International Journal of Education, Vocational and Social Science
https://e-journal.citakonsulindo.or.id/index.php/IJEVSS
E-ISSN : 2963 4954
IJEVSS

The Effectiveness Of A Project-Based Learning Model Using Mind Mapping Instructional Materials On Eighth-Grade Students' Comprehension Of Islamic Cultural History

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Abstract

This study aimed to analyze the effectiveness of the Project-Based Learning (PjBL) model supported by mind mapping teaching materials in improving students' understanding of Islamic Cultural History (SKI) among eighth-grade students at SMP Negeri 2 Cikajang. The study employed a quantitative approach using a one-group pretest-posttest design involving 30 students selected through purposive sampling. Data were collected through pretests and posttests and analyzed using a paired-sample t-test and N-Gain analysis. The results revealed an increase in the mean score from 80.36 on the pretest to 85.16 on the posttest. The paired-sample t-test yielded a significance value of $p < 0.001$, indicating a significant improvement in students' understanding after the implementation of the PjBL model supported by mind mapping materials. However, the N-Gain score was 0.247 (24.72%), which falls into the low category, indicating that the level of effectiveness was not yet optimal. Therefore, while the PjBL model supported by mind mapping materials significantly improved students' understanding, its overall effectiveness remained relatively low.

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Keywords: Islamic Cultural History (SKI); Mind Mapping; Project Based Learning; Students' Understanding.

INTRODUCTION

The learning of Islamic Cultural History (SKI) plays a crucial role in helping students understand the development of Islamic civilization and draw exemplary values from various historical events to be applied in daily life. However, SKI materials, which contain numerous facts, figures, events, and historical chronologies, are often perceived as complex subjects, causing students to experience difficulties in understanding the interconnections among the concepts learned (Prameswati et al., 2022). This condition causes learning to tend to be oriented towards mastering information and memorization rather than a deep understanding of the meaning of Islamic historical events (Mufarrohah & Khoeroni, 2025). Consequently, student involvement in the learning process becomes suboptimal because opportunities to explore, connect, and construct knowledge remain limited. These conditions indicate the need for a more innovative and student-centered learning model. From a constructivist perspective, understanding will be optimally formed when students actively build their knowledge through learning experiences, exploration, and interaction with the learning environment (Putri & Winangun, 2025).

Preliminary observations at SMP Negeri 2 Cikajang indicated that SKI learning was still dominated by the lecturing method, causing students to tend to be passive during the learning process. Based on the learning evaluation results, some students had not achieved the expected level of understanding. This finding is in line with the research by Prameswati et al. (2022), which states that historical materials are often considered complex because they contain a lot of information that must be understood sequentially. This condition demonstrates the need for learning strategies capable of helping students understand the interconnections between concepts more systematically.

In line with constructivist principles, learning needs to be designed so that students actively construct their knowledge through meaningful learning experiences. The application of activity-based learning is known to have a significant role in improving the quality of students' understanding. Project-Based Learning (PjBL) can encourage active student involvement in the learning process while simultaneously enhancing higher-order thinking skills and a deeper understanding of concepts (Loyens et al., 2023). Furthermore, the implementation of PjBL is also associated with increased motivation, learning activities, and student learning outcomes at various educational levels (Septianingsih et al., 2025). In its implementation, support from

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strategies that can help students organize information systematically is required, one of which is mind mapping, which functions as a visual technique for arranging and connecting learning concepts. The use of mind mapping can assist students in organizing information visually so that relationships between concepts become easier to understand and remember during the learning process; the use of mind mapping contributes to improving student understanding as it helps to arrange materials in a more structured and systematic manner (Sholeh, 2021).

Both approaches also show their relevance in learning Islamic Cultural History. The implementation of Project-Based Learning in the SKI subject can increase student involvement through a more active and meaningful learning process (Amalia & Nugroho, 2025). This model also contributes to the improvement of students' understanding and critical thinking skills as it encourages them to collaborate and explore materials more deeply (Rahayu, 2025). On the other hand, the use of mind mapping helps students understand the linkages between historical events more systematically, thereby having an impact on improving learning outcomes (Kusumaningtyas, 2025).

Furthermore, various studies have shown that the integration of Project-Based Learning (PjBL) with mind mapping has a positive impact on the learning process and outcomes. Combining these two approaches can help students understand learning concepts better compared to conventional learning because students participate in project completion while simultaneously acquiring visual aids to organize the information learned (Sukaesih et al., 2022). Besides contributing to an improved understanding of concepts, the application of PjBL combined with mind mapping can also improve student learning outcomes through active participation in the learning process and ease in systematically connecting various pieces of information (Pratiwi & Fatmawati, 2025). Furthermore, the use of mind mapping in project-based learning not only impacts cognitive aspects but also can increase students' learning interest and critical thinking skills, making the learning process more meaningful and student-centered (Kurniawati et al., 2024). These findings indicate that the combination of PjBL and mind mapping has the potential to become an effective alternative learning method to improve the quality of students' understanding.

The implementation of learning that integrates Project-Based Learning and mind mapping has also been applied in eighth-grade SKI learning at SMP 2 Cikajang as an effort to improve students' understanding of the material studied. The application of both approaches is based on the need to create more active, systematic, and meaningful learning so that students not only understand historical facts but are also able to connect the various concepts contained therein.

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Although various studies have proven the benefits of both Project-Based Learning and mind mapping in improving learning quality, studies that combine these two approaches in the Islamic Cultural History (SKI) subject at the junior high school (SMP/MTs) level are still relatively scarce. Most previous studies tested the effectiveness of Project-Based Learning or mind mapping separately across various subjects. Research integrating both approaches simultaneously in the Islamic Cultural History subject at the junior high school level remains limited. Additionally, previous research has focused more on learning outcomes and learning motivation, whereas studies specifically measuring students' understanding of SKI materials are still relatively few. The novelty of this research lies in the integration of the Project-Based Learning model with mind mapping teaching materials in learning Islamic Cultural History to improve student understanding. Unlike previous studies that generally examined the two approaches separately, this study combines both in a single instructional design oriented towards strengthening the understanding of Islamic historical concepts.

Based on this description, the research question of this study is: Is the Project-Based Learning model based on mind mapping teaching materials effective in improving students' understanding of the eighth-grade Islamic Cultural History subject? Meanwhile, the objective of this study is to analyze the effectiveness of the Project-Based Learning model based on mind mapping teaching materials on students' understanding of the eighth-grade Islamic Cultural History subject.

RESEARCH METHODS

This study employed a quantitative approach to measure the effectiveness of implementing the Project-Based Learning model based on mind mapping teaching materials on students' understanding in the Islamic Cultural History (SKI) subject. The research design used was a one-group pretest-posttest design, involving a single research group that was administered a test before the treatment (pretest) and after the treatment (posttest). This design allows researchers to identify changes in students' understanding after participating in the provided learning process (Creswell, 2015).

The population in this study was all eighth-grade students of SMP Negeri 2 Cikajang, totaling 305 students. The research sample was selected using a purposive sampling technique, namely one eighth-grade class serving as the experimental group with a total of 30 students.

The data collection technique used was a test. The test instrument consisted of pretest and posttest questions formulated based on the indicators of students' understanding of the SKI

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material. The test was administered before and after the application of the learning model to determine the improvement in students' understanding.

Data analysis in this study employed two main statistical tests utilizing SPSS software. First, a paired sample t-test was used to test the significance of changes or differences in students' scores before and after the treatment, after ensuring the data met the normality prerequisite test. Second, the data were analyzed using Normalized Gain (N-Gain) to determine the level of improvement in students' understanding after participating in the learning process. N-Gain is a measure of normalized learning outcome improvement that considers the difference between the initial score and the maximum possible score, thereby depicting the effectiveness of learning more proportionally compared to merely using the difference between the pretest and posttest scores (Hake, 1998).

RESULTS AND DISCUSSION

A. Research Results

Data refers to any form of information or details related to a condition, phenomenon, or event. In this study, the type of data used is quantitative data, namely numerical data where facts and phenomena are not presented in natural language but in numerical form (Fitri et al., 2023). The data utilized originated from the students' exam scores prior to the implementation of the PjBL method and their scores after using the PjBL method.

The first step in data analysis is establishing the research hypothesis. A hypothesis is a temporary statement whose truth must be proven through testing. Thus, a hypothesis can be understood as an initial assumption or temporary answer that must be tested to ensure its validity. In the context of statistics, a hypothesis is defined as a statement regarding population conditions (parameters) that will be tested based on data obtained from the research sample (statistics) (Wulansari, 2018). The hypotheses in this study are as follows:

a. H0: There is no difference in the understanding of eighth-grade students before and after the application of the Project-Based Learning (PjBL) method in SKI learning.
b. H1: There is a difference in the understanding of eighth-grade students before and after the application of the Project-Based Learning (PjBL) method in SKI learning.

The second step in data analysis in this study was conducted through descriptive statistics, which is a method used to process, summarize, and present data to make it easier to understand, such as in the form of tables or graphs. Through the use of numerical and visual data, descriptive

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statistics help identify patterns within a dataset, summarize existing information, and present it according to needs (Terimajaya et al., 2024). The results of the descriptive test data processing are presented in Table 1 below:

Table 1. Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Sebelum_PjBL	30	74,00	85,00	80,3667	3,31645
Setelah_PjBL	30	79,00	92,00	85,1667	3,33305
Valid N (listwise)	30				

Based on Table 1, there is a visible change in the indicators of students' score achievements before (pre-test) and after (post-test) the application of the Project-Based Learning (PjBL) method. Before the PjBL method was applied, the students' scores had a minimum value of 74.00 and a maximum of 85.00, with an average score (mean) of 80.36 and a standard deviation of 3.31. This relatively large standard deviation value indicates that the variation in the distribution of students' initial abilities regarding the understanding of SKI material is still relatively high.

After the PjBL method was applied, the students' scores experienced a fairly positive shift, where the minimum score increased to 79.00, the maximum score reached 92.00, and the overall average linearly increased to 85.16. The standard deviation after implementation reached 3.33. The score data before PjBL can be seen in Figure 1, which is the result of the SPSS histogram output.

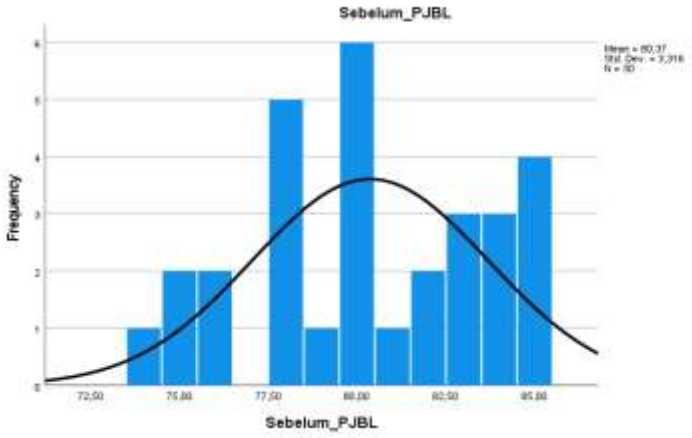


Figure 1. Histogram Before the Project-Based Learning Method

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From Figure 1, it can be seen that the minimum score is 75.00 and the maximum is 85.00. Additionally, the histogram results after the application of the Project-Based Learning method can be seen in Figure 2.

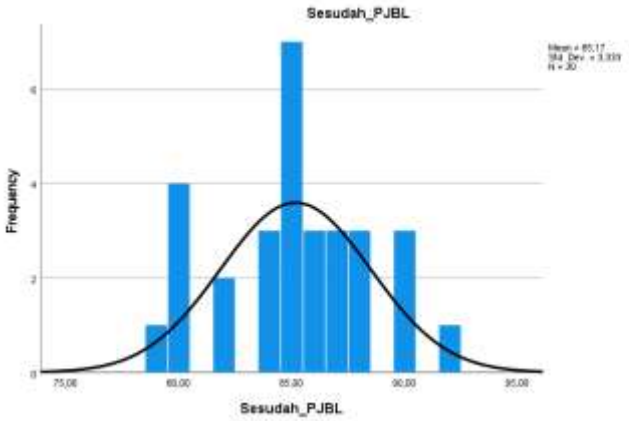


Figure 2. Histogram After the Project-Based Learning Method

In Figure 2, an increase in student scores is apparent after the PjBL method was applied, with the minimum score becoming 79.00 and the maximum 92.00.

The third step of the data analysis involved performing a data normality test. The normality test is a procedure to assess whether the obtained data is normally distributed so that it is suitable for use in parametric (inferential) statistical analysis. In other words, this test aims to determine whether empirical data from the field conforms to a specific theoretical distribution (Priati et al., 2022). The results of the data normality test can be seen in Table 2 below:

Table 2. Data Normality Test

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Before_PjBL	,120	30	,200 *	,945	30	,096
After_PjBL	,147	30	,098	,960	30	,242
*. This is a lower bound of the true significane a. Lilliefors Significance Correction						

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The results of the prerequisite analysis test were conducted using the Kolmogorov-Smirnov and Shapiro-Wilk normality tests to ensure the data distribution of students' understanding scores. The analysis results showed the significance value (Sig.) before the application of the PjBL method (pre-test) was 0.200* (Kolmogorov-Smirnov) and 0.096 (Shapiro-Wilk). Meanwhile, the significance value after the application of PjBL (post-test) was 0.098 (Kolmogorov-Smirnov) and 0.242 (Shapiro-Wilk). Because all significance values were consistently greater than the 0.05 level (Sig. > 0.05), it can be concluded that the data of students' understanding scores, both before and after the application of the PjBL method, were normally distributed. This indicates that the data meets the normality requirements, rendering it suitable for use in parametric statistical analysis, specifically the related/paired two-sample t-test (Paired Samples Test).

The results of the data distribution in the form of Normal Q-Q Plots before and after the application of the Project-Based Learning method are presented in the form of Gambar 3 below:

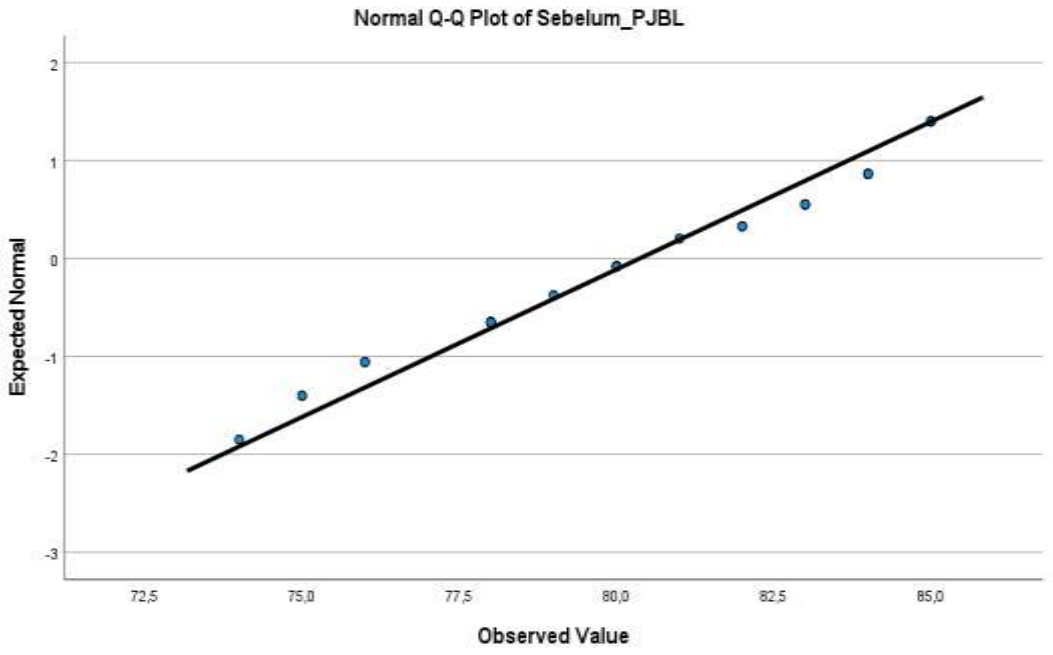


Figure 3. Normal Q-Q Plot Before the Project-Based Learning Method

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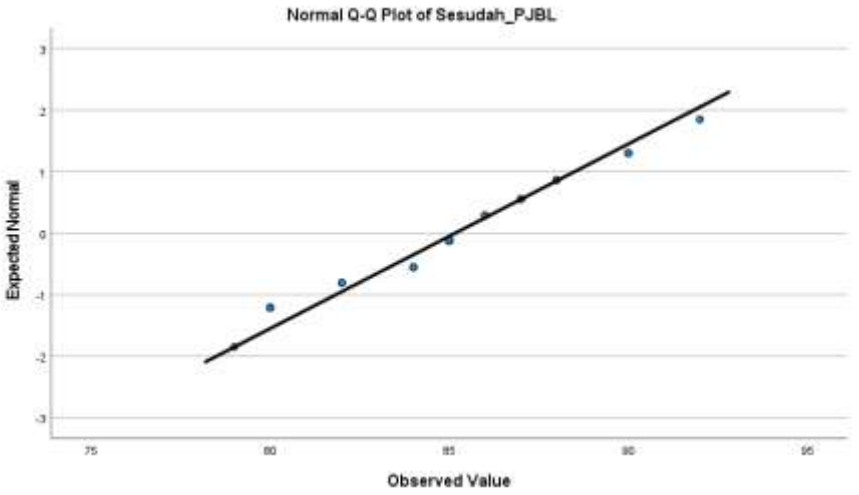


Figure 4. Normal Q-Q Plot After the Project-Based Learning Method

Based on the Normal Q-Q plot graph before and after the application of the Project-Based Learning method, both show a pattern of points that tend to follow the diagonal line. This indicates that both before and after the application of the learning method, the data are normally distributed. However, minor differences can be seen in the pattern of several points, especially in the lower values, where the distribution appears less tight against the diagonal line before the implementation. After the implementation, there is a change where the points begin to close in on the diagonal line. This shows that after the implementation of the PjBL learning method, the data distribution became more stable and closer to normal compared to before. Thus, both datasets meet the normality criteria, but the post-treatment data shows a better distribution pattern.

The fourth step in this data analysis was conducting a parametric statistical test, which was used because the data had been proven to be normally distributed. Parametric statistics are part of inferential statistical methods that focus on population parameters, such as mean, standard deviation, and so on. Generally, this approach uses interval or ratio scale data in numerical form (Wulansari, 2018). In this study, the analysis technique used was the t-test, specifically the paired sample t-test. The t-test is a method used to test comparative hypotheses or observe differences, especially on small sample sizes with unknown population variances (Fitri et al., 2023). The paired sample t-test is an examination conducted on two paired samples, namely samples with the same subjects but experiencing two different treatments. Through this test, researchers can determine the difference in averages between two conditions, namely before and after the treatment

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(Wulansari, 2018). The results of the Paired Sample t-test are as follows:

Table 3. Paired Samples Statistics Test Results

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Before_PjBL	80,3667	30	3,31645	,60550
	After_PjBL	85,1667	30	3,33305	,60853

Based on the results from Table 3, the paired sample statistics show the average score before the application of the PjBL method is 80.3667, and the average score after the application of the PjBL method is 85.1667. By looking at this data, an increase in the average score after the application of the PjBL method of 4.8000 can be observed. After the implementation of the PjBL method, the students' scores experienced an average increase of 4.8 points. The standard deviation after implementation is smaller, indicating that the distribution of scores became more uniform than before. Besides this, there are also SPSS output results showing the relationship or correlation between the two variables, which can be seen in Table 4:

Table 4. Paired Samples Correlations Test Results of Student Understanding

Paired Samples Correlations				
		N	Correlation	Sig.
Pair 1	Sebelum_PBL& Setelah_PBL	30	,821	<,001

Based on the results from Table 4, the correlation between the two variables produces a Sig value of <0.001, meaning Sig < 0.05. It can be concluded that there is a significant relationship between the two variables. Furthermore, to observe the strength of this relationship, the correlation value can be seen to be 0.821. This means that the correlation value falls in the range of 0.79-0.89, signifying that the correlation between the scores before and after the applied treatment is very strong and meaningfully related.

To see the difference in scores before and after the treatment, refer to Table 5 below:

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Table 5. Paired Samples T-Test Results of Student Understanding

Paired Samples Test									
Paired Differences									
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std.Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Before_PjBL - After_PjBL	-4,80000	1,98963	,36325	-5,54294	-4,05706	-13,214	29	<,001

The next step from the SPSS data processing results in this study is hypothesis testing. Based on the paired samples test output, a significance value (Sig.) of <0.001 was obtained. Because this value is less than 0.05 (Sig. < 0.05), H0 is rejected and H1 is accepted. Thus, it can be concluded that **there is a difference in the understanding of eighth-grade students before and after the application of the Project-Based Learning (PjBL) method in SKI learning**.

After the hypothesis testing results showed a difference in student understanding before and after the application of the PjBL method, the final step of this data analysis was through the Normalized Gain test. This N-Gain test is to determine the level of improvement as well as the effectiveness of the PjBL method implementation. According to Edward Corcoran (2005:4), the N-Gain test is used to measure the extent of the increase in student understanding after the learning process takes place. The gain value is obtained from the difference between the posttest and pretest scores, so through this test, the magnitude of the increase in student understanding after learning is conducted can be known (Corcoran, 2005). The results of the N-Gain Test in this study can be seen in Table 6 below.

Table 6. N-Gain Calculation Values

Descriptives				
			Statistic	Std. Error
NGain_Persen	Mean		24,7264	1,76163
		Lower Bound	21,1234	

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	95% Confidence Interval for Mean	Upper Bound	28,3293	
	5% Trimmed Mean		24,8194	
	Median		25,0000	
	Variance		93,100	
	Std. Deviation		9,64886	
	Minimum		,00	
	Maximum		46,67	
	Range		46,67	
	Interquartile Range		12,79	
	Skewness		-,087	,427
	Kurtosis		,906	,833

Based on Table 6, the calculation results of the N-Gain on student scores show an average of 24.7264 or 0.247264, which falls into the **LOW** category of student understanding. The determination of the effectiveness of implementing the SKI learning model using the PjBL method in improving student understanding can be observed from this N-Gain value. Based on the obtained percentage, which is 24.7264%, and referring to the criteria table for determining the level of effectiveness, this value falls into the **ineffective category**. Based on the N-Gain calculation, the category of improvement in student understanding after the application of the PjBL method can be seen in Table 7 below.

Table 7. N-Gain Score Results

No.	Name	Pre-test	Post-test	N-Gain Score	Improvement Criteria	N-Gain %
1	S1	78.00	82.00	0.18	Low	18.18
2	S2	82.00	85.00	0.17	Low	16.67
3	S3	75.00	80.00	0.20	Low	20.00
4	S4	78.00	87.00	0.41	Medium	40.91
5	S5	78.00	80.00	0.09	Low	9.09
6	S6	82.00	84.00	0.11	Low	11.11
7	S7	83.00	87.00	0.24	Low	23.53
8	S8	85.00	90.00	0.33	Medium	33.33

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9	S9	74.00	80.00	0.23	Low	23.08
10	S10	76.00	82.00	0.25	Low	25.00
11	S11	84.00	88.00	0.25	Low	25.00
12	S12	85.00	90.00	0.33	Medium	33.33
13	S13	75.00	85.00	0.40	Medium	40.00
14	S14	80.00	85.00	0.25	Low	25.00
15	S15	79.00	79.00	0.00	No Improvement	0.00
16	S16	78.00	84.00	0.27	Low	27.27
17	S17	80.00	85.00	0.25	Low	25.00
18	S18	80.00	85.00	0.25	Low	25.00
19	S19	81.00	85.00	0.21	Low	21.05
20	S20	80.00	85.00	0.25	Low	25.00
21	S21	80.00	86.00	0.30	Low	30.00
22	S22	76.00	80.00	0.17	Low	16.67
23	S23	78.00	84.00	0.27	Low	27.27
24	S24	80.00	87.00	0.35	Medium	35.00
25	S25	85.00	92.00	0.47	Medium	46.67
26	S26	84.00	88.00	0.25	Low	25.00
27	S27	84.00	88.00	0.25	Low	25.00
28	S28	83.00	86.00	0.18	Low	17.65
29	S29	85.00	90.00	0.33	Medium	33.33
30	S30	83.00	86.00	0.18	Low	17.65

Based on Table 7, the results of the N-Gain test conducted through SPSS indicate that:

a. The improvement in student understanding in the low category amounted to 22 students, or approximately 73.33% of the total 30 students.
b. The improvement in student understanding in the medium category amounted to 7 students, or approximately 23.33% of the total 30 students.
c. The category where no improvement occurred in student understanding amounted to 1 student, or approximately 3.33% of the total 30 students.

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DISCUSSION

The research results indicate that the application of the Project-Based Learning (PjBL) model based on mind mapping teaching materials has an influence on students' understanding in the Islamic Cultural History (SKI) subject. This is evident from the increase in the average student score from 80.36 during the pretest to 85.16 during the posttest. The results of the Paired Sample t-Test also showed a significance value of <0.001, which is smaller than 0.05, so it can be concluded that there is a significant difference between students' understanding before and after the application of the Project-Based Learning model based on mind mapping teaching materials.

The improvement in students' understanding can be explained through the theory of constructivism, which states that knowledge will be more meaningful if students actively build their own understanding through learning experiences. In this study, students did not merely receive information passively from the teacher but were directly involved in project completion as well as the creation of mind maps that helped them connect various Islamic historical concepts in a more structured manner. The active involvement of students in the learning process enables a deeper knowledge construction process so that understanding of the material becomes better.

Additionally, the use of mind mapping as supporting teaching materials also helps students in organizing complex information to become simpler and easier to understand. Islamic Cultural History material contains many figures, events, and historical chronologies that are interrelated. Through mind mapping, the relationships between concepts can be visualized systematically so that students more easily understand the links between the materials studied. This condition aligns with the opinion of Sholeh (2021), who states that mind mapping can help students understand and remember information through a structured visual presentation.

The results of this study also support previous research which found that Project-Based Learning is capable of increasing student activity and understanding during the learning process (Loyens et al., 2023; Septianingsih et al., 2025). The findings of this study are also in line with the research of Sukaesih et al. (2022), which shows that the combination of Project-Based Learning and mind mapping can help students understand learning concepts better compared to conventional learning. Similarly, the research by Kurniawati et al. (2024) states that the use of mind mapping in project-based learning can improve the quality of the learning process because students find it easier to connect various pieces of information they learn.

Nevertheless, the N-Gain analysis results showed an average value of 0.247 or 24.72%, which falls into the low category and is not yet effective. This finding indicates that although there was a significant increase in student understanding, the magnitude of the increase that occurred

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was still relatively small. This condition can be influenced by several factors, such as the relatively short duration of the learning model's application, the initial ability of the students which was already quite high before the treatment was given, and the adaptation process of students to the project-based learning model, which still requires time. The average pretest score, which had already reached 80.36, shows that the majority of students already had a fairly good initial understanding, so the room for improvement that could be achieved became more limited.

Based on these findings, it can be concluded that the Project-Based Learning model based on mind mapping teaching materials is capable of significantly improving student understanding, but the effectiveness level of the improvement is still in the low category. Therefore, the application of this model needs to be carried out more intensively and continuously so that it can provide a more optimal improvement in understanding in Islamic Cultural History learning.

CONCLUSION

Based on the research results, it can be concluded that the implementation of the Project-Based Learning (PjBL) model supported by mind mapping instructional materials has an influence on eighth-grade students' comprehension in the Islamic Cultural History (SKI) subject. The results of the Paired Sample t-Test showed a significance value of < 0.001, which is less than 0.05, indicating a significant difference in students' comprehension before and after the implementation of the learning model. These results demonstrate that the use of PjBL based on mind mapping can help students understand SKI materials better compared to their comprehension prior to the treatment. The improvement in students' comprehension is also evident from the increase in the average pretest score from 80.36 to 85.16 on the posttest.

Nevertheless, the N-Gain analysis results showed an average value of 0.247 or 24.72%, which falls into the low category. These findings indicate that although the implementation of the Project-Based Learning model supported by mind mapping instructional materials can significantly improve students' comprehension, the level of improvement achieved is still relatively low, meaning its effectiveness is not yet optimal. Thus, this learning model can serve as an alternative approach in SKI learning to enhance students' comprehension, but it still requires further development and more intensive application to maximize the outcomes.

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RECOMMENDATIONS

Based on the research findings obtained, the following recommendations are proposed:

- For Teachers: It is advised to apply the Project-Based Learning model supported by mind mapping instructional materials as an alternative learning method in the Islamic Cultural History subject, as it is capable of increasing student involvement in the learning process and helping them understand the material more systematically.
- For Schools: Schools are expected to provide support for the implementation of innovative learning models by supplying adequate facilities and infrastructure so that project-based learning activities can take place optimally.
- For Future Researchers: It is recommended to utilize an experimental research design that includes a control group so that the effectiveness of the learning model can be tested more comprehensively.
- Subsequent research should be conducted over a longer time frame and involve a larger sample size to obtain a more in-depth understanding of the influence of Project-Based Learning based on mind mapping on students' comprehension.
- Further studies can also examine the impact of this model on other variables, such as learning outcomes, learning motivation, critical thinking skills, and student creativity.

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