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Comparative Study of Problem Based Learning and Jigsaw Models in Enhancing Students' Critical Thinking Skills in Islamic Religious Education

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A B S T R A C T

Critical thinking is an essential skill for students in the 21st century, enabling them to analyze, evaluate, and make rational decisions. However, students' critical thinking in Islamic Religious Education (IRE) often remains low, as learning tends to emphasize memorization rather than analytical skills. This study aims to (1) describe students' critical thinking skills when taught using the Problem Based Learning (PBL) model, (2) describe students' critical thinking skills when taught using the Jigsaw cooperative model, and (3) compare the differences between the two approaches. The research employed a quantitative quasi-experimental design with a posttest only non-equivalent control group. The participants were 22 tenth-grade students of SMKN 10 Bandung, divided into two classes: 11 students in the experimental group (PBL) and 11 students in the control group (Jigsaw). Data were collected through a critical thinking test adapted from Ennis' indicators and analyzed using descriptive statistics and an independent samples t-test. The results revealed that students taught with PBL achieved a higher mean score ($M = 76.36$, $SD = 5.52$) than those taught with Jigsaw ($M = 61.82$, $SD = 13.83$). The t-test indicated a significant difference between the two groups ($t = 2.683$, $p < 0.05$). The findings suggest that PBL is more effective in fostering students' critical thinking compared to Jigsaw, as it engages learners in real-life problem solving and analytical reasoning.

INTRODUCTION

Critical thinking skills are essential competencies that students must possess to navigate the increasingly complex flow of information. It is not enough for students to merely memorize concepts; they are required to analyze, evaluate, and make decisions based on logical reasoning(Moustaghfir & Brigui, 2024). In the learning process, critical thinking becomes a fundamental foundation for students to deeply understand the material, solve problems rationally, and connect knowledge with real-life situations (Robbani, 2024).

In the educational context, critical thinking plays a central role in enhancing the quality of understanding and mastery of content. Students who are accustomed to thinking critically are able to evaluate arguments, filter valid information, and relate it to real-life experiences(Hitchcock, 2017). Islamic Religious Education (IRE), as a subject that focuses on character formation, is also required to cultivate critical thinking skills so that students do not merely memorize religious concepts, but are able to reflect on, critique, and internalize Islamic values in their daily lives (Ariadila et al., 2023).

However, field observations reveal that students' critical thinking skills in IRE remain low. Initial observations at SMKN 10 Bandung indicate that many students are unfocused during lessons, prefer copying answers from peers rather than working independently, and are not yet capable of providing in-depth reasoning when faced with higher-order thinking skill (HOTS)-based questions. Similar situations were also found in various other schools, such as SDN 10 Peusangan (Meutia, 2024) and SMP Negeri 4 Semarang (Dwi et al., 2023; Uyyun et al., 2024), where students showed significant difficulties in developing critical thinking skills in the IRE subject.

The low level of students' critical thinking indicates the need for innovation in instructional models. Teachers are expected to transform from being mere transmitters of knowledge into facilitators who can create active, challenging, and relevant learning environments. Innovative teaching methods are believed to stimulate students to think more deeply, find solutions to problems, and construct knowledge independently (Aisyah, 2023; Firdaus, 2022).

One proven approach is the Problem-Based Learning (PBL) model, which focuses learning on solving real-world problems, thereby encouraging students to analyze, investigate, and discover solutions collaboratively. Research by (Lubis & Astuti, 2024) at MTs Negeri 1 Lhokseumawe showed that PBL improved students' critical thinking in the Akidah Akhlak subject. Similar findings were reported by (Sujalmo et al., 2024) at MA Nurul Falah Center, emphasizing PBL's effectiveness in fostering analytical and argumentative thinking among students.

In addition to PBL, the Jigsaw cooperative learning model is also widely used in IRE instruction. This model emphasizes group collaboration, where each student is responsible for mastering a portion of the material and then teaching it to their peers. Jigsaw enhances social interaction and responsibility; however, some studies suggest that this model tends to emphasize collaborative skills more than deep critical thinking (Diza & Muchlis, 2023; Kurnia et al., 2018).

Previous studies have confirmed the effectiveness of PBL in enhancing critical thinking, both at the elementary (Umiyati & Khumairo, 2024), junior high (Uyyun et al., 2024), and Islamic junior secondary (Firdaus, 2024; Lubis & Astuti, 2024) levels. However, most research focuses on primary and lower secondary education. A notable research gap exists in the limited exploration of critical thinking development among vocational high school (SMK) students, particularly in the context of IRE, which often emphasizes normative and cognitive aspects.

The urgency of this research lies in the need to comprehensively examine the differences in the effectiveness of the PBL and Jigsaw models in fostering critical thinking among SMK students. Given the characteristics of SMK students, who are prepared for the workforce, IRE learning based on PBL can offer more practical, challenging, and real-life-relevant learning experiences. On the other hand, while Jigsaw supports cooperative learning, its contribution to strengthening critical thinking still requires further evaluation.

Therefore, this study aims to: (1) describe students' critical thinking abilities in IRE learning using the Problem-Based Learning model, (2) describe students' critical thinking abilities using the Jigsaw cooperative model, and (3) compare the differences in students' critical thinking skills between the two models. The results of this study are expected to contribute both theoretically and practically to the development of IRE instructional strategies that are more innovative, applicable, and aligned with the demands of the 21st century.

RESEARCH METHODS

This study employed a quantitative approach with a quasi-experimental design. This design was chosen as it allows researchers to compare two different instructional models without conducting full randomization of research subjects (Creswell & Clark, 2017; Fraenkel et al., 2012). The specific design used was the posttest-only non-equivalent control group design. In this design, two groups

were given different treatments: one group received instruction using the Problem-Based Learning (PBL) model, while the other was taught using the Jigsaw cooperative learning model (Sugiyono, 2017).

The research was conducted at SMKN 10 Bandung during the even semester of the 2024/2025 academic year. The study population consisted of all tenth-grade students taking Islamic Religious Education (IRE). The sample was selected using purposive sampling, namely two classes with relatively equal characteristics in terms of academic ability based on previous IRE scores (Arikunto, 2013). One class was assigned as the experimental group (PBL model), and the other as the control group (Jigsaw model).

The research instrument was a critical thinking skills test developed based on (Ennis, 1996) indicators, which include: (1) providing simple explanations, (2) building basic skills, (3) drawing inferences, (4) giving further explanations, and (5) setting strategies and tactics. The test consisted of essay-type questions aligned with the IRE subject matter. Content validity was ensured through expert judgement by IRE lecturers and subject teachers (Gall et al., 2003). Instrument reliability was tested using Cronbach's Alpha, yielding a high reliability score (Adrias & Ruswandi, 2025).

The research procedure consisted of three stages: (1) Preparation stage – including the development of instructional tools, instrument validation, and coordination with the school; (2) Implementation stage – applying the PBL model in the experimental class and the Jigsaw model in the control class, each over four sessions; (3) Evaluation stage – administering a posttest on critical thinking skills to both groups after treatment.

Data analysis techniques included both preliminary tests and hypothesis testing. Preliminary tests included normality testing using the Kolmogorov-Smirnov test and homogeneity testing using Levene's Test (Ghozali, 2016). Once the assumptions were met, an independent sample t-test was conducted to determine the difference in critical thinking skills between the experimental (PBL) and control (Jigsaw) groups. Data analysis was performed using SPSS version 25(Pallant, 2020).

Through this design, the study aims to provide empirical evidence on the effectiveness of the PBL model compared to Jigsaw in enhancing students' critical thinking skills in Islamic Religious Education at the vocational high school level.

RESULTS

Students' Critical Thinking Ability Using the Problem-Based Learning (PBL) Model

To address the first research question, the researcher conducted a descriptive analysis of the posttest scores on critical thinking ability in the experimental class, namely Class XI PF 1 of SMKN 10 Bandung, which received instruction using the Problem-Based Learning (PBL) model. The descriptive analysis aimed to provide a comprehensive overview of students' learning outcomes based on the collected data, without making generalizing inferences.

This descriptive analysis is essential as an initial step to understand the distribution of scores, range of achievement, and average tendencies before proceeding to inferential statistical analysis. Through this, the basic patterns in the development of students' critical thinking skills after participating in problem-based learning can be identified.

The descriptive analysis results of students' critical thinking abilities in the experimental class are presented in Table 1 below:

Tabel 1
Descriptive Statistics of Critical Thinking Ability (Experimental Class – PBL Model)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Posttest Eksperimen	11	15	70	85	76,36	5,519
Valid N (listwise)	11					

Based on the descriptive analysis results in Table 1, the average posttest score for students' critical thinking ability was 76.36. This score places students' critical thinking skills in the "good" category. The figure indicates that the majority of students were able to achieve a relatively high level of understanding and reasoning in the problem-based Islamic Religious Education (IRE) learning context. A score range of 15 points (70–85) shows some variation among students' scores; however, this variation is not significant. This suggests that the distribution of critical thinking skills in the experimental class was relatively even, with no extreme gaps between high- and low-achieving students.

The standard deviation of 5.519 indicates that the data distribution was relatively stable around the mean score. In other words, most students achieved consistent results in the critical thinking test. This condition reflects the effectiveness of the PBL model in producing homogeneous learning outcomes. Field observations supported these findings, as students in the experimental class were more active in asking questions, expressing opinions, and engaging in in-depth discussions. These activities encouraged them to develop analytical skills and logical reasoning within the context of IRE lessons.

The IRE teacher who taught the experimental class also confirmed these findings. According to the teacher, the PBL model provides more space for students to explore the material and relate it to real-world problems, thereby motivating them to think more critically and creatively. In conclusion, the implementation of the Problem-Based Learning (PBL) model in the experimental class had a positive impact on students' critical thinking skills. The relatively stable distribution of scores, high average performance, and consistent student achievement demonstrate that PBL is an effective instructional strategy for developing critical thinking skills in Islamic Religious Education.

Students' Critical Thinking Ability Using the Jigsaw Cooperative Learning Model

To address the second research question, the researcher conducted a descriptive analysis of the posttest scores on students' critical thinking ability in the control class, namely Class XI PF 2 at SMKN 10 Bandung, which received instruction using the Jigsaw cooperative learning model. This descriptive analysis aimed to illustrate the general trends in students' learning outcomes before conducting a comparative test with the experimental group.

The descriptive analysis was used to examine the mean score, standard deviation, and score range among students. This helps to reveal the characteristics of students' critical thinking ability distribution after the Jigsaw-based learning process. The results of the descriptive analysis of students' critical thinking scores in the control group are presented in Table 2 below:

Table 2.
Descriptive Statistics of Critical Thinking Ability (Control Class – Jigsaw Model)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Posttest Kontrol	11	45	40	85	61,82	13,833
Valid N (listwise)	11					

Based on the analysis in Table 2, the average posttest score of students in the control class was 61.82, with a standard deviation of 13.833. This average places the students' critical thinking ability in the moderate category, and it is notably lower than that of the experimental group (PBL). The 45-point score range (40–85) indicates a fairly wide variation among students. While some students achieved relatively high scores, others scored low, suggesting an uneven distribution of

learning outcomes. This indicates that the Jigsaw model did not have a consistent impact across all students. The relatively high standard deviation reinforces the finding that there were significant individual differences within this group. Thus, the Jigsaw model tends to yield varied learning outcomes, where some students adapted well, while others struggled to develop their critical thinking skills.

Observations during the learning process showed that students were actively collaborating—dividing learning materials and presenting their findings to group members. However, the activities were more focused on information sharing rather than deep critical analysis. Students with higher academic ability tended to dominate, while others passively followed the explanations.

The IRE teacher also confirmed this during interviews, noting that while Jigsaw promotes social interaction, not all students actively engaged in critical thinking processes. Some students were more focused on descriptive delivery of content rather than exploring analytical and evaluative aspects. In conclusion, while the Jigsaw cooperative learning model did succeed in promoting collaboration and peer interaction, its contribution to the development of critical thinking skills was uneven. The wide variation in results suggests that this approach is more effective for students who already possess strong foundational skills, whereas other students may experience limited benefits.

Differences in Students' Critical Thinking Ability Between the PBL and Jigsaw Models

To address the third research question, the researcher conducted a mean difference test using the independent samples t-test. This test was employed to determine whether there was a significant difference in students' critical thinking abilities between the experimental group (PBL) and the control group (Jigsaw).

Prior to the t-test, assumption tests were conducted—specifically, tests of normality and homogeneity. The Kolmogorov-Smirnov test results indicated that data from both groups were normally distributed, while the Levene's Test results showed that the variances between the groups were homogeneous. Therefore, the assumptions for conducting a t-test were satisfied. The results of the independent samples t-test are presented in Table 3 below:

Table 3.
Independent Samples t-Test Results

Variable	t-value	Sig. (p)	Description
Critical Thinking Ability	2.683	0.014 ($p < .05$)	Significantly different

Based on the t-test results, the calculated t-value was 2.683 with a significance level of $p = 0.014$ ($p < .05$). This indicates a statistically significant difference in students' critical thinking abilities between those taught using the Problem-Based Learning (PBL) model and those taught using the Jigsaw cooperative model.

The mean score of the experimental group (PBL) was 76.36, higher than that of the control group (Jigsaw), which was 61.82. This difference suggests that the application of the PBL model contributed more effectively to the enhancement of students' critical thinking skills in the Islamic Religious Education (IRE) subject at SMKN 10 Bandung. Classroom observations support these findings. In the PBL class, students were engaged in in-depth discussions, posed critical questions, and actively sought solutions to real-world problems. In contrast, students in the Jigsaw class were more focused on dividing content and presenting it, with analytical and evaluative skills not yet fully developed.

The IRE teacher also confirmed that PBL was more challenging and required students to think actively and critically. Meanwhile, the Jigsaw model, although effective in fostering collaboration, was less successful in encouraging higher-order thinking skills. Thus, the findings of this study affirm that there is a significant difference between the PBL and Jigsaw models in

developing students' critical thinking skills. PBL proves to be superior, as its real-world problem-solving approach encourages students to analyze, evaluate, and draw conclusions independently. Overall, these findings provide empirical evidence that the implementation of innovative instructional models like PBL is more effective in enhancing critical thinking skills among vocational high school students, particularly in Islamic Religious Education. The significant difference in outcomes highlights the importance of choosing the right instructional model aligned with the goals of 21st-century education.

DISCUSSION

Research findings indicate that students taught using the Problem-Based Learning (PBL) model exhibited higher critical thinking skills compared to those taught with the Jigsaw cooperative model. The average score in the PBL class reached 76.36, while the Jigsaw class only averaged 61.82. This difference highlights that a real-world problem-based approach is more effective in stimulating students to analyze, evaluate, and draw conclusions. These findings are consistent with constructivist theory, which emphasizes the importance of active student engagement in constructing knowledge (Vygotsky & Cole, 1978).

The PBL model positions problems as the starting point of learning, prompting students to think critically in order to find solutions. (Barrows & Tamblyn, 1980; Firdaus, 2024) assert that PBL encourages the development of higher-order thinking skills, as students are confronted with authentic, real-life problems. This aligns with classroom observatio Peningkatan aktivitas dan hasil belajar ips melalui model pembelajaran kooperatif tipe jigsawns in the study, where PBL students were more actively involved in questioning and discussion.

In contrast, while the Jigsaw model effectively enhances cooperation and social interaction, it does not fully stimulate critical thinking skills. In this model, students tend to share descriptive information without engaging in in-depth analysis. This supports the findings of (Megawati et al., 2021; Suparta et al., 2020), who concluded that Jigsaw contributes more to collaborative skills than to strengthening students' analytical abilities.

These findings are further supported by the study of (Lubis & Astuti, 2024) at MTs Negeri 1 Lhokseumawe, which reported that PBL significantly improved students' critical thinking skills in Akidah Akhlak. A similar conclusion was drawn by (Shafamarwa et al., 2024)at MA Nurul Falah Center, who found that PBL empowered students to express opinions and construct arguments more confidently. Hence, empirical evidence consistently supports the superiority of PBL over traditional cooperative methods.

The high mean score and low standard deviation in the PBL group indicate that students' achievements were relatively uniform. This suggests that PBL benefits not only high-performing students, but also supports those with moderate abilities in reaching critical thinking standards. (Darling-Hammond, 2017) emphasized that problem-based models help narrow the achievement gap among students by ensuring active participation in problem-solving for all learners.

Conversely, in the Jigsaw class, a wider score range (40–85) and a standard deviation of 13.833 were found. This variation reflects uneven learning outcomes, where dominant students grasped the material more quickly while others lagged behind. Diza and Muchlis (2023) also found that the Jigsaw model tends to result in unequal participation, as some students remained passive and relied heavily on their peers.

The significant difference in critical thinking skills between PBL and Jigsaw can also be understood through the lens of Higher Order Thinking Skills (HOTS). (Brookhart, 2010, 2013) stated that HOTS develop more effectively when students are challenged with analytical and evaluative tasks. PBL provides this environment, while Jigsaw focuses more on communication and collaboration skills.

This research is in line with international findings by (Choi et al., 2014; Rehman et al., 2024), who found that PBL not only enhances conceptual knowledge but also cultivates critical thinking, problem-solving, and reflection skills. Therefore, implementing PBL in Islamic Religious Education (IRE) at vocational high schools is highly relevant to the demands of 21st-century education, which prioritizes higher-order thinking.

The practical implication of this study is that IRE teachers should consider using PBL as the primary instructional strategy for fostering critical thinking skills. Jigsaw can still be used as a complementary method to train social skills, but it is insufficient if the learning goals emphasize analytical and evaluative aspects.

From a policy perspective, these findings highlight the urgency of enhancing teacher capacity through training in innovative teaching models. PBL requires careful planning, development of relevant problem scenarios, and teacher facilitation to ensure active student engagement. Therefore, support from schools and education authorities is essential to ensure the successful implementation of PBL across various subjects, including IRE.

In conclusion, this study confirms that the Problem-Based Learning model outperforms the Jigsaw model in developing critical thinking skills among vocational high school students in Islamic Religious Education. Supported by prior research and learning theory, it can be concluded that PBL is an instructional approach aligned with modern educational needs—one that demands higher-order thinking, real-life relevance, and active student participation.

CONCLUSION

This study concludes that the implementation of different learning models significantly influences students' critical thinking skills in Islamic Religious Education. Students who were taught using the Problem Based Learning *(PBL)* model achieved higher average scores ($M = 76.36$, $SD = 5.52$) compared to those who learned through the *Jigsaw* cooperative model ($M = 61.82$, $SD = 13.83$). The independent samples t-test confirmed a significant difference ($t = 2.683$, $p < 0.05$), indicating that PBL is more effective in enhancing students' critical thinking. The findings highlight that PBL encourages students to actively analyze problems, construct arguments, and connect religious concepts with real-life situations, leading to more consistent and homogeneous outcomes. In contrast, while Jigsaw supports collaboration and information sharing, it does not equally stimulate higher-order thinking skills across students. Therefore, PBL is recommended as a more effective instructional strategy for strengthening critical thinking skills in vocational school contexts, particularly in Islamic Religious Education. Teachers are advised to integrate PBL into their teaching practices, supported by adequate training and institutional policies, to foster meaningful and student-centered learning.

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