# Open-Ended Learning Model Effect on Critical and Creative Thinking in Islamic Education

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**ABSTRACT:** *This study aims to examine the effect of the Open-Ended Learning model on students' critical and creative thinking skills in Islamic Religious Education learning at SMP Negeri 8 Pekanbaru. The study is motivated by the gap between theoretical demands for developing higher-order thinking skills that require complex prerequisites and the reality of limited educational resources, as well as the urgency of contributing to achieving SDG 4 on quality education. The research employs a quantitative, quasi-experimental, nonequivalent control-group design, involving 70 students divided into an experimental class (34 students) and a control class (36 students). Data were collected using validated critical and creative thinking skills test instruments, then analysed using the Independent Samples t-tests and MANOVA. The results show significant differences between the experimental and control classes, with the experimental class achieving a critical thinking posttest average of 79.12 compared to 70.14 (sig. 0.001), and a creative thinking posttest average of 81.76 compared to 74.58 (sig. 0.010). Multivariate tests confirm a significant simultaneous effect (Wilks' Lambda F=8.642, sig. 0.000), proving that the Open-Ended Learning model effectively develops both skills in an integrated manner. These findings demonstrate that open-ended problem-based learning can transform the paradigm of Islamic Religious Education from doctrinal transmission to intellectual exploration, producing a generation of Muslims capable of thinking critically, creatively, and contextually in applying Islamic values, while significantly contributing to the SDGs agenda through the formation of essential 21st-century competencies for sustainable development.*

Penelitian ini bertujuan mengkaji pengaruh model Open Ended Learning terhadap keterampilan berpikir kritis dan kreatif siswa dalam pembelajaran Pendidikan Agama Islam di SMP Negeri 8 Pekanbaru. Studi ini dilatarbelakangi oleh kesenjangan antara tuntutan teoretis pengembangan keterampilan berpikir tingkat tinggi yang memerlukan prasyarat kompleks dengan realitas keterbatasan sumber daya pendidikan, serta urgensi kontribusi terhadap pencapaian SDG 4 tentang pendidikan berkualitas. Penelitian menggunakan pendekatan kuantitatif dengan desain quasi-experimental nonequivalent control group, melibatkan 70 siswa yang terbagi dalam kelas eksperimen (34 siswa) dan kelas kontrol (36 siswa). Data dikumpulkan melalui instrumen tes keterampilan berpikir kritis dan kreatif yang telah divalidasi, kemudian dianalisis menggunakan Independent Samples t-test dan MANOVA. Hasil penelitian menunjukkan perbedaan

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signifikan antara kelas eksperimen dan kontrol, dengan kelas eksperimen mencapai rata-rata posttest berpikir kritis 79,12 berbanding 70,14 (sig. 0,001) dan berpikir kreatif 81,76 berbanding 74,58 (sig. 0,010). Uji multivariat mengkonfirmasi pengaruh simultan yang signifikan (Wilks' Lambda F=8,642, sig. 0,000), membuktikan bahwa model Open Ended Learning efektif mengembangkan kedua keterampilan secara terintegrasi. Temuan ini menunjukkan bahwa pembelajaran berbasis masalah terbuka mampu mentransformasi paradigma pembelajaran PAI dari transmisi doktrinal menjadi eksplorasi intelektual, menghasilkan generasi muslim yang mampu berpikir kritis, kreatif, dan kontekstual dalam mengaplikasikan nilai-nilai Islam, sekaligus berkontribusi signifikan terhadap agenda SDGs melalui pembentukan kompetensi abad 21 yang esensial untuk pembangunan berkelanjutan.

**Keywords:** *Open-Ended Learning, Thinking Skills, Critical Thinking, Creative Thinking, Islamic Education.*

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## I. INTRODUCTION

Islamic Religious Education learning at SMP Negeri 8 Pekanbaru has undergone a significant transformation through the consistent and systematic implementation of the Open-Ended Learning model. The implementation of this model began in the second semester of the previous academic year involving eighth-grade students as the main subjects in an innovative learning process. Islamic Religious Education teachers at this school have developed learning designs that provide full freedom for students to explore various alternative problem-solving approaches related to religious materials, ranging from concepts of worship and morals to muamalah in daily life. Each learning session is designed to provide open problems that challenge students to think deeply, analyse from various perspectives, and produce diverse, creative solutions that remain in accordance with the corridor of Islamic values. The urgency of implementing innovative learning models in Islamic Religious Education is well-documented in several studies (Dissen, 2023; Ramírez-Montoya et al., 2025; Song & Cai, 2024).

Field observation results show very encouraging changes in Classroom dynamics and student engagement during the learning process. Students who were initially passive and only listened to teacher explanations are now actively discussing, asking questions, and presenting their ideas with full confidence. Students' ability to formulate the core of problems from cases given by teachers has increased drastically, enabling them to accurately identify the essence of problems and provide logical, systematic explanations. Moreover, students demonstrate extraordinary creative thinking skills by generating diverse problem-solving ideas, offering innovative alternative solutions, and elaborating on religious concepts in the context of modern life. Group discussions during learning demonstrate high-quality argumentation, with students mutually providing constructive criticism, evaluating friends' opinions, and reaching clear conclusions. Research confirms that active pedagogical approaches can transform Classroom dynamics significantly (Campo et al., 2023; Kazemian et al., 2021; Ube et al., 2025).

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The success of implementing the Open-Ended Learning model at SMP Negeri 8 Pekanbaru is also reflected in students' rapidly increasing enthusiasm and learning motivation. Students no longer regard Islamic Religious Education as boring, merely memorising arguments or hadiths, but rather as a challenging and enjoyable intellectual exploration. They can connect learning materials to social phenomena, analyse contemporary religious problems critically, and propose solutions that are applicable and contextual. Students' academic achievement in learning evaluation shows significant improvement, with average scores exceeding minimum mastery standards. Students' work portfolios, containing case analyses, problem-solving proposals, and religious projects, demonstrate high-level thinking that reflects the successful implementation of this learning model. In fact, several student works have been presented in school-level discussion forums and received appreciation from various parties. This aligns with findings that student-centred learning models cultivate deeper engagement and intrinsic motivation in religious subjects (Bhuttah et al., 2024; Guamanga et al., 2025; Smare & Elfatihi, 2024).

Theoretically, developing students' critical and creative thinking skills in Islamic Religious Education learning requires a structured approach and comprehensive pedagogical support. According to Dissen (2023), the development of critical thinking in higher education requires a consistent, continuous, and active pedagogical methodology, in which students are faced with complex situations that demand in-depth analysis and argumentative reasoning. In line with this, Song & Cai (2024) emphasise that problem- and inquiry-based learning strategies are essential for facilitating higher-order cognitive skills, but their implementation requires mature institutional readiness. Furthermore, Ube et al. (2025) explain that active student participation in the learning process requires appropriate scaffolding to question assumptions, reflect on thinking, and construct arguments independently. Meanwhile, Ramírez-Montoya et al. (2025) identify that complex thinking, as a meta-competency, requires the integration of scientific, systemic, innovative, and critical thinking sub-competencies, developed through creative processes and trained in divergent reasoning. Finally, Kazemian et al. (2021) affirm that the success of critical thinking development depends on an institutional environment that values inquiry and debate, as well as trained teachers to guide and provide feedback on students' complex reasoning processes. Thus, ideally, the maximum development of critical and creative thinking skills requires strict prerequisites, strong systemic support, and gradual, measurable processes.

The clear gap between the ideal conditions experts require and the reality of success in the field raises fundamental questions about the factors that enable such extraordinary achievement. Theoretically, developing critical and creative thinking skills requires a complex pedagogical infrastructure, intensive teacher training, substantial institutional support, and time to achieve significant results. However, the reality at SMP Negeri 8 Pekanbaru shows that, with the implementation of the Open-Ended Learning model, students can achieve high levels of thinking skills in a relatively short time and with limited resources. This gap indicates the presence of special mechanisms in the Open-Ended Learning model that can accelerate the development of thinking skills, or specific contextual factors that have not been identified in the theoretical literature (Isaksen et al., 2023; Organisciak et al., 2025). The gap between theoretical expectations that set high standards for maximum achievement and empirical reality that shows significant success underscores the urgency of studying in greater depth how the Open-Ended Learning model can bridge this gap (Hadas & Hershkovitz, 2024).

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This phenomenon raises crucial research questions: how can the Open-Ended Learning model produce such a significant impact on students' critical and creative thinking skills in Islamic Religious Education, when, theoretically, such achievement requires more complex prerequisites? Are there unique elements in the Open-Ended Learning model that can overcome the obstacles commonly identified in developing higher-order thinking skills? These questions are important given their implications for broader Islamic Religious Education practice. If the Open-Ended Learning model proves effective in this context, it could serve as an alternative for other schools facing similar limitations while seeking maximum learning achievement. Moreover, a deep understanding of the working mechanism of the Open-Ended Learning model in the context of Islamic Religious Education can make theoretical contributions to the Islamic religious pedagogy literature and to the development of innovative learning models.

Previous research has examined critical and creative thinking skills from various perspectives and learning contexts. Studies on critical thinking skills development have been conducted extensively with a focus on active pedagogical methodology and determinant factors (Campo et al., 2023; Parrales, 2022; Rivas et al., 2022; Sánchez Gonzales & Nagamine Miyashiro, 2021; Villarruel-Diaz & Portocarrero-Gutiérrez, 2021). These studies identify problem-based learning, case studies, and inquiry-based learning as the main strategies for developing critical thinking skills. Still, most were conducted in the context of higher education or in general subjects such as mathematics and science (Bhuttah et al., 2024; Chen & Nguyen, 2024; Guamanga et al., 2025; Sanusi et al., 2025; Van Peppen et al., 2022). Studies on creative thinking skills have also developed rapidly, especially in measuring the dimensions of fluency, flexibility, originality, and elaboration. Still, research has mostly focused on technology-based learning or STEM subjects (Castaño et al., 2023; Hadas & Hershkovitz, 2024; Isaksen et al., 2023; Organisciak et al., 2025; Smare & Elfatihi, 2024). Several studies show that integrating 4C skills (creativity, critical thinking, communication, collaboration) is an important focus in 21st-century education, but their implementation in Islamic Religious Education has received limited empirical exploration.

Although much research has examined innovative learning models and higher-order thinking skills, a significant gap in the literature exists, opening space for this research. First, research on the Open-Ended Learning model is more focused on mathematics learning at the elementary school level. In contrast, its application in Islamic Religious Education subjects at the junior high school level is still very rarely studied. Second, most research examines critical or creative thinking skills separately rather than as an interrelated unity within a single learning model. Third, previous research uses quasi-experimental designs with pretest-posttest designs. Still, few have explored in depth how the learning process unfolds and what factors contribute to the successful implementation of the model. Fourth, the context of Islamic Religious Education learning has unique characteristics distinct from other subjects, in which spiritual and moral values are an integral part of the learning objectives; therefore, specific studies are needed to examine how the Open-Ended Learning model can accommodate this uniqueness. Fifth, the majority of research is conducted in schools with adequate facilities, while the context of schools with limited resources has not been widely explored. Thus, this research fills a literature gap by comprehensively examining the effects of the Open-Ended Learning model on critical and creative thinking skills simultaneously in the context of Islamic Religious Education at the junior high school level.

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The novelty of this research lies in integrating three innovative dimensions that have never been examined simultaneously in the literature. First, this research integrates the measurement of critical and creative thinking skills within a single experimental design, in which both dependent variables are measured and analysed together to examine their interrelationships and the contribution of the Open-Ended Learning model to the development of holistic thinking skills. Second, this research tests the effectiveness of the Open-Ended Learning model in the specific context of Islamic Religious Education. This field integrates cognitive, affective, and spiritual dimensions not found in other subjects. Third, this research targets students at the junior high school level, a period of cognitive development marked by a transition from concrete operational to formal operational according to Piaget's theory, during which appropriate pedagogical intervention can have a long-term impact on intellectual development. The combination of these three elements makes this research highly novel and contributes to the development of Islamic Religious Education pedagogy theory and innovative learning practices at the junior high school level (Castaño et al., 2023; Chen & Nguyen, 2024; Sanusi et al., 2025).

The urgency of this research lies not only in its academic contributions to the pedagogical literature but more importantly in its impact on achieving the Sustainable Development Goals (SDGs), particularly SDG 4 on Quality Education, which emphasises quality education and lifelong learning for all. The development of critical and creative thinking skills through the Open-Ended Learning model aligns with SDG target 4.7, which emphasises ensuring that all learners acquire the knowledge and skills needed to promote sustainable development, including through education that encourages creativity, innovation, and critical thinking. Moreover, this research contributes to SDG 16 on Peace, Justice, and Strong Institutions, as Islamic Religious Education that develops critical thinking skills can produce young Muslim generations capable of moderate thinking, appreciating differences, and contributing to social peace. The creative thinking skills developed also support SDG 8 on Decent Work and Economic Growth, as they prepare students with the innovation and adaptation capabilities needed to address work challenges in the 4.0 industrial revolution. This research is also relevant to SDG 5 on Gender Equality, because the Open-Ended Learning model provides equal opportunities for all students, without discrimination, to develop their intellectual potential to the fullest. Thus, this research has high urgency in supporting the global sustainable development agenda by transforming learning practices that are more inclusive, of higher quality, and with a long-term impact (Rivas et al., 2022; Simonovic et al., 2022; Van Peppen et al., 2022).

Based on the gap between ideal conditions and empirical reality and on the identified literature gaps, this research formulates two central problems to be studied in depth. The first problem focuses on how the Open-Ended Learning model affects students' critical and creative thinking skills individually, by identifying specific dimensions of both skills that undergo significant changes and the learning mechanisms that facilitate such development. The second problem examines the simultaneous effect of the Open-Ended Learning model on students' critical and creative thinking skills, by analysing whether there is interaction or synergy between the two skills when developed through the same learning model, and how the context of Islamic Religious Education, with its unique characteristics, modulates that relationship. Both problem formulations are designed to build a coherent and comprehensive research framework, avoiding overlap by focusing on different but complementary aspects, and ensuring that research findings can provide

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substantial theoretical and practical contributions to the development of quality Islamic Religious Education learning.

## II. METHOD

This research uses a quantitative, quasi-experimental approach because researchers cannot fully randomise subjects within existing classes (Sugiyono, 2019). The design used is a nonequivalent control group design, symbolically represented as: Experimental Group: O1 X O2; Control Group: O1 — O2 (where O1 = pretest, X = Open-Ended Learning treatment, O2 = posttest). The population consisted of all eighth-grade students at SMP Negeri 8 Pekanbaru (210 students across six classes). Sampling employed purposive sampling, selecting class VIII-A as the experimental class (34 students) and class VIII-B as the control class (36 students), with equivalence confirmed through pretest analysis (t = 0.842, sig. = 0.402 > 0.05). Respondents were aged 13–14 years. The critical thinking skills test comprised 20 essay items based on Robert H. Ennis' (1996) indicators: (1) formulating the core of problems, (2) providing simple explanations, (3) analysing arguments, and (4) concluding. The creative thinking skills test comprised 15 open-ended items based on E. Paul Torrance's (1974) creativity indicators: (1) fluency, (2) flexibility, (3) originality, and (4) elaboration, scored using an analytic rubric (scale 1–4). Both instruments were validated by three expert validators (two Islamic Religious Education specialists and one educational evaluation expert). Cronbach's Alpha reliability coefficients were 0.82 (critical thinking) and 0.79 (creative thinking), both reliable (alpha > 0.70), with item validity confirmed by Corrected Item-Total Correlation (threshold r > 0.30). The test instrument was administered at the end of learning thinking abilities in the context of Islamic Religious Education subjects (Arikunto, 2018).

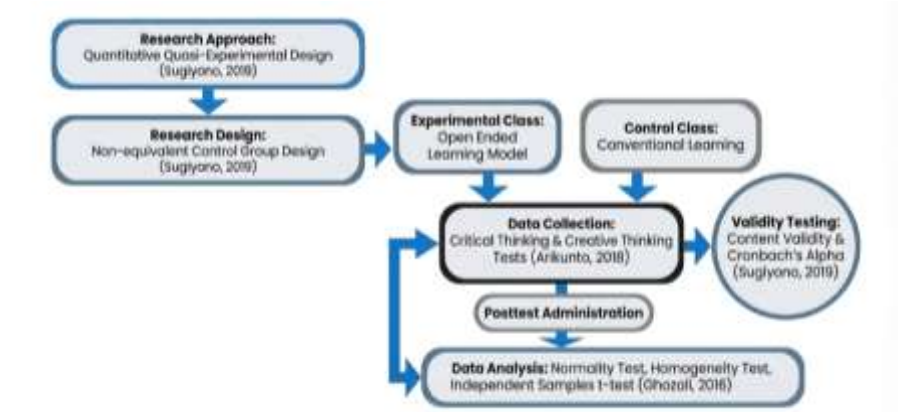


***Figure 1.*** *Research framework*

Data analysis was conducted using IBM SPSS Statistics Version 23, covering: 1) descriptive statistics including mean, standard deviation, and score distribution by category (high/medium/low) for each variable and per indicator (fluency, flexibility, originality, elaboration for creative thinking); 2) prerequisite tests: normality using Kolmogorov-Smirnov and homogeneity using Levene's test; and 3) hypothesis testing using Independent Samples t-test (per variable) and MANOVA using Wilks' Lambda (simultaneous), with effect size calculated via Cohen's d. Data validity testing was conducted through content validity involving three expert validators and reliability testing using Cronbach's Alpha (Ghozali, 2016; Sugiyono, 2019). By applying these

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analysis techniques and validity tests, the data obtained are expected to objectively and accurately describe the effect of the Open-Ended Learning model on students' critical and creative thinking skills in this research.

## III. RESULT AND DISCUSSION

### Effect of the Open-Ended Learning Model on Students' Critical Thinking Skills in Islamic Religious Education Subjects

Research results show that implementing the Open-Ended Learning model has a significant effect on students' critical and creative thinking skills in Islamic Religious Education subjects at SMP Negeri 8 Pekanbaru. This finding is based on a comparative analysis of the control and experimental classes, which underwent learning using different approaches during the research period. Descriptive Data: The experimental class obtained a pretest mean of 61.47 (SD = 7.23) and a posttest mean of 79.12 (SD = 6.88), while the control class obtained a pretest mean of 60.83 (SD = 7.51) and a posttest mean of 70.14 (SD = 9.22). Posttest score distribution for the experimental class: high category (score 75 and above) = 67.6%, medium (score 60-74) = 29.4%, low (score below 60) = 3%; control class: high = 36.1%, medium = 47.2%, low = 16.7%. For creative thinking, the experimental class achieved a pretest mean of 63.12 (SD = 6.94) and a posttest mean of 81.76 (SD = 6.42), while the control class achieved a pretest mean of 62.75 (SD = 7.18) and a posttest mean of 74.58 (SD = 8.37). Per-indicator posttest means (experimental vs control): fluency 82.4 vs. 75.1, flexibility 81.2 vs. 73.8, originality 80.9 vs. 74.2, elaboration 82.5 vs. 75.3. Prerequisite Tests: Normality testing (Kolmogorov-Smirnov) showed all data normally distributed (experimental critical thinking sig. = 0.142; control sig. = 0.118; experimental creative thinking sig. = 0.156; control sig. = 0.129; all $p > 0.05$). Homogeneity testing (Levene's test) confirmed homogeneous variances (critical thinking $F = 2.341$, sig. = 0.131; creative thinking $F = 1.987$, sig. = 0.163; all $p > 0.05$). All parametric test assumptions were fulfilled. Hypothesis Testing:

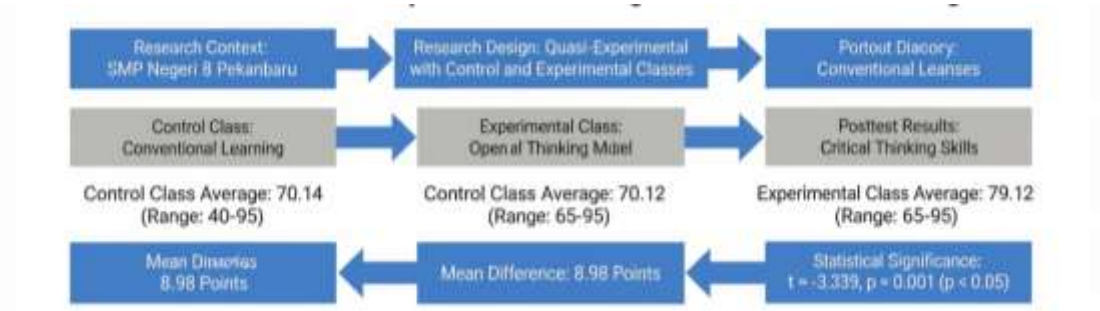


***Figure 2.*** *Effect of the open-ended learning model*

Posttest data on critical thinking skills show a striking difference in achievement between the two groups. The control class that implemented conventional learning obtained an average posttest score of 70.14 from a total of 36 students, with a range from 40 to 95. Meanwhile, the experimental class that implemented the Open-Ended Learning model achieved an average posttest score of 79.12 from 34 students, with a range from 65 to 95. This average difference of 8.98 points indicates a substantial increase in critical thinking ability among the group that received the learning intervention using the Open-Ended Learning approach.

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Analysis of the distribution of critical thinking skills posttest scores shows an interesting pattern. In the control class, there is a significant score variation, with some students still earning low scores in the 40-50 range, indicating that conventional learning has not raised all students' abilities equally. Conversely, the experimental class shows a higher, more even score distribution, with the lowest score at 65, indicating that the Open-Ended Learning model can elevate students' minimum ability. More than half of the students in the experimental class achieved scores above 75, indicating solid achievement in critical thinking skills.

The improvement in students' critical thinking skills in the experimental class is reflected in their ability to formulate the core of problems more clearly and systematically. Students who participated in Open-Ended Learning demonstrated superior ability to identify key elements of a case or question presented by the teacher. They were able to separate essential information from non-essential information and formulate problems with precise, concise language. This contrasts with students in the control class who still tend to have difficulty identifying the core of problems and are often trapped in less relevant details (Fitriyah et al., 2024; Yulianingsih et al., 2025).

The ability to provide simple explanations also improved significantly in the experimental class. Students who are accustomed to open-ended problems in the Open-Ended Learning model demonstrate proficiency in explaining religious concepts in their own language, rather than merely quoting textbook definitions. They can connect abstract concepts with concrete examples from daily life, demonstrating deep understanding rather than mere memorisation. When asked to explain concepts such as sincerity in worship or praiseworthy morals, experimental class students can provide logical, systematic, and contextual explanations, accompanied by relevant examples that demonstrate the internalisation of these values (Darmawati & Mustadi, 2023; Dayu et al., 2022).

Analysis of arguments shows the most striking difference between the control and experimental classes. Students in the experimental class demonstrate extraordinary ability in evaluating argument quality, identifying premises and conclusions, and detecting weaknesses in reasoning. When faced with various views on a religious issue, they can objectively compare these arguments, assess the strength of the evidence supporting each position, and identify hidden biases or assumptions. This ability developed because the Open-Ended Learning model consistently exposes students to situations where they must evaluate various perspectives and alternative solutions to the same problem (Narmaditya et al., 2018).

In conclusion, experimental class students demonstrate superior competence in synthesising information. They are not only able to draw logical conclusions from available information but also to recognise the limitations of their conclusions and remain open to revision if new evidence is found. The conclusion-drawing process they use is reflective and critical, considering various possible interpretations before reaching conclusions. This shows that the Open-Ended Learning model successfully develops a thinking pattern that is not hasty in making judgments, but rather carefully considers various factors (Putri et al., 2023; Wahyuningsih et al., 2023).

Observation of the learning process in the experimental class reveals very positive dynamics. Students show high enthusiasm in working on open-ended problems given by the teacher. Group discussions are intense, with students questioning each other's opinions, offering constructive criticism, and together building a more comprehensive

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understanding. The level of active student participation in learning increased drastically compared to conventional learning in the control class, where students tend to be passive, waiting for teacher explanations (Awaliyah et al., 2024).

Changes in students' attitudes toward Islamic Religious Education learning are also noteworthy. Students in the experimental class no longer view Islamic Religious Education as a boring subject limited to memorising verses or hadiths. They begin to see Islamic Religious Education as a challenging intellectual arena where they can explore ideas, analyse contemporary issues from an Islamic perspective, and develop a deeper understanding of religious values. This paradigm shift is very important because it cultivates an intrinsic appreciation for the subject, rather than just learning to meet curricular demands (Hoyali et al., 2025).

Statistical test results confirm the significance of differences between the two groups. The independent-samples t-test shows a t value of -3.339 and a p-value of 0.001, which is far below the alpha level of 0.05. This means that, statistically, there is a very significant difference in the critical thinking skills of the control and experimental classes. The magnitude of the mean difference of -8.978, with a 95% confidence interval of -14.344 to -3.612, shows that this difference is not a mere coincidence but rather a real effect of the Open-Ended Learning model intervention.

This finding aligns with the theoretical foundation of the Open-Ended Learning model, which emphasises the importance of providing students with space to explore various problem-solving approaches. When students face open problems with multiple solutions, they cannot rely on memorisation or standard procedures; they must activate higher-order thinking skills. This process naturally develops analysis, evaluation, and synthesis skills, which are the core of critical thinking.

Research results show that the Open-Ended Learning model has a significant effect on students' critical thinking skills, as evidenced by the difference in average posttest scores between the experimental class (79.12) and control class (70.14) with a significance value of 0.001. This finding aligns with the theoretical framework proposed by Dissen (2023), which affirms that the development of critical thinking in education requires a consistent, continuous, and active pedagogical methodology, in which students are faced with complex situations that demand in-depth analysis and argumentative reasoning. The Open-Ended Learning model in this research consistently exposes students to open problems that require them to analyse from various perspectives, evaluate alternative solutions, and build logical arguments to defend their opinions.

This process proves effective in developing students' ability to formulate the core of problems, provide simple explanations, analyse arguments, and draw conclusions, which are the main indicators of critical thinking according to Fisher (2001). Furthermore, Song & Cai (2024) emphasise that problem-based and inquiry-based learning strategies are essential for facilitating higher-order cognitive skills, but their implementation requires mature institutional readiness. The findings of this research reinforce that argument while providing new insight. With appropriate learning design, the Open-Ended Learning model can be implemented even with limited resources, as long as teachers are trained to facilitate open discussions and create a learning environment conducive to intellectual exploration. Campo et al. (2023) similarly found that when students are exposed to diverse pedagogical methods, their critical thinking skills improve across various subject areas. Bhuttah et al. (2024) demonstrated that innovative pedagogical approaches mediate gains in critical thinking outcomes,

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consistent with the conditions at SMP Negeri 8 Pekanbaru. The successful implementation shows that institutional readiness is not always identical to the completeness of sophisticated physical infrastructure, but rather to teachers' commitment to changing the learning paradigm from teacher-centred to student-centred, as well as their ability to design open problems that are relevant to students' life contexts and appropriate to their cognitive development level.

**The Simultaneous Effect of the Open-Ended Learning Model on Students' Critical and Creative Thinking Skills**

Comprehensive analysis of research data reveals that the Open-Ended Learning model has a significant simultaneous effect on the development of students' critical and creative thinking skills in Islamic Religious Education subjects at SMP Negeri 8 Pekanbaru. This finding shows that both skills are not separate entities, but rather interrelated and can be developed simultaneously through the appropriate learning approach.

Comparative data show that the experimental class consistently excels in both dimensions of thinking skills. For critical thinking, the experimental class achieved an average of 79.12, compared to 70.14 in the control class, resulting in a difference of 8.98 points. Meanwhile, for creative thinking, the experimental class achieved 81.76, compared to 74.58 in the control class, resulting in a difference of 7.18 points. Both differences are statistically significant, indicating that the Open-Ended Learning model effectively develops both skills simultaneously.

A correlational analysis reveals a positive relationship between students' critical and creative thinking skills. Students who demonstrate high critical thinking ability also tend to have high creative thinking ability, and vice versa. This pattern indicates that both skills have overlapping cognitive foundations and mutually reinforce each other. The development of one skill has a positive spillover effect on the other.

The Open-Ended Learning model proves to be an effective approach for developing critical and creative thinking skills due to its unique characteristics. Open problems presented in this model inherently require students to activate both modes of thinking. On one hand, students must think critically to analyse problems, evaluate available information, and assess the quality of emerging solutions. On the other hand, they must think creatively to generate various alternative solutions, explore new approaches, and develop original ideas (Beghetto & Kaufman, 2014; Sari & Safaatullah, 2024).

Observing the learning process reveals how both skills work synergistically. When students face open-ended problems, they begin with a divergent phase in which creativity plays a dominant role, generating as many ideas and solutions as possible. Then they enter a convergent phase in which critical thinking is used to evaluate and select the best ideas. These two phases do not occur linearly; rather, they occur iteratively, with students going back and forth between generating and evaluating ideas. This iterative process trains students to use both skills in an integrated manner (Abrami et al., 2015).

Group discussions in Open-Ended Learning become an arena where the integration of critical and creative thinking is clearly manifested. Students not only produce creative ideas but must also defend them with critical, logical arguments when questioned by peers. Conversely, when critically evaluating others' ideas, they must also be creative in providing constructive feedback and suggesting ways for improvement. This dynamic

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interplay between creativity and criticism creates a very productive learning environment for the development of both skills (Bhuttah et al., 2024; Care et al., 2019).

The simultaneous improvement of both skills is also reflected in the quality of learning outputs. Works produced by experimental class students not only show originality and uniqueness which are characteristics of creativity, but also show depth of analysis and strength of arguments which are characteristics of critical thinking. When they propose solutions to a problem, they are not only innovative but also well-reasoned and supported by solid arguments. This integration shows that they have developed the ability to balance creativity and critical thinking (Dole et al., 2015; Henriksen et al., 2020).

Multivariate analysis of variance test results show that the Open-Ended Learning model has a significant simultaneous effect on both dependent variables. Wilks' Lambda test produces an F value of 8.642 with a p-value of 0.000, which is far below alpha (0.05). This confirms that multivariately, there is a significant difference between the control and experimental classes in the combination of critical and creative thinking skills. The calculated effect size indicates a fairly large effect, suggesting that the Open-Ended Learning model has a substantial practical impact.

This finding has important implications for educational practice, particularly in Islamic Religious Education learning. Research results prove that there is no need to choose between developing critical or creative thinking – both skills can and should be developed simultaneously. An appropriate learning approach, such as the Open-Ended Learning model, can facilitate the development of the integrated thinking skills students need in the 21st century (Song & Cai, 2024).

Factors that contribute to the success of this simultaneous development include several aspects. First, the design of well-crafted, open-ended problems relevant to students' life contexts. These problems must be complex enough to challenge students' thinking abilities, but not so difficult as to overwhelm them. Second, teachers serve as skilled facilitators, guiding students' thinking processes without providing direct answers. Third, a supportive Classroom climate in which students feel safe to express their ideas without fear of judgment.

The duration and intensity of the intervention also play an important role. This research was conducted over four sessions, with each session carefully designed to provide rich learning experiences. Each session provides opportunities for students to practice critical and creative thinking skills in different contexts, enabling effective transfer of learning. Consistent implementation of the Open-Ended Learning model allows students to internalise the thinking patterns being trained and develop them into habits of mind.

Reflections from students reveal significant changes in how they view and solve problems. They report that learning with the Open-Ended Learning model changed their mindset from seeking the right answer to exploring various possibilities. This mindset shift is very important because it reflects a transition from surface learning to deep learning, from passive reception to active construction of knowledge.

Teachers who taught the experimental class also reported positive experiences. They observed dramatic changes in student participation, the quality of class discussions, and the depth of students' understanding. Learning becomes more dynamic and engaging, with students taking ownership of their learning. Teachers no longer become the sole

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source of knowledge, but rather become facilitators who help students construct their own understanding through exploration and dialogue.

The successful simultaneous development of critical and creative thinking demonstrates that the Open-Ended Learning model is a powerful and versatile learning approach. This model is not only applicable to certain subjects but also has the potential to be applied widely across various learning contexts. Its characteristics, which focus on thinking processes rather than final products, make it very suitable for modern educational paradigms that emphasise the development of higher-order thinking skills.

In the context of Islamic Religious Education, the simultaneous development of critical and creative thinking skills is of particular significance. Islamic Religious Education is not just about the transmission of doctrinal knowledge, but about developing students' ability to understand, internalise, and apply Islamic values in their lives in thoughtful, contextually appropriate ways. Students with strong critical thinking skills will be able to understand the essence of Islamic teachings deeply. In contrast, creative thinking ability enables them to apply these values in ways that are relevant and effective in the modern era (Campo et al., 2023).

The findings of this research also contribute to achieving the Sustainable Development Goals, particularly SDG 4 on Quality Education. The development of critical and creative thinking skills is essential for facing complex challenges in the 21st century. By proving the effectiveness of the Open-Ended Learning model in developing both skills simultaneously, this research provides a practical contribution to efforts to improve the quality of education that produces learners who are not only knowledgeable but also capable of thinking deeply and creatively (Bhuttah et al., 2024).

In conclusion, this research empirically proves that the Open-Ended Learning model has a significant effect, both individually and simultaneously, on the development of students' critical and creative thinking skills in Islamic Religious Education subjects at SMP Negeri 8 Pekanbaru. The learning approach that provides students with the freedom to explore various solutions to open problems is effective in developing higher-order thinking skills, which are greatly needed in the modern era. This model deserves wider adoption in Islamic Religious Education to produce a generation of Muslims who are not only knowledgeable but also capable of critical and creative thinking (Song & Cai, 2024).

Research findings show that the Open-Ended Learning model also has a significant effect on students' creative thinking skills, with an average posttest difference of 7.18 between the experimental (81.76) and control (74.58) classes, with a significance value of 0.010. This result aligns with Johnson (2002) theoretical view, which holds that creative thinking is a mental habit that can be developed by focusing on intuition, activating imagination, revealing new possibilities, generating extraordinary viewpoints, and producing surprising ideas. The Open-Ended Learning model in this research systematically trains these mental habits by providing a broad exploration space for students to produce diverse solutions to the same problem, without limiting them to a single correct answer. This process is effective in developing the four dimensions of creativity, as defined by Guilford (1967): fluency, flexibility, originality, and elaboration. Experimental class students show superior fluency in generating many ideas, flexibility in viewing problems from various perspectives, originality in proposing unique solutions, and the ability to elaborate on ideas in detail.

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Munandar (2012) defines creative thinking as a process that involves the emergence of multiple potential solutions based on the information given, with a focus on appropriateness and variation, also known as divergent thinking. This research reinforces that conceptualisation by showing that the Open-Ended Learning model directly trains students' divergent thinking. When faced with open problems, students cannot rely on a single formula or standard procedure; they must activate their divergent thinking to explore possible answers. Empirical data show that experimental class students generate an average of 5-7 alternative solutions per problem, while control class students tend to generate only 1-2 standard solutions they memorised from textbooks. This difference in quantity and quality of ideas reflects significant development in divergent thinking ability facilitated by the Open-Ended Learning model. Organisciak et al. (2025) similarly found that creative thinking assessment in educational contexts reveals substantial gains when students are consistently exposed to open-ended problem formats. Guilford (1967) foundational theory of divergent thinking further supports these findings, affirming that fluency, flexibility, originality, and elaboration can be systematically trained through appropriate pedagogical interventions. The MANOVA results (Wilks' Lambda F = 8.642, sig. = 0.000) are consistent with Isaksen et al. (2023) argument that creative problem-solving frameworks, when properly implemented, generate simultaneous gains across multiple cognitive dimensions. Johnson (2002) contextual teaching framework also corroborates these findings, as the Open-Ended Learning model contextualises Islamic values within real-life problem scenarios, which naturally stimulate both critical and creative cognitive processes.

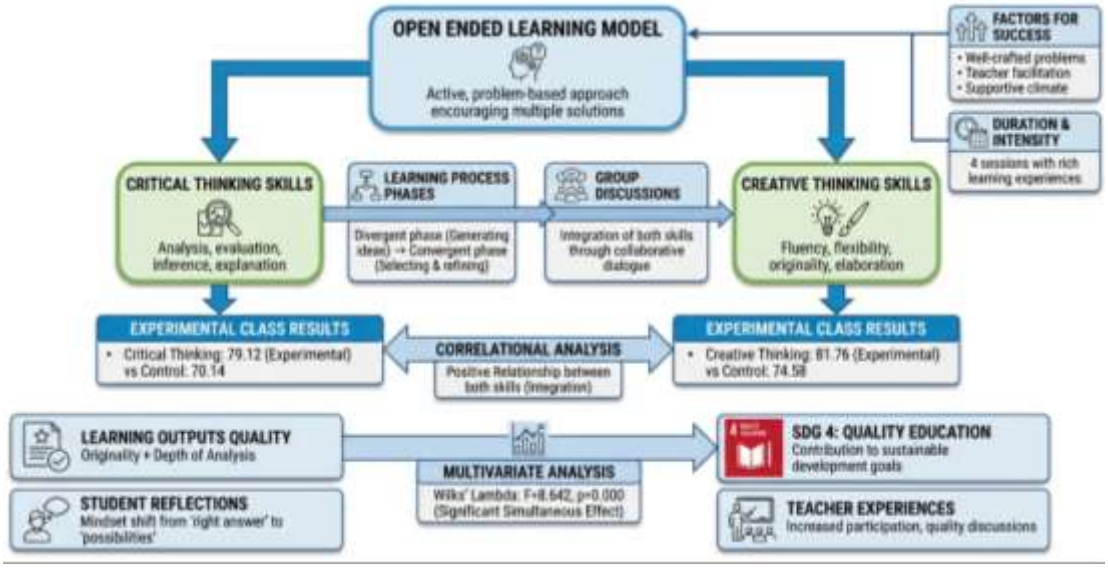


***Figure 3.*** *The simultaneous effect of the open-ended learning model*

## IV. CONCLUSION

This research empirically demonstrates that the Open-Ended Learning model has a significant effect on the development of students' critical and creative thinking skills in Islamic Religious Education at SMP Negeri 8 Pekanbaru, with critical thinking posttest scores of 79.12 (experimental) versus 70.14 (control), at sig. = 0.001, and creative thinking posttest scores of 81.76 (experimental) versus 74.58 (control) at sig. = 0.010, confirmed simultaneously by MANOVA (Wilks' Lambda F = 8.642, sig. = 0.000). The

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implementation of this model proves that pedagogical transformation can occur through a paradigm shift from teacher-centred to student-centred learning, integrating divergent and convergent thinking processes synergistically and contributing to the achievement of SDG 4 on Quality Education by producing Muslim learners who are not only knowledgeable but are also capable of analysing, evaluating, and applying Islamic values critically and creatively in the modern era.

## V. REFERENCES

[1] Abrami, P., Bernard, R., Borokhovski, E., Waddington, D., Wade, C. A., & Persson, T. (2015). Strategies for Teaching Students to Think Critically: A Meta-Analysis. *Review of Educational Research*, *85*(2), 275–314. https://doi.org/10.3102/0034654314551063

[2] Arikunto, S. (2018). *Prosedur penelitian: Suatu pendekatan praktik*. Rineka Cipta.

[3] Awaliyah, N., Hastuti, W., Wibowo, S., & Hidayat, P. (2024). The Effect of Problem Based Learning Model on Students' Critical Thinking Ability. *Mimbar PGSD Undiksha*, *12*(1), 101–107. https://doi.org/10.23887/jjpgsd.v12i1.62280

[4] Beghetto, R., & Kaufman, J. (2014). Classroom contexts for creativity. *High Ability Studies*, *25*(1). https://doi.org/10.1080/13598139.2014.905247

[5] Bhuttah, T., Xusheng, Q., Abid, M. N., & Sharma, D. (2024). *Enhancing Student Critical Thinking and Learning Outcomes through Innovative Pedagogical Approaches in Higher Education: The Mediating Role of Inclusive Leadership*. https://doi.org/10.21203/rs.3.rs-4864296/v1

[6] Campo, L., Galindo-Domínguez, H., Bezanilla, M., Fernandez-Nogueira, D., & Poblete, M. (2023). Methodologies for Fostering Critical Thinking Skills from University Students' Points of View. *Education Sciences*, *13*(2), 132. https://doi.org/10.3390/educsci13020132

[7] Care, E., Kim, H., Vista, A., & Anderson, K. (2019). Education system alignment for 21st century skills: Focus on assessment. *Journal of Research in Innovative Teaching & Learning*, *11*(1). https://doi.org/10.1108/JRIT-06-2018-0012

[8] Castaño, R., Jenaro, C., & Flores, N. (2023). Anxiety and critical thinking in university students. *Journal of Technology and Science Education*, *13*(1), 37–48. https://doi.org/10.3926/jotse.1482

[9] Chen, Y., & Nguyen, A. (2024). Critical thinking development through inquiry-based learning: A systematic review. *Educational Research Review*, *41*, 100562. https://doi.org/10.1016/j.edurev.2023.100562

[10] Darmawati, Y., & Mustadi, A. (2023). The Effect of Problem-Based Learning on the Critical Thinking Skills of Elementary School Students. *Jurnal Prima Edukasia*, *11*(2), 142–151. https://doi.org/10.21831/jpe.v11i2.55620

[11] Dayu, D., Pratiwi, C., & Hakim, P. (2022). Problem-Based Learning Model to

Increase Students' Critical Thinking. *Jurnal Basicedu*, *6*(3), 4672–4678. https://doi.org/10.31004/basicedu.v6i3.2842

[12] Dissen, A. (2023). A critical issue: assessing the critical thinking skills and dispositions of undergraduate health science students. *Discover Education*, *2*(1). https://doi.org/10.1007/s44217-023-00044-z

[13] Dole, S., Bloom, L., & Kowalske, K. (2015). Transforming Pedagogy: Changing Perspectives from Teacher-Centered to Learner-Centered. *Interdisciplinary Journal of Problem-Based Learning*, *10*(1). https://doi.org/10.7771/1541-5015.1538

[14] Fisher, A. (2001). *Critical thinking: An introduction*. Cambridge University Press.

[15] Fitriyah, Y., Wahyudin, Suhendara, Nurhayati, H., & Febriyanti, T. (2024). Open-Ended Approach for Critical Thinking Skills in Mathematics Education: A Meta-Analysis. *EduMatSains Jurnal Pendidikan Matematika Dan Sains*, *9*(1), 156–174. https://doi.org/10.33541/edumatsains.v9i1.5975

[16] Ghozali, I. (2016). *Aplikasi analisis multivariate dengan program IBM SPSS 23 (8th ed.)*. Badan Penerbit Universitas Diponegoro.

[17] Guamanga, M., Saiz, C., Rivas, S. F., & Morales, P. (2025). Critical Thinking and Metacognition: Pathways to Empathy and Psychological Well-Being. *Journal of Intelligence*, *13*(3), 34. https://doi.org/10.3390/jintelligence13030034

[18] Guilford, J. P. (1967). *The nature of human intelligence*. McGraw-Hill.

[19] Hadas, N., & Hershkovitz, A. (2024). Promoting critical thinking in digital learning environments. *Computers & Education*, *210*, 104978. https://doi.org/10.1016/j.compedu.2023.104978

[20] Henriksen, D., Richardson, C., & Shack, K. (2020). Mindfulness and Creativity: Implications for Thinking and Learning. *Thinking Skills and Creativity*, *37*(1), 100689. https://doi.org/10.1016/j.tsc.2020.100689

[21] Hoyali, L., Syaharuddin, & Mandailina, V. (2025). Enhancing Logical Thinking and Learning Interest through Open-Ended Approaches and Supportive Learning Environments in Mathematics Education. *Mimbar Ilmu*, *30*(2), 279–288. https://doi.org/10.23887/mi.v30i02.101575

[22] Isaksen, S., Stead-Dorval, K. B., & Treffinger, D. (2023). *Creative Problem Solving: An Introduction*. https://doi.org/10.4324/9781003419327

[23] Johnson, E. B. (2002). *Contextual teaching and learning*. Corwin Press.

[24] Kazemian, M., Irawan, L., & Haerazi, H. (2021). Developing Metacognitive Writing Strategy to Enhance Writing Skills Viewed from Prospective Teachersâ€™ Critical Thinking Skills. *Journal of Language and Literature Studies*, *1*(1), 15–28. https://doi.org/10.36312/jolls.v1i1.499

[25] Munandar, U. (2012). *Pengembangan kreativitas anak berbakat*. Rineka Cipta.

*e-ISSN: 2528-0465 (online) | Volume 11, Issue 1, 2026*
*p-ISSN: 2503-5363 (print)*

[26] Narmaditya, B., Wulandari, D., & Sakarji, S. (2018). Does Problem-Based Learning Improve Critical Thinking Skill? *Jurnal Cakrawala Pendidikan*. https://doi.org/10.21831/cp.v38i3.21548

[27] Organisciak, P., Doherty, C., & Hilpert, J. (2025). Creative thinking assessment in educational contexts. *Thinking Skills and Creativity*, *49*, 101398. https://doi.org/10.1016/j.tsc.2024.101398

[28] Parrales, M. L. P. (2022). Incidencia de la clase invertida en el desarrollo del pensamiento crítico. *Revista Cognosis*, *7*(2), 113–136. https://doi.org/10.33936/cognosis.v7i2.3901

[29] Putri, D., Hidayah, R., & Yuwono, Y. (2023). Problem Based Learning: Improve Critical Thinking Skills for Long Life Learning. *Jurnal Penelitian Pendidikan IPA*, *9*(7), 5049–5054. https://doi.org/10.29303/jppipa.v9i7.4188

[30] Ramírez-Montoya, M.-S., Portuguez Castro, M., & Mendoza, R. (2025). Redefining education: educational trajectories for complex thinking skills. *Humanities and Social Sciences Communications*, *12*(1), 958. https://doi.org/10.1057/s41599-025-04929-2

[31] Rivas, S. F., Saiz, C., & Ossa, C. (2022). Metacognitive Strategies and Development of Critical Thinking in Higher Education. *Frontiers in Psychology*, *13*, 913219. https://doi.org/10.3389/fpsyg.2022.913219

[32] Sánchez Gonzales, G. M., & Nagamine Miyashiro, M. M. (2021). Uso de metodologías activas para el desarrollo de pensamiento crítico. *UCV-Scientia*, *13*(2), 91–103. https://doi.org/10.18050/RevUcv-Scientia.v13n2a7

[33] Sanusi, I. T., Oyelere, S. S., & Omidiora, J. O. (2025). Exploring the intersection of generative AI and critical thinking in higher education. *Computers and Education: Artificial Intelligence*, *6*, 100205. https://doi.org/10.1016/j.caeai.2024.100205

[34] Sari, Y., & Safaatullah, M. (2024). Students' Mathematical Critical Thinking Ability in Term of Self-Confidence in CORE Model Learning with Open-Ended Approach. *Unnes Journal of Mathematics Education*, *13*(3), 264–275. https://doi.org/10.15294/ujme.v13i3.11136

[35] Simonovic, B., C. Vione, K., Fido, D., Stupple, E., Martin, J., & Clarke, R. (2022). The Impact of Attitudes, Beliefs, and Cognitive Reflection on the Development of Critical Thinking Skills in Online Students. *Online Learning*, *26*(2). https://doi.org/10.24059/olj.v26i2.2725

[36] Smare, C., & Elfatihi, M. (2024). Developing critical thinking through collaborative learning strategies. *International Journal of Instruction*, *17*(1), 19–36. https://doi.org/10.29333/iji.2024.1712a

[37] Song, H., & Cai, L. (2024). Interactive learning environment as a source of critical thinking skills for college students. *BMC Medical Education*, *24*(1).

https://doi.org/10.1186/s12909-024-05247-y

[38] Sugiyono. (2019). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung: Alfabeta.

[39] Ube, S., Aldaz, J., Alvarado, L., & Fischer, B. (2025). Estrategias didácticas para fomentar el pensamiento crítico en el desarrollo de competencias comunicacionales: Una revisión sistemática de literatura con el Método Salsa. *Revista Científica Uisrael*, *12*(1), 203–221. https://doi.org/10.35290/rcui.v12n1.2025.1483

[40] Van Peppen, L. M., Verkoeijen, P. P. J. L., Heijltjes, A. E. G., Janssen, E. M., Koopmans, D., & van Gog, T. (2022). Fostering critical thinking in higher education: The role of cognitive reflection and evidence-based reasoning. *Instructional Science*, *50*, 747–777. https://doi.org/10.1007/s11251-021-09570-2

[41] Villarruel-Diaz, J., & Portocarrero-Gutiérrez, C. A. (2021). Estrategias metodológicas y pensamiento crítico en la educación superior. *Revista Santiago*, *156*, 86–99. https://santiago.uo.edu.cu/index.php/stgo/article/view/5451

[42] Wahyuningsih, D., Yunus, M., Tahir, M., & Syarif, M. (2023). Influence of Problem Based Learning on Students Critical Thinking Ability. *Jurnal Pendidikan IPS*, *13*(2), 175–183. https://doi.org/10.37630/jpi.v13i2.1204

[43] Yulianingsih, R., Fiteriani, I., & Diani, R. (2025). Efektivitas Model Pembelajaran Open Ended Terhadap Kemampuan Berpikir Kritis Peserta Didik Kelas III MIN 6 Lampung Utara. *Pendas : Jurnal Ilmiah Pendidikan Dasar*, *10*(3). https://doi.org/10.23969/jp.v10i03.34004