International Journal of Education and Social Science Research

ISSN 2581-5148

Vol. 9, Issue.1, Jan-Feb 2026, page no. 87-105

To cite this article: Siti Nur Aini, Retna Ngesti Sedyati and Sukidin (2026). THE EFFECT OF DEEP LEARNING – BASED LEARNING (PBL) AND NON – DEEP LEARNING ON THE CRITICAL THINKING SKILLS OF STUDENTS IN MTS NEGERI 1 JEMBER, International Journal of Education and Social Science Research (IJESSR) 9 (1): 87-105 Article No. 1186, Sub Id 1833

THE EFFECT OF DEEP LEARNING – BASED LEARNING (PBL) AND NON – DEEP LEARNING ON THE CRITICAL THINKING SKILLS OF STUDENTS IN MTS NEGERI 1 JEMBER

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DOI : https://doi.org/10.37500/IJESSR.2026.9107

ABSTRACT

This study aims to analyze the effect of critical thinking skills between students who learn with the Deep Learning-based Problem-Based Learning (PBL) model and students who learn with the non-Deep Learning PBL model in Social Sciences (IPS) for ninth grade students in the Achievement Development Program at MTs Negeri 1 Jember. This study used a quantitative approach with a quasi-experimental design of the Pre-test–Post-test Control Group Design. Two classes, each consisting of 32 students, were selected randomly, with the experimental class receiving Deep Learning-based PBL treatment and the control class using non-Deep Learning PBL. Critical thinking skills were measured based on the FRISCO indicators (Focus, Reason, Inference, Situation, Clarity, Overview). The results showed that the average posttest score of the experimental class (M = 21.71) was higher than that of the control class (M = 19.90). Based on the FRISCO indicator analysis, the experimental class excelled in five of the six indicators with an overall average of 3.62, while the control class scored 3.31. Hypothesis testing using One Way ANOVA produced an F value of 1303.698 with a significance of 0.000 ($p < 0.05$), indicating a significant difference between the two groups. These findings confirm that the integration of Deep Learning principles in PBL is more effective in improving students' critical, analytical, and reflective thinking skills than conventional PBL.

KEYWORDS: Deep Learning, Problem-Based Learning, Critical Thinking, Social Sciences

1. INTRODUCTION

One of the main challenges in 21st century education is developing students' critical thinking skills. This skill is essential for every student, especially at the junior high school level. Amidst the rapid flow of information and the complexity of global issues, students are required to be able to analyze, evaluate, and solve problems rationally and systematically. However, the results of the Computer-

Based National Assessment (ANBK) show that most Madrasah Tsanawiyah students are still in the low category in terms of higher-order thinking skills, including critical thinking (Kemendikbudristek, 2022). This finding is reinforced by the Programme for International Student Assessment (PISA) report, which ranks Indonesian students' literacy and reasoning skills at the bottom globally (OECD, 2019:57).

In the context of madrasah, critical thinking skills not only play a role in academic achievement, but are also important in shaping religious reasoning, moral decision-making, and a rational and open Islamic character. Therefore, a learning model is needed that not only focuses on imparting knowledge but also encourages students to explore meaning, interconnections between concepts, and the application of knowledge in real-life contexts (Nugraheni, 2020:66). One approach that is considered relevant to these needs is deep learning, which emphasizes deep understanding, reflection, and meaningful knowledge transfer (Biggs & Tang, 2011:42).

In reality, learning practices in madrasahs are still dominated by conventional approaches that are teacher-centered and oriented toward short-term cognitive outcomes. In fact, innovative learning models such as Problem-Based Learning (PBL) are designed to develop critical thinking skills through authentic problem solving (Hmelo-Silver, 2014). However, the implementation of PBL in madrasahs is often not optimal because it emphasizes task completion rather than deep thinking processes. According to Kirschner et al. (2006), for learning to foster deep learning, instructional design that encourages continuous exploration, elaboration, and reflection is needed.

Deep learning is not only a learning strategy, but also an approach that emphasizes deep cognitive engagement through three main principles: integration of knowledge with experience, critical reflection on meaning, and transferability to new situations (Marton & Säljö, 1997). Through this approach, learners do not simply memorize or repeat information, but build meaningful understanding and are able to relate it to real life. These principles make deep learning highly relevant in the development of critical thinking skills.

Several studies support the effectiveness of this approach. Hidayati (2017) shows that the application of deep learning in biology learning can significantly improve students' conceptual understanding. Meanwhile, Sari and Kusumawati (2019) found that project-based deep learning effectively improves junior high school students' reflective thinking skills. However, most of these studies have not specifically examined the application of deep learning in the context of madrasahs, particularly in relation to comprehensively improving critical thinking skills (Rahmawati, 2021:55).

Based on this, this study was conducted to examine the effectiveness of applying deep learning-based Problem-Based Learning (PBL) in improving the critical thinking skills of ninth-grade students in the Bina Prestasi class at MTs Negeri 1 Jember in the Social Sciences (IPS) subject. This study focuses not only on learning outcomes but also on the cognitive processes that occur during learning.

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The research question in this study is: Is there a difference in critical thinking skills between students who use the Deep Learning-based Problem-Based Learning model and students who use the Non-Deep Learning Problem-Based Learning model in Digital Economics material in class IX at MTs Negeri 1 Jember?

The purpose of this study is to determine and analyze the effectiveness of implementing the Deep Learning-based Problem- Based Learning (PBL) model compared to the Non-Deep Learning Problem-Based Learning model in improving the critical thinking skills of students in class IX Bina Prestasi MTs Negeri 1 Jember. The results of this study are expected to contribute theoretically to the development of educational science, particularly regarding the integration of deep learning in social studies learning in madrasahs, as well as practically to teachers in designing more meaningful learning that is oriented towards the development of higher-order thinking skills.

This research is also a strategic effort in responding to the challenges of 21st century education, which requires students to not only master knowledge but also have critical, reflective, and adaptive thinking skills in response to change. Thus, the Deep Learning-based Problem-Based Learning approach is expected to be a pedagogical innovation that strengthens the quality of learning and increases the competitiveness of madrasah students in the global era (Sukarno, 2018:34; Fauziah, 2020:18).

2. METHODS

Research Design, this study uses a quantitative approach with a quasi-experimental design in the form of a Pretest–Posttest Control Group Design (Sugiyono, 2013). This design was chosen because it allows researchers to measure the difference in critical thinking skills between two groups that received different treatments, namely the experimental group that used a Deep Learning-based Problem-Based Learning (PBL) model and the control group that used Non-Deep Learning Problem-Based Learning. Both groups were given a pretest to determine their initial critical thinking skills, then given different treatments, and finally given a posttest to assess the improvement in critical thinking skills after learning.

The research design is described as follows:
Experimental Group: $O_1 \rightarrow$
$X_1 \rightarrow O_2$ Control Group:
$O_1 \rightarrow X_2 \rightarrow O_2$
Explanation: O_1 = pretest, O_2 = posttest, X_1 = Deep Learning-based PBL treatment, X_2 = Non-Deep Learning PBL

Research Respondents, this study was conducted at MTs Negeri 1 Jember Regency, with a population of all ninth-grade students in the Bina Prestasi program for the 2025/2026 academic year, consisting of four parallel classes. Each class had 32 students, bringing the total population to 130 students. From

this population, two classes were selected as research samples with the same number of students. The sample selection was conducted using random sampling to ensure that each member of the population had an equal chance of becoming a research respondent. The selected classes had a Mid-Semester Summative Assessment (ASTS) score that was closest to the population average, so that their academic characteristics were equivalent. Next, a draw was conducted to determine the experimental class and the control class. The experimental class received treatment in the form of Deep Learning-based PBL, while the control class received Non-Deep Learning PBL. This sampling procedure ensured that the difference in critical thinking skills between the two groups was truly caused by the difference in treatment, not by differences in the students' initial abilities. This strategy is in line with the principles of experimental research, which emphasize initial equality between groups (Arikunto, 2010).

Materials and Instruments, Research data were obtained through a critical thinking ability test instrument developed based on the FRISCO (Focus, Reason, Inference, Situation, Clarity, Overview) indicators as proposed by Ennis (2015). The test consisted of essay questions that required students to reason, analyze, and construct logical arguments regarding the problems given. The test was administered twice, before the treatment (pretest) and after the treatment (posttest). In addition to the test, interview and observation techniques were used to supplement the quantitative data with qualitative information about student responses and behavior during the learning process. Documentation in the form of attendance lists, academic grades, and photos of activities were used to strengthen the validity of the data. The test instruments were validated by experts before use through content and construct validity tests. The reliability of the instruments was tested using Cronbach's Alpha formula to measure the internal consistency of the items. Based on Arikunto's (2010) guidelines, a reliability coefficient value of ≥ 0.60 indicates high reliability, meaning that the instruments are suitable for use in research.

3. RESULTS AND DISCUSSION

RESULTS

a. Overview of the Research Location

MTs Negeri 1 Jember is an educational institution under the Ministry of Religious Affairs of Jember Regency that provides Islamic-based junior high school education with a vision of “Innovative, Intelligent, Independent, and Islamic.” This vision is outlined in the mission to realize fair education, build public awareness, excel in multi-competence, and provide a quality curriculum. Historically, this madrasah began in 1969 as a branch of IAIN Jember, underwent a change in status to become MTs Negeri 1 Jember in 2016, and is located at Jl. Imam Bonjol No. 1, Tegal Besar, Kaliwates, Jember. Its strategic location supports conducive learning. The innovative curriculum implements the Merdeka Curriculum with the Pancasila Student Profile Strengthening Project, emphasizing the values of faith, morals, mutual cooperation, diversity, independence, and critical thinking. Extracurricular activities support creativity. Project-based learning strategies strengthen 21st-century skills. With professional staff and adequate facilities, this madrasah is relevant for research on innovative learning models to improve critical thinking. The implementation of this curriculum is supported by a project-based

learning strategy that aims to strengthen 21st- century skills, namely critical thinking, creativity, collaboration, and communication. With the support of professional educators and adequate learning facilities, MTs Negeri 1 Jember has become a relevant and representative educational environment as a research location, particularly in studying the application of innovative learning models to improve students' critical thinking skills.

b. Implementation of Learning in Social Studies Subjects

The implementation of social studies learning through deep learning-based PBL shows that teachers and students understand Problem Based Learning as a student-centered learning model. Teachers position themselves as facilitators who guide and assist students in finding solutions to problems, rather than as the main source of information. Classroom learning practices begin with the presentation of problems or contextual case studies, encouraging students to think actively and engage in the learning process.

Teachers clearly distinguish between Deep Learning-based PBL and surface learning. Deep Learning-based PBL emphasizes deep conceptual understanding, interrelationships between concepts, critical thinking skills, and the application of knowledge in real contexts, while surface learning is more oriented towards superficial mastery of material through memorization. The results of the observation show that Deep Learning-based PBL is able to increase student engagement in discussions, asking questions, and expressing opinions compared to surface learning.

PBL is implemented through systematic stages, starting from problem orientation, group organization, investigation guidance, solution development and presentation, to analysis and evaluation. The problems given are actual and close to the students' l ives, thus triggering curiosity and learning engagement. Students were seen actively seeking information from various sources, discussing in groups, and presenting their problem-solving results in front of the class. During the learning process, students demonstrated critical thinking skills such as analyzing problems, asking questions, expressing opinions, and drawing conclusions based on discussions. Enthusiasm and motivation to learn increase when the material is linked to real phenomena, such as the discussion of natural disasters, which encourages students to relate concepts to their surrounding environment. This indicates that students' cognitive and emotional engagement are developing simultaneously.

Despite its positive impact, the implementation of Deep Learning-based PBL also faces challenges, such as differences in student characteristics, fixed mindsets that make some students give up easily, and varying levels of literacy and information analysis skills. Teachers need to balance their role as mentors and providing space for independent thinking. The success of learning is supported by the selection of authentic and relevant problems, the role of teachers as effective facilitators, collaboration among students, the availability of diverse learning resources, and a safe and comfortable learning environment.

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Critical thinking skills are assessed not only through written tests but also using rubrics that cover discussion participation, the ability to express opinions, conceptual understanding, and problem solving. Based on interviews and observations, Deep Learning-based PBL is considered to have a positive impact on student learning outcomes and attitudes, including improved conceptual understanding, critical thinking skills, motivation, participation, creativity, and collaboration skills. The main difference with non-Deep Learning PBL lies in the depth of the thinking process, where non-Deep Learning PBL tends to focus on task completion without deepening and reflection, while Deep Learning-based PBL encourages in-depth analysis, conceptual connections, and solution evaluation.

c. Pre-test Results on Students' Thinking Skills

The researchers collected data using random sampling, with class IX A as the experimental class and class IX D as the control class based on the results of the ASTS pretest for class IX. The following figures show the average pretest scores for the experimental class and control class in Figure 1.

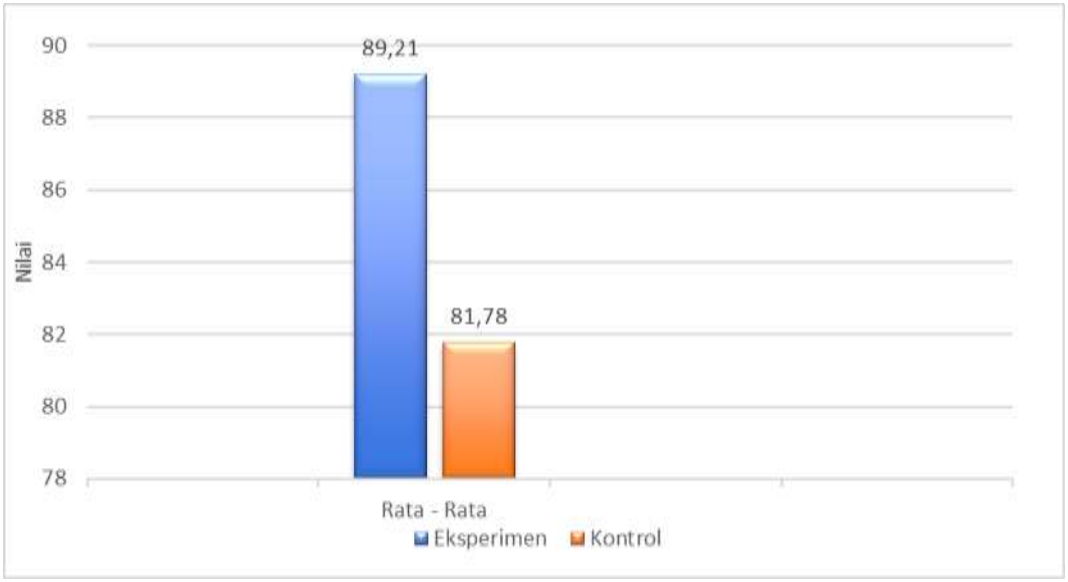

Figure 1 Graph of the average pretest scores for the experimental class and the control class.

Based on this graph, the average score for the experimental class is 89.21, while the average score for the control class is 81.78. Further information regarding the center and distribution of the pretest scores can be found in Table 1.

Table 1. Measures of central tendency and dispersion of pretest data for the experimental class and control class

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No	Measures of central tendency and dispersion	Value	
		Experimental Class	Control Class
1	Lowest Value	85	80
2	Highest Value	92	85
3	Mean	89,21	81,78
4	Median	89,00	80,00
5	Mode	89	80
6	Std. Deviation	2,18	2,16

Source: Data processed by the author, 2026

Based on the results of the pretest of students' critical thinking skills, it can be seen that the experimental class and the control class have different initial achievements. The lowest score in the experimental class was 85, while in the control class it was 80, with the highest scores being 92 and 85, respectively. The average pretest score for the experimental class was 89.21, higher than the average for the control class, which was 81.78. The median score in the experimental class was 89.00 with a mode of 89, while the control class had a median of 80.00 and a mode of 80, indicating that the scores obtained by most students in the experimental class were higher. In terms of data distribution, the standard deviation of the experimental class was 2.18 and that of the control class was 2.16, indicating that the distribution of scores in both classes was relatively uniform and homogeneous, so that the two groups could be considered to have relatively comparable initial ability variations before the learning treatment was given.

d. Posttest Results on Students' Critical Thinking Skills

After the treatment was carried out, the researchers collected data to see the effect of critical thinking abilities of the students after being given treatment with the experimental class using deep learning-based PBL and the control class using non-deep learning PBL. The posttest for both classes was conducted on October 20, 2025, with different questions according to the treatment of each class using the FRISCO critical thinking indicators. The results of the posttest were then processed by the author, as shown in Figure 2.

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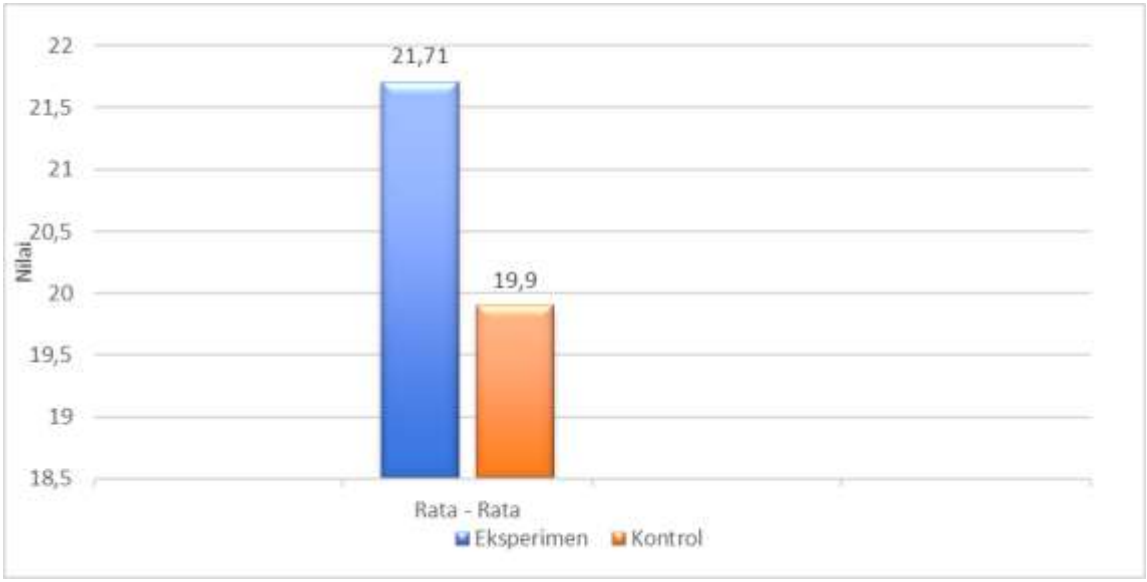

Figure 2 Graph of the average posttest scores for the experimental class and the control class

Based on the graph, the average score for the experimental class is 21.71, while the average score for the control class is 19.90. Further information regarding the center and distribution of data from the pretest scores can be found in Table 2.

Table 2 Measures of central tendency and dispersion of posttest data for the experimental class and control class

No	Measures of central tendency and dispersion	Value	
		Experimental Class	Control Class
1	Lowest Value	20	18
2	Highest Value	24	21
3	Mean	21,71	19,90
4	Median	21,00	20,00
5	Mode	20	20
6	Std. Deviation	20	18

Sumber: Data Processed by author, 2026

Based on the results of the posttest of students' critical thinking skills after the learning treatment, it can be seen that the experimental class and the control class showed differences in learning outcomes. The lowest score in the experimental class was 20, while in the control class it was 18, with the highest scores being 24 and 21, respectively. The average posttest score for the experimental class was 21.71,

higher than the average for the control class, which was 19.90. The median score in the experimental class was 21.00 with a mode of 20, while the control class had a median of 20.00 and a mode of 20, indicating that the achievement scores of students in the experimental class were higher. In terms of data distribution, the standard deviation of the experimental class was 1.61 and that of the control class was 0.92, indicating that the learning outcomes in the experimental class showed a different and higher achievement pattern compared to the control class after the learning treatment was given.

e. Posttest Results on Critical Thinking Skills Based on FRISCO Indicators

The results of the posttest on students' critical thinking skills were analyzed using the FRISCO indicators, which include Focus, Reason, Inference, Situation, Clarity, and Overview, referring to the critical thinking framework proposed by Ennis (2011). This framework emphasizes students' ability to focus on problems, construct logical arguments, draw conclusions, understand context, convey ideas clearly, and review their thinking process. The posttest was administered after students participated in Problem-Based Learning (PBL), with Deep Learning-based PBL in the experimental class and Non-Deep Learning PBL in the control class. The comparison of posttest results is shown through the average critical thinking ability scores for each indicator.

Table 2 Critical Thinking Ability Scores of Students on Each Indicator

No	Critical Thinking Ability Indicator	Control Class	Experimental Class
1	*Focus*	3,00	3,84
2	*Reason*	3,00	3,47
3	*Inference*	3,72	3,63
4	*Situation*	3,28	3,47
5	*Clarity*	3,00	3,31
6	*Overview*	3,91	4,00
Average		3,31	3,62

Sumber: Data Processed by author, 2026

Based on the results of the posttest of students' critical thinking skills on the FRISCO indicators, ranging from Focus to Overview, it can be seen that the experimental class generally achieved higher scores than the control class. On the Focus indicator, students in the experimental class showed better ability to identify the core of the problem and focus on the main issue, as reflected in the average score of 3.84 compared to 3.00 in the control class. On the Reason indicator, the experimental class also excelled with an average score of 3.47, which shows a better ability to construct logical and relevant arguments compared to the control class, which scored 3.00. On the Inference indicator, both classes showed relatively good ability to draw conclusions, although the control class scored slightly higher with an average score of 3.72 compared to 3.63 for the experimental class. Furthermore, on the Situation indicator, the experimental class obtained an average score of 3.47, higher than the control

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class at 3.28, indicating a better understanding of the context of the problem. On the Clarity indicator, the experimental class again showed superiority with an average score of 3.31 compared to 3.00 in the control class, indicating the ability to convey ideas more clearly and structurally. Meanwhile, on the Overview indicator, the experimental class obtained an average score of 4.00, higher than the control class's score of 3.91, indicating the consistency of students in reviewing their answers and thought processes.

Overall, the posttest results based on the FRISCO indicators show that the experimental class had higher critical thinking skills than the control class. These findings reveal a difference in critical thinking skills between students who participated in Deep Learning-based PBL and Non-Deep Learning PBL, which is presented in Figure 3, a graph comparing the average critical thinking skills of students after being given treatment (posttest).

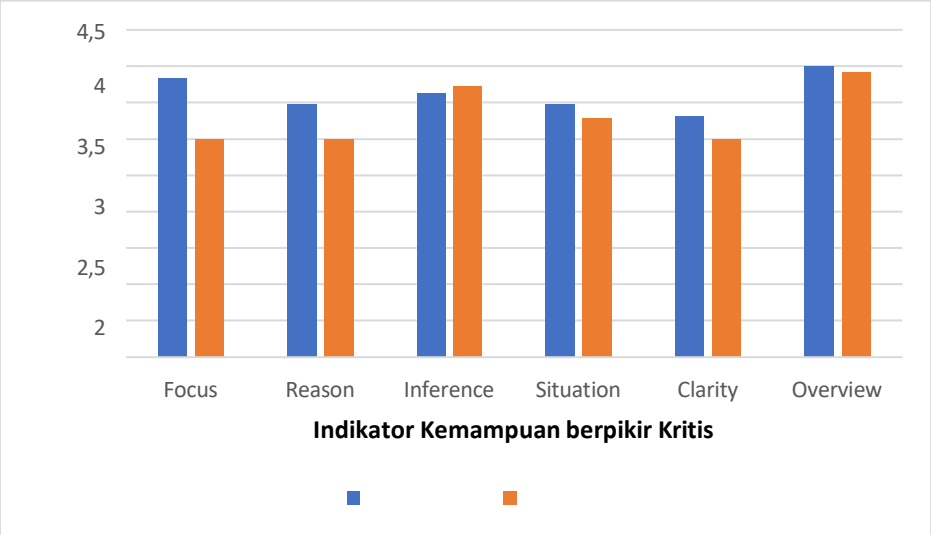

Figure 3 Graph showing the average percentage of students' critical thinking skills for each indicator.

f. Hypothesis Analysis and Testing

Data analysis in this study was conducted by examining the results of critical thinking skills and student learning outcomes before and after the treatment was administered. This analysis used homogeneity tests, normality test, reliability test, and hypothesis test to determine whether or not there was an effect of the deep learning approach on students' critical thinking skills using the hypothesis H0 if there was no fundamental difference between the experimental class that applied the Deep Learning- based PBL learning model and the control class that only used the surface learning method, and H1 if there is a fundamental difference between the experimental class and the control class in social studies learning in class IX MTS Negeri 1 Jember.

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1) Homogeneity Test

The homogeneity test was conducted to ensure that both research groups had relatively similar data variance characteristics, making them suitable for use in subsequent statistical tests. The results of the homogeneity test for the pretest data of the experimental and control groups are presented in Table 4.

Table 4. Pretest Homoneity Test Results

Levene Statistic	df1	df2	Sig.
0.905	1	62	.345

Based on the results of the variance homogeneity test using the Levene test, a Levene Statistic value of 0.905 was obtained with a significance value (Sig.) of 0.345. This significance value is greater than the significance level $\alpha = 0.05$, so H_0 is accepted, which means that the variance between data groups is considered homogeneous (Didin, 2016:94). These results indicate that there is no significant difference in variance between the critical thinking ability data of students in the experimental class that applied Deep Learning-based Problem Based Learning (PBL) and the control class that applied Non-Deep Learning PBL. Thus, both groups have relatively similar variance characteristics, so that the research data meets one of the prerequisites for parametric statistical analysis and is suitable for continuing to the hypothesis testing stage using a difference test, such as One Way ANOVA.

2) Normality Test

The normality test aims to determine whether the critical thinking ability data of students in the experimental class and control class is normal, which is one of the prerequisite tests that must be fulfilled before conducting a hypothesis test.

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Table 4. Critical Thinking Ability Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Kelas		**Statistic**	**df**	**Sig.**	**Statistic**	**df**	**Sig.**
Hasil	Pretest Experimental Class	0,199	32	0,002	0,898	32	0,005
	Posttest Experimental Class	0,256	32	0,000	0,798	32	0,000
	Pretest control class	0,472	32	0,000	0,313	32	0,000
	Posttest control class	0,251	31	0,000	0,855	31	0,001

a. Lilliefors Significance Correction

Based on the results of normality tests using the Kolmogorov–Smirnov and Shapiro–Wilk tests on the critical thinking ability data of the students, it was found that the sample size in the experimental class was 32 students and, in the control, class was 32 students in the pretest and 32 students in the posttest of the control class. The results of the Kolmogorov –Smirnov test showed that the significance value of the pretest for the experimental class was 0.002 with a statistical value of 0.199, the posttest for the experimental class was 0.000 with a statistical value of 0.256, the pretest for the control class was 0.000 with a statistical value of 0.472, and the posttest for the control class was 0.000 with a statistical value of 0.251. Furthermore, the Shapiro–Wilk test results also showed a significance value < 0.05, namely 0.005 in the pretest of the experimental class (statistic 0.898), 0.000 in the posttest of the experimental class (statistic 0.798), 0.000 in the pretest of the control class (statistic 0.313), and 0.001 in the control class posttest (statistic 0.855). Statistically, these results indicate that the data are not completely normally distributed. However, data analysis was continued using the parametric One-Way ANOVA test. This was based on the opinions of Field (2018) and Ghozali (2018), who stated that the ANOVA test is robust against violations of normality assumptions, especially in studies with a sample size ≥ 30 and homogeneous data variance. In addition, the results of the variance homogeneity test indicate that the data comes from a homogeneous group, so that the use of parametric tests remains appropriate for testing differences in students' critical thinking skills between classes that implement Deep Learning- based Problem Based Learning and classes that implement Non-Deep Learning PBL.

3) Reliability Test

Reliability testing was conducted to determine the level of consistency of the test instruments used to measure students' critical thinking skills. Reliable instruments will produce relatively consistent data when used under the same conditions. In this study, reliability testing was conducted using Cronbach's alpha, as presented in Table 5.

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Table 5. Reliability Test Result

Reliability Statistics	Nilai
Cronbach's Alpha	,072

Source: Data processed by researcher, 2026

Based on the reliability test results of the instrument in Table 4.5, a Cronbach's Alpha value of 0.072 was obtained. Referring to the reliability criteria proposed by Arikunto (2010), a reliability coefficient value below 0.40 is classified as low reliability. This indicates that the internal consistency between the items in the critical thinking ability test instrument is still relatively weak. Nevertheless, the instrument was still used in this study because it was compiled based on the FRISCO critical thinking ability indicators, had undergone expert validation (expert judgment), and was used to comprehensively measure critical thinking ability in the context of Deep Learning-based Problem Based Learning and Non-Deep Learning PBL. Therefore, these reliability results are one of the limitations of this study that need to be considered when interpreting the overall research results.

2. Hypothesis Testing

Hypothesis testing was conducted to determine whether there was a difference in the thinking abilities of students between classes based on deep learning using the F test in Analysis of Variances (ANOVA). hypothesis testing was conducted at a significance level of 5% ($\alpha = 0.05$) with decision criteria based on the calculated F value and significance value (Sig.) obtained from the statistical analysis results. The F test results are presented in Table 6 below.

Table 6. Anova

ANOVA

Hasil

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	130413,248	3	43471,083	1303,698	0,000
Within Groups	4101,366	123	33,344		
Total	134514,614	126			

Source: Data processed by researchers, 2026

Based on the results of the One-Way ANOVA test presented in Table 4.6, a calculated F value of 1303.698 was obtained with a significance value (Sig.) of 0.000. This significance value is smaller than the significance level $\alpha = 0.05$, so H_0 is rejected and H_a is accepted. Thus, it can be concluded that

there is a significant difference in the critical thinking skills of students between the group that applies Deep Learning-based Problem Based Learning (PBL) and the group that applies Non-Deep Learning PBL. These results indicate that the application of the Deep Learning-based PBL model has a significant effect on the critical thinking skills of students in the social studies subject in class IX Bina Prestasi MTs Negeri 1 Jember.

DISCUSSION

Based on the results of the posttest of students' critical thinking skills analyzed using FRISCO indicators, it can be seen that the application of Deep Learning-based Problem Based Learning (PBL) has a more positive impact than Non-Deep Learning PBL. In general, students in the experimental class showed higher critical thinking skills than the control class in most indicators, namely Focus, Reason, Situation, Clarity, and Overview. This shows that the deep learning approach in PBL is able to encourage students to engage more deeply in the learning process, both in understanding problems, constructing arguments, and reflecting on the thinking process. This finding is in line with Ennis' (2011) critical thinking framework, which emphasizes the importance of depth of analysis, logical reasoning, and reflection in learning.

On the Focus indicator, students in the experimental class were better able to identify the core of the problem and focus their attention on the main issues presented in the questions compared to students in the control class. This shows that Deep Learning-based PBL is effective in training students to understand problems comprehensively from the early stages of learning. On the Reason indicator, the experimental class also showed superiority in constructing logical and relevant arguments to support the answers given. The process of in-depth discussion, problem investigation, and the role of the teacher as a facilitator encouraged students to not only answer questions but also provide rational arguments. In contrast, in the control class, the reasons given by students tended to be general and lacked in-depth analysis.

In terms of inference, both classes showed relatively good ability to draw conclusions based on the available information, although the control class achieved slightly higher results. These findings indicate that the ability to draw conclusions is not only influenced by the learning approach but also by the students' basic ability to understand information. However, in the experimental class, the process of drawing conclusions was carried out through more systematic stages of analysis and reflection, so that the conclusions produced tended to be more meaningful. Furthermore, on the Situation indicator, students in the experimental class showed better ability in understanding the context of the problem and relating it to real situations. The use of authentic problems in Deep Learning-based PBL helped students connect social studies concepts with social phenomena in their surroundings, while students in the control class still tended to answer textually without in-depth context analysis.

On the Clarity indicator, although the experimental class achieved higher scores than the control class, this indicator still showed relative weaknesses. Students still had difficulty conveying ideas and

solutions clearly, coherently, and systematically. These findings indicate that the application of Deep Learning-based PBL has improved critical thinking skills, but strengthening academic communication skills still needs to be improved. Meanwhile, on the Overview indicator, the experimental class obtained the highest average score, indicating that students were more consistent in reviewing their answers and thought processes. The reflection stage in Deep Learning-based PBL encourages students to evaluate solutions, correct mistakes, and reassess the accuracy of their thought processes, which are key characteristics of high-level critical thinking.

Overall, the results of this discussion show that Deep Learning-based PBL is more effective in improving students' critical thinking skills than Non-Deep Learning PBL. The difference lies in the depth of the thinking process being trained, where Deep Learning-based PBL encourages students to understand problems in depth, connect concepts, construct logical arguments, and continuously reflect on their thinking processes. These findings are in line with the results of observations and interviews with social studies teachers, which show an increase in student activity, learning motivation, discussion skills, and reflection during the learning process. Thus, the application of Deep Learning-based PBL has been proven to improve the quality of the critical thinking process and outcomes of students in social studies learning at MTs Negeri 1 Jember.

4. CONCLUSSION

Based on the results of the research and discussion, it can be concluded that there is a significant effect of the application of the Deep Learning-based Problem Based Learning (PBL) model and the non-Deep Learning Problem Based Learning (PBL) model on the critical thinking skills of ninth-grade students in the Bina Prestasi class at MTs Negeri 1 Jember in social studies. This difference shows that the integration of deep learning principles in PBL learning has a stronger impact on developing students' critical thinking skills than PBL applied without a deep learning approach.

The difference in critical thinking skills is clearly seen in the post-test results, where the average critical thinking score of students in the class that applied Deep Learning-based PBL was higher than that of the class that applied non-Deep Learning PBL. This finding indicates that learning that emphasizes deep understanding, linking concepts to real contexts, and reflecting on the thinking process can encourage students to think more analytically, logically, and systematically in solving social studies problems. Furthermore, the results of hypothesis testing using One Way Analysis of Variance (ANOVA) showed a significance value of 0.000 (sig. < 0.05). These results confirm that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is accepted, so it can be statistically stated that there is a significant difference in critical thinking skills between students who participated in Deep Learning-based PBL learning and students who participated in non-Deep Learning PBL learning.

The analysis of critical thinking skills based on FRISCO indicators also shows that students in the Deep Learning-based PBL class performed better on most indicators, especially in the aspects of

Focus, Reason, Situation, Clarity, and Overview. This shows that the deep learning approach in PBL is able to strengthen students' abilities to focus on problems, construct logical arguments, understand the context of social issues, communicate ideas clearly, and reflect on the thinking process. Meanwhile, the Inference indicator shows relatively balanced achievements, indicating that the ability to draw conclusions is also influenced by factors other than the learning treatment.

Thus, it can be concluded that the Deep Learning-based PBL model is more effective than non-Deep Learning PBL in improving students' critical thinking skills. This difference in effectiveness is not only reflected in test results but also in the quality of the learning process, such as increased student activity in discussions, the ability to express opinions argumentatively, and awareness to reflect on learning outcomes and processes.

Overall, this study confirms that differences in the approach to implementing PBL, particularly through the integration of deep learning, play an important role in determining the quality of students' critical thinking skills. However, students' critical thinking skills are also influenced by other factors, such as individual characteristics, learning environment, and learning support, which were not examined in depth in this study and could be the subject of further study in subsequent research.

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