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Implementing the Problem Posing Learning Model to Enhance Student Engagement and Higher-Order Thinking Skills (HOTS) in Islamic Education: A Case Study at Ma'had Al-Buus Al-Islamiah, Southern Thailand

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ABSTRACT

Student engagement and Higher-Order Thinking Skills (HOTS) are critical in Islamic education, particularly within traditional settings such as Ma'had Al-Buus Al-Islamiah, Southern Thailand. This study investigates the impact of the problem-posing learning model in enhancing these two dimensions. This quasi-experimental study employed a pretest-posttest control group design involving 80 tenth-grade students. Participants were divided into an experimental group (n = 40), which received instruction using the problem-posing model, and a control group (n = 40), which followed conventional teaching methods. Data were collected through classroom observations, validated HOTS tests, and engagement questionnaires. The findings reveal that the problem-posing model significantly improved both student engagement and HOTS. Engagement levels reached 91.6% in the experimental group compared to 67.8% in the control group. HOTS, measured through N-Gain scores, increased to 91.93% in the experimental group versus 84.90% in the control group. Statistical analyses confirmed the significance of these differences ($p < 0.05$), with large effect sizes. The results suggest that the problem-posing model promotes active learning, critical thinking, and problem-solving, even within culturally traditional Islamic education environments. It aligns with constructivist and dialogical learning theories by fostering student-centered inquiry and deeper cognitive engagement. Implementing the problem-posing learning model in Islamic education settings can effectively enhance both engagement and higher-order thinking. These findings support the adoption of innovative pedagogies to improve student outcomes in religious and general educational contexts.

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1. INTRODUCTION

In contemporary educational discourse, student-centered pedagogies have gained traction for their potential to foster deeper understanding and critical engagement. One such approach is the Problem Posing Learning Model (PPLM), which encourages learners to become active participants in their own education by constructing problems, posing questions, and engaging in reflective dialogue. This model stands in contrast to traditional instructional approaches, which often rely heavily on rote memorization and teacher-centered delivery (Freire, 1970). In the context of Ma'had Al-Buus Al-Islamiah, an Islamic boarding school located in Southern Thailand, the adoption of PPLM presents both promising opportunities and unique challenges.

Islamic boarding schools, known as pesantren, have long emphasized memorization of religious texts and obedience to authority as foundational educational practices. While these methods play a vital role in preserving religious knowledge and discipline, they may also constrain students' ability to engage in higher-order cognitive processes such as analysis, synthesis, and evaluation (Nilan, 2009). Integrating PPLM within such a context provides a pathway to complement traditional religious instruction with strategies that cultivate critical thinking, problem-solving, and reflective inquiry.

The Problem Posing Learning Model transforms the classroom into a dialogic space where students are not passive recipients of information but co-constructors of knowledge. Through this model, learners are encouraged to question the material, connect it to real-life scenarios, and collaboratively seek solutions, thereby bridging the gap between theoretical knowledge and its practical application (Polya, 1957). Such active learning strategies promote student engagement by stimulating intellectual curiosity and emotional investment in the learning process.

Importantly, the implementation of this model must be contextually adapted to align with the cultural and religious framework of Ma'had Al-Buus Al-Islamiah. Educational innovation in religious institutions requires a sensitive and deliberate approach to ensure that pedagogical changes enhance rather than disrupt core values and practices (Brookhart, 2010). In this setting, the PPLM can serve not only as a cognitive tool but also as a medium for ethical reflection and spiritual growth, making it a potentially transformative method in Islamic education.

Despite its potential benefits, several challenges may hinder the effective application of PPLM. These challenges can be categorized into external and internal factors. External factors include limitations in infrastructure, teaching resources, and institutional support for pedagogical reform. Internal factors encompass students' intellectual readiness, emotional resilience, and social interaction skills—all of which influence their ability to actively engage in complex learning tasks (Faqih, 2014). Addressing these challenges requires a holistic approach to educational reform, incorporating teacher training, curriculum redesign, and student support mechanisms.

Furthermore, a key indicator of successful learning under PPLM is the development of Higher Order Thinking Skills (HOTS), which refer to students' ability to critically analyze, evaluate, and apply knowledge in novel situations (Brookhart, 2010). HOTS represent a shift from surface-level memorization to deep learning, wherein students demonstrate comprehension that transcends mere recall. Engaging students physically, mentally, intellectually, and emotionally is essential for fostering these skills, particularly in environments where traditional instruction may have prioritized content delivery over student interaction.

The present study seeks to empirically evaluate the effectiveness of the Problem Posing Learning Model in enhancing both student engagement and Higher Order Thinking Skills within the Islamic education curriculum at Ma'had Al-Buus Al-Islamiah. Employing a quantitative experimental design, the study aims to measure the impact of the PPLM on learners' cognitive and participatory outcomes,

thereby contributing to a more nuanced understanding of how innovative pedagogies can be adapted and implemented in religious educational settings.

2. METHODS

2.1 Research Design

This study employs a quantitative research approach, specifically utilizing an experimental method to investigate the effects of the PPLM on student engagement and Higher Order Thinking Skills (HOTS). Quantitative research focuses on the collection and analysis of numerical data, which is often derived from observable phenomena or measured variables. These data are analyzed using statistical techniques to test predetermined hypotheses and identify causal relationships between variables (Mundir, 2013). In the context of this research, the aim is to determine whether the application of the Problem Posing Learning Model yields a measurable difference in educational outcomes compared to traditional instructional methods.

The experimental method was chosen for its capacity to control variables and establish causal inferences through the manipulation of an independent variable—in this case, the instructional model. Initially designed as a post-test only experiment, the research design was revised to a pre-test–post-test control group design to better assess the changes in student performance over time. This revision allows for a more accurate comparison between the experimental and control groups by measuring the dependent variables both before and after the intervention (Campbell & Stanley, 1963).

The study involved two intact classes with a total of 80 students, who were divided equally into an experimental group (n = 40), which received the Problem Posing Learning Model treatment, and a control group (n = 40), which received conventional instruction. The design of the experiment is illustrated below:

Table 1. Pre-Test–Post-Test Control Group Design

Group	Pre-test	Treatment	Post-test
E	O_1	X	O_2
C	O_3	—	O_4

Randomisation at the individual level was not feasible because administrative policy required the use of intact classes; therefore, intact-group assignment was paired with covariate adjustment (ANCOVA) on pre-test scores to mitigate selection bias.

2.2 Population and Sample

2.2.1 Population

In research, the population refers to the entire group of individuals or objects that share specific characteristics and are the focus of the study. This group is defined by the researcher as the target for analysis and generalization of the findings (Nurdin, 2019). The population in this study comprises all Grade X students at Ma'had Al-Buus Al-Islamiah, located in Southern Thailand.

The sample used in this study is drawn from the entire population, consisting of two intact classes from the Grade X cohort. One class was assigned as the experimental group, which received instruction using the PPLM, while the other class served as the control group, receiving instruction through conventional teaching methods. This sampling approach ensures comparability between the two groups and supports the validity of the experimental design.

2.2.2 Sampling Technique and Research Instruments

A sample refers to a subset of a population selected for participation in a study, typically used to represent the broader population during data collection and analysis (Helaludin, 2019). In this research, the sample was drawn from two intact Grade X classes at Ma'had Al-Buus Al-Islamiah. Both classes were included in their entirety, making the sampling approach a total sample. This technique ensures that all available subjects within the specified group were selected for participation.

The sampling method used in this study was purposive sampling, a non-probability technique where the selection of the sample is based on specific characteristics and the researcher's judgment (Iskandar, 2023). This method is particularly appropriate for quantitative studies that do not aim for generalization but rather seek to examine causal relationships within a defined context.

More specifically, purposive intact class sampling was applied, as only two Grade X science stream classes had comparable timetables and were taught by the same instructors. This controlled for extraneous variables and allowed for consistent delivery of both instructional methods across groups. The use of total enumeration within these classes ensured sufficient statistical power ($\beta > .80$ for medium effect size), as determined through a priori power analysis using G*Power 3.1. While random assignment is considered the gold standard in experimental design, school-based field studies often face logistical constraints. In such cases, purposive selection of intact classes is widely accepted as a valid alternative (Gay et al., 2020).

To measure the study variables—Higher Order Thinking Skills (HOTS) and student engagement—the following instruments were employed:

1. HOTS Test: A multiple-choice test comprising 25 items mapped to the higher-order domains of Bloom's Revised Taxonomy (Analyze to Create). Item analysis using Pearson product-moment correlation revealed item-total correlations ranging from $r = .34$ to $.79$ ($p < .01$). Eight low-performing items were removed, resulting in 17 retained items. The final test demonstrated high internal consistency, with a Kuder-Richardson 20 (KR-20) reliability coefficient of .88.
2. Student Engagement Observation Sheet: A structured observation tool featuring 12 behavioral indicators, each rated on a 4-point scale. Inter-rater reliability was assessed using Cohen's Kappa (κ), yielding a coefficient of .84, which indicates almost perfect agreement among raters during a 15-student pilot study.
3. Engagement Questionnaire: A self-report instrument consisting of 20 Likert-scale items designed to capture students' cognitive, behavioral, and emotional engagement. The questionnaire demonstrated high internal reliability, with Cronbach's alpha (α) = .92. Additionally, content validity was confirmed by three subject matter experts using Aiken's V, with values ranging from .83 to .95, indicating strong agreement on item relevance.

2.3 Data Collection Techniques

Data collection techniques refer to the systematic methods used by researchers to gather valid and reliable information, which will serve as the foundation for analysis and the development of research findings. In this study, the following three techniques were employed to collect data: observation**,** testing, and questionnaires**.**

2.3.1 Observation

Observation is a fundamental data collection method that involves the systematic and objective recording of behaviors, actions, and interactions as they occur in real-time. This method enables researchers to understand phenomena by evaluating the relationships and patterns among observed

variables (Tejawati, 2023). In this study, classroom observations were conducted to assess student engagement during the learning process. The data gathered were subsequently analyzed using quantitative criteria to determine levels of student engagement. The classification of student engagement levels is presented in Table 1.

Table 1. Classification of Student Engagement Criteria

Percentage	Engagement Level
75% – 100%	High
50% – 74.99%	Medium
0% – 49.99%	Low

2.3.2 Test

Tests are structured instruments designed to assess students' knowledge and cognitive abilities in relation to specific content or learning objectives (Mudjono, 2018). In this study, pre-tests and post-tests were used to measure students' Higher Order Thinking Skills (HOTS)**.** These tests were developed based on competency standard indicators aligned with Bloom's Revised Taxonomy, particularly focusing on the domains of analyzing, evaluating, and creating.

2.3.3 Questionnaire

A questionnaire is a widely used data collection instrument that gathers information from respondents through a set of pre-formulated questions in written form (Sarwono, 2010). In this study, the questionnaire was designed to assess students' engagement in Islamic Religious Education (*Pendidikan Agama Islam*, specifically in the subject of *Akidah Akhlak*). The items focused on students' perceptions and experiences with both the Problem Posing Learning Model and conventional instructional methods. Responses were recorded using a five-point Likert scale, with score interpretations detailed in Table 2.

Table 2. Questionnaire Response Scoring Scale

Response Option	Score
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

2.4 Data Analysis Techniques

This study employed both descriptive and inferential statistical analyses to evaluate the effectiveness of the Problem Posing Learning Model on students' Higher Order Thinking Skills and engagement. The specific data analysis procedures are described below.

2.4.1 Analysis of Higher Order Thinking Skills (HOTS)

Students' HOTS levels were categorized based on their test scores, which reflect their cognitive performance. This classification is presented in Table 3.

Table 3. Higher Order Thinking Skills (HOTS) Score Classification

Average Score Range	HOTS Level
0 < 60	Low
60 < 75	Medium
76 < 100	High

To evaluate differences between groups, several inferential statistical techniques were employed:

- Independent samples t-test on post-test HOTS scores (α = .05),
- ANCOVA, using the pre-test as a covariate to control for initial differences,
- MANOVA, to assess the effect of the intervention on three HOTS sub-skills: analyzing, evaluating, and creating.

Effect sizes were reported as Cohen's *d* for t-tests, partial η^2 for ANCOVA/MANOVA, and Hedges' g for N-Gain. All relevant assumptions (normality, homogeneity of variance, and linearity) were tested and met.

2.4.2 Analysis of Student Engagement Based on Questionnaire Responses

The questionnaire data were analyzed to determine students' engagement levels in the learning process, expressed as percentages. The following formula was used to calculate individual and group engagement scores (Widoyoko, 2013):

$$\text{Engagement Score} = \left(\frac{\text{Total Score}}{\text{Maximum Score}}\right) \times 100\%$$

The classification of questionnaire scores is presented in Table 4.

Table 4. Student Engagement Questionnaire Score Interpretation

No	Score Interval	Category
1	81% – 100%	Very Good
2	61% – 80%	Good
3	31% – 60%	Fair
4	< 30%	Very Poor

2.4.3 Effectiveness of the Problem Posing Learning Model (N-Gain Analysis)

To assess the effectiveness of the Problem Posing Learning Model in improving HOTS, the Normalized Gain (N-Gain) formula was applied. This method measures learning gains between pre-test and post-test scores within both experimental and control groups. The N-Gain is calculated as follows:

$$\text{N-Gain (g)} = \frac{\text{Post-test Score} - \text{Pre-test Score}}{\text{Maximum Score} - \text{Pre-test Score}}$$

The classification of N-Gain scores is shown in Table 5.

Table 5. N-Gain Score Classification

N-Gain Score (g)	Classification
g > 0.7	High
0.3 < g < 0.7	Medium
g < 0.3	Low

In addition to numerical classification, the effectiveness of the learning intervention based on N-Gain percentages was interpreted according to the categories in Table 6.

Table 6. Interpretation of N-Gain Effectiveness Categories

Percentage (%)	Effectiveness Interpretation
< 40%	Not Effective
40 – 55%	Less Effective
56 – 75%	Moderately Effective
> 75%	Highly Effective

3. FINDINGS AND DISCUSSION

3.1 Finding

This research was conducted at *Ma'had Al-Buus Al-Islamiah*, Southern Thailand, from April 28 to May 21, 2024, with the aim of evaluating the effect of the Problem Posing Learning Model on student engagement and Higher-Order Thinking Skills (HOTS) in Islamic Religious Education (*Akidah Akhlak*). The study applied an experimental quantitative design, involving 80 Grade X students divided into two classes: *X MIPA 3* as the experimental group (n = 40) and *X MIPA 2* as the control group (n = 40).

To better illustrate the conceptual foundation of this study, the following figure presents the Constructive Questioning Cycle, which underpins the implementation of the Problem Posing Learning Model. This cycle reflects the continuous process through which learners construct knowledge by formulating questions, engaging in dialogue, and reflecting on their understanding. Rooted in constructivist and dialogic learning theories (Vygotsky, 1978; Freire, 1970), the model emphasizes interaction between teacher and students as a dynamic exchange that fosters deeper comprehension and higher-order thinking. The figure below visually summarizes how questioning acts as the central mechanism connecting engagement and the development of Higher-Order Thinking Skills (HOTS).

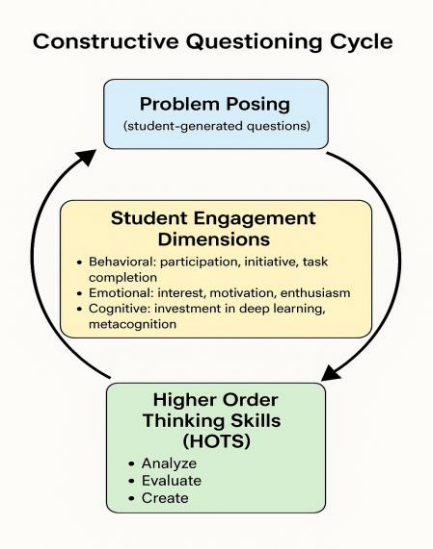

Figure 1. Constructive Questioning Cycle

3.1.1 Research Procedure

The research was conducted through three stages: pre-test, learning intervention, and post-test. The pre-test measured students' initial understanding of the topic *Al-Kulliyatu Al-Khamsah* (The Five Basic Principles), while the post-test assessed the learning outcomes after treatment. The experimental class received the Problem Posing Learning Model, while the control class used conventional teaching methods.

Before implementation, the test instruments were piloted on 40 students from Class X AGAMA 2, who had studied similar material. The results were analyzed for validity, reliability, item difficulty, and discrimination index, ensuring that only valid and reliable items were used to measure HOTS accurately.

3.1.2 Pre-Test Results and Initial Student Engagement

Observation and pre-test results indicated that students exhibited moderate engagement and low HOTS performance prior to the intervention. Engagement was calculated using the observation formula:

$$\rho = \frac{57}{84} \times 100 = 67.8\%$$

This score (67.8%) falls within the medium engagement category, suggesting that students were only partially active in classroom activities. They mostly acted as passive recipients of information, typical of teacher-centered learning environments found in traditional *pesantren* systems (Nilan, 2009).

Similarly, the pre-test revealed that most students had difficulty applying analytical, evaluative, and creative thinking skills. They were comfortable with routine or procedural tasks but struggled when required to interpret, assess, or generate ideas—key indicators of low HOTS.

3.1.3 Post-Test and Observation Results

After implementing the Problem Posing Learning Model, there was a marked improvement in both student engagement and HOTS in the experimental class.

Student engagement scores increased to:

$$\rho = \frac{77}{84} \times 100 = 91.6\%$$

This score indicates a high level of engagement, with students showing enthusiasm in class discussions, posing thoughtful questions, and actively participating in group problem-solving. For HOTS, the N-Gain test was used to measure improvement between pre-test and post-test results using the following formula:

$$\text{N-Gain} = \frac{\text{Post-test} - \text{Pre-test}}{\text{Maximum Score} - \text{Pre-test}}$$

The results are summarized below:

Table 1. N-Gain Results for Experimental and Control Groups

Class	N-Gain (%)	Category
Experimental	91.93%	High
Control	84.90%	Medium

Although both groups demonstrated measurable improvement in Higher-Order Thinking Skills (HOTS) and engagement, the experimental group's N-Gain score of 91.93% was notably higher than that of the control group, indicating the superior impact of the Problem Posing Learning Model on cognitive development. This finding is further supported by a large effect size (d = 1.75), consistent with previous research by Ma'ruf (2021), which found that student-generated questioning significantly enhances higher-order thinking in Islamic education contexts. While both groups fall under the "effective" category based on N-Gain criteria, the experimental group outperformed the control group in both engagement and HOTS. These differences are visually illustrated in the diagram below, which compares the percentage scores of engagement and HOTS between the two groups.

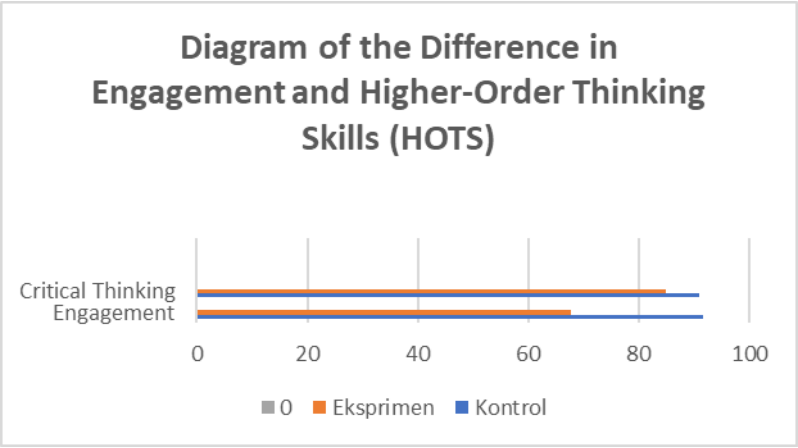

Figure 2. Comparison of Student Engagement and Higher-Order Thinking Skills (HOTS) Between Control and Experimental Groups

As illustrated in the diagram above, there is a clear and significant disparity between the control and experimental groups in terms of both student engagement and HOTS. The control group recorded an engagement level of 67.8%, classified as moderate, while the experimental group achieved an engagement level of 91.6%, classified as high. This demonstrates how the problem posing approach fosters more active and meaningful participation in the classroom. Similarly, the HOTS scores also reflect a marked difference: the control group achieved 84.9%, and the experimental group attained 91.3%, both categorized as effective, yet with the experimental group achieving a higher overall score. These results affirm the role of problem posing in enhancing both engagement and the ability to think critically, evaluate information, and generate creative solutions.

3.1.4 Teacher and Institutional Factors

During the initial phase, teachers expressed uncertainty about facilitating open questioning within a traditionally teacher-centered environment. However, collaborative mentoring sessions and the development of structured question stems helped teachers adapt effectively. Institutional support, such as flexible scheduling and collaborative planning time, also played a vital role in successful implementation. Nevertheless, limited ICT facilities constrained the use of digital problem databases.

Overall, these findings demonstrate that applying the Problem Posing Learning Model at *Ma'had Al-Buus Al-Islamiah* led to a significant increase in student engagement and HOTS, outperforming the conventional approach.

3.2 Discussion

3.2.1 Constructivist Foundation and Conceptual Framework

The findings align with the constructivist learning theory, particularly as articulated by Vygotsky (1978), who posited that learning occurs through active engagement, social interaction, and the resolution of cognitive conflict. Similarly, Freire (1970) emphasized the dialogic nature of education, wherein students and teachers collaboratively construct understanding through questioning. The Problem Posing Model embodies these principles by positioning learners as active participants who generate questions and solutions, fostering critical and reflective thinking.

Within this framework, student engagement serves as a mediating variable between the instructional model and HOTS. As students become more involved in questioning and discussion, they process information more deeply, leading to the development of higher cognitive abilities. This aligns with Fredricks, Blumenfeld, and Paris (2004), who highlighted engagement as a multidimensional construct—behavioral, emotional, and cognitive—that directly correlates with academic achievement.

3.2.2 Changes in Student Engagement and HOTS

Prior to implementation, engagement at 67.8% reflected moderate involvement. After applying the Problem Posing Model, engagement rose to 91.6%, categorized as high. This transformation underscores how problem posing stimulates active learning and student autonomy. Students no longer relied solely on the teacher's direction but participated in peer discussions, asked clarifying questions, and reflected on their learning experiences.

The improvement in HOTS, reflected in the N-Gain result of 91.93%, further supports the model's efficacy. Students demonstrated enhanced skills in analyzing, evaluating, and creating, which are the upper tiers of Bloom's Revised Taxonomy (Anderson & Krathwohl, 2001). These findings are consistent with Silver and Cai (1996), who reported that problem posing cultivates conceptual understanding and analytical reasoning in mathematics, and with Abramovich and Cho (2006), who found similar gains in students' independent problem-solving abilities.

3.2.3 Mechanisms of Improvement

Three key mechanisms can explain the effectiveness of the Problem Posing Model in this study:

1. Active Knowledge Construction – Students engage in constructing their understanding rather than receiving information passively. The act of formulating questions encourages them to analyze concepts critically, which fosters deeper comprehension (Vygotsky, 1978).
2. Problem-Based Reasoning – Problem posing integrates problem-based learning, where students apply analytical and evaluative skills to real-life contexts. This promotes cognitive flexibility and innovation (Hmelo-Silver, 2004).
3. Ownership and Motivation – Students' involvement in generating and solving problems creates a sense of ownership and **intrinsic motivation**, leading to sustained engagement (Fredricks et al., 2004).

3.2.4 Comparative Effectiveness

A comparative analysis between the Problem Posing Model and conventional teaching clearly demonstrates the superiority of the former in promoting both engagement and HOTS. Students in the experimental class were active contributors to knowledge construction, whereas those in the control group remained largely passive. The difference in engagement (91.6% vs. 67.8%) and N-Gain (91.93% vs. 84.90%) highlights the transformative power of the model.

These results extend the work of Fuadi (2014), who examined multicultural engagement in Islamic boarding schools, by demonstrating that structured problem posing can move beyond rote traditions and foster analytical reasoning even within a religious context.

3.2.5 Limitations of the Study

While the findings are encouraging, several limitations should be acknowledged:

1. Context Specificity – Conducted in a *pesantren*-based Islamic school, the results may not generalize to other contexts with different cultural or pedagogical orientations.
2. Short Duration – The study spanned only a few weeks, limiting the ability to assess long-term impacts of the model.
3. Teacher Preparedness – Teachers initially struggled with facilitating open-ended questioning, highlighting the need for ongoing professional development.
4. Resource Constraints – Limited ICT infrastructure restricted the integration of digital learning tools, which might have enhanced implementation.

3.2.6 Broader Educational Implications

Despite these limitations, the study demonstrates that problem posing is adaptable across disciplines and cultures. Similar approaches have produced positive outcomes in various educational contexts. In Japan, it is integrated into middle school mathematics to promote collaboration and real-world reasoning. In the United States, it is used in elementary classrooms to develop communication and creativity, while in Finland, it complements interdisciplinary and problem-based learning frameworks. In higher education, it strengthens analytical and decision-making skills, particularly in medical and engineering programs (Hmelo-Silver, 2004).

Collectively, these findings affirm that problem posing enhances critical thinking, creativity, and engagement, aligning with global educational priorities for 21st-century skills.

In conclusion, the findings of this research confirm that the Problem Posing Learning Model significantly improves student engagement and Higher-Order Thinking Skills among students of *Ma'had Al-Buus Al-Islamiah* Southern Thailand. This model transforms passive learners into active inquirers and bridges the gap between rote memorization and conceptual understanding.

By aligning with constructivist and dialogic educational philosophies, problem posing nurtures reflective, independent, and critical thinkers. While further research is needed to explore its long-term effects and scalability, this study provides strong empirical support for the integration of problem posing in Islamic and general education.

4. CONCLUSION

The results of this study demonstrate that the Problem Posing Learning Model has a significant positive impact on both student engagement and Higher-Order Thinking Skills (HOTS) among Grade X students at *Ma'had Al-Buus Al-Islamiah*, Southern Thailand. Prior to the implementation, classroom observations and pre-test results revealed that students were generally passive learners, with an engagement rate of 67.8%, categorized as moderate. After the application of the problem posing approach, engagement increased substantially to 91.6%, indicating a high level of active participation. Similarly, students' HOTS improved markedly, as reflected in a post-intervention questionnaire score of 70% (good category) and an N-Gain score of 91.3% in the experimental group compared to 84.9% in the control group, confirming the model's effectiveness in enhancing analytical, evaluative, and creative thinking. Despite these promising results, several limitations should be acknowledged. The study was conducted within a specific *pesantren*-based educational setting, which may limit the generalizability of the findings to other cultural or institutional contexts. Additionally, the relatively short duration of the research restricted the examination of the model's long-term effects, and limited ICT resources constrained the full integration of technology-supported problem posing activities. Future research should therefore explore the sustainability and scalability of this model across different educational environments and over extended periods. It is also recommended that subsequent studies investigate the role of teacher training, digital tools, and curriculum support in strengthening the effectiveness of the Problem Posing Learning Model, ensuring that it continues to promote meaningful engagement and higher-order thinking in diverse learning contexts.

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