinking and problem-solving skills do not develop optimally (Suyantana et al., 2023)

Although this study did not show a significant improvement in students' learning activeness, the learning approach emphasized thinking processes, observation, and the exploration and discovery of solutions to given problems (Tarigan et al., 2022). The study recommends that instructional models be adapted to the students' conditions and characteristics and combined with other strategies to enhance their motivation and engagement (Nabila & Mujazi, 2023). Perubahan dalam penerapan model Learning Cycle 9E, Modifications to the implementation of the 9E Learning Cycle model such as simplifying its stages or integrating it with educational technology could be effective solutions for improving Islamic education outcomes at the senior high school level (Ida et al., 2023). Future research could focus on other factors that influence student engagement, such as how teachers involve students, the use of formative assessment methods, and the role of the social environment in supporting student participation (Susilowati, 2022).

The results of this study indicate that integrating the learning model with conventional teaching methods can enhance problem-solving skills in Islamic Religious Education. Students who were taught using the Learning Cycle model demonstrated better problem-solving abilities compared to those who learned through direct instruction. They were also more actively engaged in the learning process. Furthermore, the students were able to apply the material learned to real-life situations. These findings provide new insights for the development of more effective teaching methods.

## CONCLUSION

Based on the research findings, it can be concluded that the 9E Learning Cycle model does not have a significant impact on improving students' problem-solving abilities in Islamic Religious Education at SMA Negeri 15 Bandar Lampung. This is supported by the results of the t-test, which showed no significant difference between the experimental and control classes. Several key factors contributed to this outcome, including students' lack of preparedness, limited time for implementing the model, low learning motivation, and an unsupportive learning environment. Although the 9E Learning Cycle model did not show a significant effect on problem-solving skills in this study, the results still offer valuable insights for the future development of teaching methods. Therefore, adjustments and modifications in the implementation of the model

are necessary to better align with students' characteristics and to take into account other factors that can enhance their problem-solving abilities.

This study has certain limitations, particularly in its narrow scope, as it was applied to a single educational level and subject area, and within a limited time frame. Furthermore, the research employed a quantitative approach, which did not explore qualitative aspects such as student motivation and classroom interaction. For future research, it is recommended that the Learning Circle 9E model be tested across more diverse educational levels and contexts, and that a mixed-methods approach be employed to enrich the understanding of the model's overall impact.

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