



RESEARCH ARTICLE

Development of higher order thinking skill for students in madrasa southern Thailand: Engaging case-based learning methods

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Abstract: This study examined the influence of case-based learning (CBL) on the higher-order thinking skills (HOTS) of madrasa students in southern Thailand. Using a quantitative correlational design, data were collected from 1,259 students through questionnaires and documentation, followed by descriptive and simple linear regression analyses. The findings reveal that students perceive their teachers' mastery of the CBL model to be high (93.8%), with a mean score of 103.86. Students' HOTS levels were similarly strong, with 95% categorized at a high level (mean = 54.47). Regression analysis further demonstrated a significant effect of CBL on HOTS ($p < 0.001$), with the model accounting for 44% of the variance, indicating a moderate but meaningful influence. The predictive coefficient ($\beta = 0.506$) suggests that consistent application of CBL substantially enhances students' analytical, evaluative, and creative capacities. These findings underscore the central role of case-based pedagogy in cultivating analytical reasoning, evaluative judgment, and creative problem-solving—competencies essential for the intellectual and moral formation of learners in Islamic educational contexts. While the effect size is moderate, this suggests that CBL must operate alongside other complementary pedagogical approaches, institutional supports, and teacher professional development initiatives to maximize impact. The study highlights the importance of integrating innovative, student-centered instructional practices to support the development of advanced thinking skills and recommends further research to expand pedagogical innovation in Islamic education.

Keywords: higher order thinking skill, case-based learning, madrasa, teaching and learning, madrasa teacher

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1. Introduction

Higher-order thinking skills (HOTS)—which include critical thinking, problem-solving, creativity, and the ability to analyze and evaluate information—are essential competencies for students to navigate the demands of 21st-century learning. In Islamic educational institutions such as madrasas, the development of HOTS is highly relevant, as these skills support deeper comprehension of religious knowledge, enhance students' ability to reason ethically, and encourage reflective engagement with both classical and contemporary issues. However, many students in Southeast Asian Islamic schools, including those in southern Thailand, still demonstrate limited mastery of HOTS due to traditional teaching approaches that prioritize memorization and teacher-centered instruction.

Madrasas in southern Thailand face unique challenges that affect the development of students' cognitive skills. The region's dual-curriculum model—which integrates Islamic studies with the national curriculum—often results in heavy academic loads, leaving insufficient room for student-centered pedagogies. Additionally, many teachers continue to rely on lecture-based methods, while classroom activities emphasize rote learning rather than analytical engagement. These conditions hinder students' ability to develop higher-level cognitive processes, which are increasingly required for academic success, social participation, and future employment. In recent years, educational reform efforts in Thailand have highlighted the importance of developing critical and analytical abilities among students. Within madrasas, this reform aligns closely with Islamic pedagogical traditions that emphasize reasoning (*ijtihad*), reflection (*tafakkur*), and deep understanding (*tadabbur*). Consequently, there is a growing awareness among educators and policymakers that innovative teaching methods are necessary to cultivate students' HOTS without compromising religious learning.

The development of higher-order thinking skills (HOTS) has become a global priority in 21st-century education, driven by the need to prepare students for increasingly complex social and technological challenges. Numerous studies emphasize that HOTS—such as critical thinking, problem-solving, reasoning, and creativity—are essential competencies across learning environments. In Islamic education contexts, these skills are especially important because they support students in interpreting religious texts, engaging in ethical reasoning, and applying Islamic knowledge to real-world issues. However, research across Southeast Asia reveals that Islamic schools, including madrasas, still struggle to implement instructional strategies that effectively promote HOTS due to the prevalence of rote learning and teacher-centered practices.

Research related to HOTS in Thailand has been expanding, but most studies focus on general education, not on Islamic institutions. Existing literature shows that madrasas in southern Thailand face additional challenges due to bilingual instruction, limited learning resources, and a dual curriculum that combines Islamic studies with the national curriculum. Studies by Waemahadi (2020) and Noor (2021) indicate that students in southern Thai madrasas tend to perform lower in analytical and problem-solving skills compared to national benchmarks. Despite educational reforms promoting active learning, little is known about pedagogical innovations that specifically target HOTS development in this unique sociocultural and religious environment. This gap highlights the need for instructional models that respond to the complexities of madrasa education in the region.

Case-based learning (CBL) has emerged internationally as an effective method for strengthening HOTS across disciplines such as medicine, law, business, and teacher education. Research by Kim (2017), Thistlethwaite et al. (2019), and Tarmizi & Bayat (2020) demonstrates that CBL enhances students' ability to analyze scenarios, interpret evidence, justify decisions, and apply knowledge to real-world problems. While CBL has been widely used in secular education, its application in Islamic educational settings remains limited. Early studies in Indonesia and Malaysia suggest that CBL aligns with Islamic pedagogical principles such as *ijtihad*, *qiyas*, and contextual reasoning. Yet, empirical evidence on how CBL can be used to cultivate HOTS among madrasa students—especially in minority Muslim contexts—remains scarce. Case-based learning (CBL) has emerged as a promising instructional strategy for promoting higher-order thinking. CBL provides real-world scenarios that require students to interpret information, analyze problems, make decisions, and justify their reasoning. This method encourages active participation and collaborative learning and aligns well with Islamic educational philosophies that value contextual understanding and application of knowledge. For madrasa students in southern Thailand, CBL has the potential to bridge theoretical knowledge with real-life challenges

relevant to their social, cultural, and religious context. Despite its potential, research on the implementation of CBL in Thai madrasas remains limited. Few studies have explored how this method can effectively enhance HOTS among students in Islamic educational settings, particularly in regions affected by linguistic, cultural, and socio-political complexities. Thus, there is a need for empirical evidence to determine the extent to which CBL can be integrated into madrasa pedagogy and its effectiveness for improving HOTS.

Given the limited use of CBL in madrasas and the persistent challenges in promoting HOTS in southern Thailand, existing research has not adequately addressed how innovative, contextually relevant instructional strategies can support students' cognitive development. No previous studies have systematically examined the integration of CBL within the madrasa system in Thailand's southern provinces, nor measured its effectiveness in enhancing HOTS. Therefore, this study fills a significant research gap by introducing and evaluating case-based learning as a pedagogical approach designed specifically to strengthen higher-order thinking skills among madrasa students in southern Thailand. The findings contribute new insights to the fields of Islamic education, pedagogical innovation, and HOTS development in minority Muslim contexts. This study aims to fill this research gap by examining the use of case-based learning to develop higher-order thinking skills among students in madrasas in southern Thailand. The findings are expected to contribute to both theory and practice by offering insights into effective instructional strategies for Islamic schools in minority-Muslim contexts, informing teacher professional development, and supporting the ongoing educational transformation in the region.

Therefore this problem is very urgent to be examined and focus to; What is the level of mastery of the madrasa teachers case-based learning model in the perception of students in the madrasa in Southern Thailand?; What is the level of high-order thinking skills of students in the madrasa in Southern Thailand?: How does the case-based learning model influence the high-order thinking skills of students of the madrasa in the Southern Thailand?

2. Literature Review

2.1. Higher order thinking skill

Higher order thinking skills (HOTS) refer to cognitive processes that go beyond memorization and recall, requiring students to analyze, evaluate, and create new knowledge. These skills align with the upper levels of Bloom's taxonomy—analysis, synthesis, evaluation, and creation—reflecting complex cognitive functions that enable learners to reason logically, solve problems, make decisions, and apply knowledge in unfamiliar contexts. According to Anderson and Krathwohl (2001), HOTS are essential for preparing students to engage with 21st-century challenges, where adaptability, creativity, and critical reasoning are fundamental competencies for academic and professional success.

Research highlights that HOTS play a central role in improving students' learning outcomes across disciplines. Zohar and Dori (2003) emphasize that developing HOTS allows learners to construct deeper conceptual understanding, engage in metacognitive reflection, and transfer learning to real-life situations. Studies in science and mathematics education show that HOTS-based instruction increases students' problem-solving ability, conceptual mastery, and capacity for independent inquiry (Lee et al., 2024; King et al., 2018; Nurhayati, & Angraeni, 2017). Similarly, in language learning, HOTS enhance students' interpretive skills, argumentation, and creativity in constructing meaning from texts. These findings underscore the cross-disciplinary importance of HOTS in shaping competent, reflective learners.

Despite its significance, research indicates that many educational systems—particularly in Asia—struggle to effectively implement HOTS in classroom practice. Teachers often rely on traditional, teacher-centered methods that emphasize memorization rather than analytical thinking. Several studies across Malaysia, Indonesia, and Thailand reveal that limited teacher training, rigid examination systems, and heavy curriculum demands hinder the development of HOTS in schools (Yee et al., 2020; Zubaidah, 2019; Ulker, & Celik, 2025). In Islamic education settings, including madrasa institutions, these challenges are compounded by a historical emphasis on rote learning of religious texts. As a result,

students may achieve proficiency in recall but lack opportunities to analyze information, evaluate arguments, or apply knowledge creatively in new situations.

To address these challenges, contemporary research suggests the need for innovative pedagogical approaches that actively engage students in cognitive processing. Instructional methods such as inquiry-based learning, problem-based learning, project-based learning, and case-based learning have been shown to effectively cultivate HOTS by encouraging students to investigate problems, evaluate evidence, and construct their own solutions (Luzyawati et al., 2025). Case-based learning, in particular, enables learners to apply higher-level reasoning within real-world scenarios, making it a promising strategy for HOTS development in diverse educational contexts, including faith-based schools. These methods shift the learning environment from passive reception to active, collaborative meaning-making, aligning well with the cognitive demands of HOTS.

2.2. Case-based learning method

Case-Based Learning (CBL) is an instructional approach that engages students in analyzing real-life or simulated scenarios to promote active learning, critical thinking, and problem-solving. Historically rooted in medical, legal, and business education, CBL has expanded into various disciplines as educators recognize its effectiveness in fostering deeper cognitive engagement. According to Thistlethwaite et al. (2019), CBL encourages learners to navigate complex situations, identify underlying issues, evaluate different perspectives, and propose evidence-based solutions. This process aligns closely with contemporary educational goals that emphasize the development of higher-order thinking skills, collaborative learning, and knowledge transfer across contexts.

From a theoretical perspective, CBL is grounded in constructivist learning principles, which posit that learners construct meaning through active engagement, reflection, and interaction with authentic problems. Kim (2017) highlights that CBL transforms the classroom from a teacher-dominated environment into a learner-centered space, where students assume responsibility for exploring ideas, generating hypotheses, and discussing potential outcomes. This shift promotes metacognitive awareness and encourages students to integrate prior knowledge with new information. By situating learning within real-world scenarios, CBL supports both cognitive and affective learning outcomes, enabling students to connect theory with practice more effectively. Empirical studies demonstrate that CBL significantly enhances student performance across cognitive, social, and emotional dimensions (Higashitsuji, Otsuka, & Watanabe, 2025). Research in medical education reveals that students exposed to case-based instruction exhibit improved diagnostic reasoning, analytical thinking, and decision-making skills (Savery, 2015). In social sciences and teacher education, CBL has been shown to enhance students' communication skills, collaborative learning, and ethical reasoning (Chen et al., 2024; Loyens & Rikers, 2018). Studies in STEM fields also indicate that CBL supports conceptual understanding and promotes innovative problem-solving. One of the distinguishing strengths of CBL is its ability to stimulate student motivation by presenting meaningful, contextually relevant challenges that mirror real-life dilemmas.

Despite its proven advantages, the implementation of CBL presents several challenges. Teachers may face difficulties in preparing high-quality cases, facilitating open-ended discussions, and assessing learning outcomes that are complex and diverse. Additionally, students accustomed to traditional rote-based models may initially struggle with the ambiguity and autonomy required in case-based activities. Research in Asian educational settings suggests that cultural expectations—such as respect for authority and reluctance to challenge peers—can also affect CBL effectiveness (Tarmizi & Bayat, 2020). These challenges highlight the need for teacher training, curriculum restructuring, and supportive classroom environments to ensure the successful adoption of CBL.

Overall, the existing body of research positions case-based learning as a highly effective pedagogical model for developing critical thinking, problem-solving, and reflective judgment—skills

essential for both academic success and real-world application. As education systems increasingly emphasize 21st-century skills, CBL offers a robust framework for active and meaningful learning. Its potential is particularly significant for contexts seeking to shift from teacher-centered to student-centered pedagogy, including madrasa education and other religious schooling models. This makes CBL a promising method for enhancing higher-order thinking skills and preparing students to navigate complex contemporary challenges.

3. Method

3.1. Research design

This study uses quantitative research, with a correlation approach. Correlation is a study that involves collecting data to determine whether there is a relationship between two or more variables, namely the independent or dependent variable (Arikunto, 2006). This research was conducted at the madrasa in Southern Thailand. This research was conducted for four (4) months starting from March to June 2025.

3.2. Populations

The population is a generalized area consisting of subjects and objects that have certain characteristics and qualities determined by the researcher to be studied and then conclusions drawn. Thus, the population is a group of people, objects and events that have certain characteristics and are used as research objects (Suryani & Hendryadi, 2015). The population of this study only examined totaling 1.720 active students of four madrasa in the madrasa in Southern Thailand. The sample is part of the number and characteristics possessed by the population (Sugiyono, 2012). The sample use technique uses proportionate stratified random sampling. Proportionate stratified random sampling is a sampling technique in heterogeneous populations by taking samples from each sub-population whose number is adjusted to the number of members of each sub-population randomly or haphazardly. Because the population is very large, the researchers took a sample using the Slovin formula with a 4% error margin as follows: 1.259 students. According to Siregar (2013) a questionnaire is an information gathering technique that allows analysis to study the behavior, attitudes, beliefs and characteristics of some of the main people in an organization who are usually deceived by the existing system. The questionnaire was distributed for one week starting from 12 April 2025 to 25 April 2025.

3.3. Data analysis

The data analysis technique used is descriptive. According to Suryani & Hendryadi (2015: 210) descriptive in general is only giving a description of the actual state of the data without intending to make generalizations from the data. In descriptive statistics includes the activities of collecting data, processing data, and presenting data. Presentation can use tables, diagrams, sizes, and pictures. The purpose of this descriptive is to make a systematic description of factual and accurate data regarding facts and relationships between the phenomena being investigated or researched (Riduwan & Sunarto, 2019). On the other hand is a simple linear regression. Hypothesis testing using simple regression analysis is used to find out how the dependent (bound) variable can be predicted (forecast) through the independent (free) variables partially or simultaneously (simultaneously). Regression analysis can be used to decide whether to increase or decrease the independent variable. In the regression model, the independent variable explains the dependent variable. In simple regression analysis, the relationship between variables is linear. Mathematically, a simple linear regression analysis model can be described as follows (Sugiyono: 2011).

4. Result

The first theme that became the focus of this research was mastery of the case-based learning method by teachers of Islamic education in the madrasa in Southern Thailand. Table 1 shows that 1.243 students or 93.8% think that madrasa teacher in the madrasa in Southern Thailand master the use of case-based learning methods (mean = 103.86, SD = 9,868) are in the high category. This illustrates that Islamic religious education lecturers have mastered the case-based learning method in lectures.

Table 1. Mastery of case-based learning model level

Description	Low Stage		High Stage		Mean	SD	Category
	N	%	N	%			
Model Case-based Learning	116	6.2	1.243	93.8	103,86	9,868	High

The second theme relates to the high-level thinking skills of students of the madrasa teacher in the madrasa in Southern Thailand. Table 2 shows that 1.246 or 95% of students' high-order thinking skills (mean = 54.47, SD = 7.532) are in the high category. This illustrates that students of the madrasa in Southern Thailand have very highly level thinking skills in lectures.

Table 2. Higher order thinking skill level

Description	Low Stage		High Stage		Mean	SD	Category
	N	%	N	%			
Higher Order Thinking	111	4.2	1.246	95	54.47	7.532	High

The third theme relates to the effect of the case-based learning method on students' higher-order thinking skills. Table 3 using simple linear regression shows that there is an effect of the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand. This is indicated by the value (F = 202.179) and probability value (0.000) which is smaller than the significance value (0.005) (P <0.005). Based on this, the research hypothesis which states that there is an influence of the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand is accepted.

Table 3. The influence of case-based learning method on higher order thinking

Model	Sum of Squares	Df	Mean Square	F	Sig
Regression	6441.869	1	6441.869	202.179	.000 ^b
Residual	8188.602	257	31.862		
Total	14630.471	258			

Table 4 clearly illustrates the effect of the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand by 0.440 or 44%, this is indicated by the value (R Square + 0.440). The R Square value of (0.440) or (44%) illustrates that the effect of the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand is in the moderate category. This shows that the level of influence of the case-based learning model on the high-order thinking skills of students of the madrasa in Southern Thailand is moderate.

Table 4. Magnitude of case-based learning method on higher order thinking

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.664 ^a	.440	.438	5.645

Furthermore, table 5 can show a prediction of the effect of the case-based learning model on higher order thinking skills. The table coefficients show Nilan (constant) = 14.219 and a B value of 0.506 (X) and a significant level of 0.000 (X). From the coefficients table, a simple linear regression equation is obtained, namely: $\hat{Y} = a +$

$bX = 1.880 + 0.506X$, the meaning of the equation is 1.880. The regression coefficient is 0.506 (X), stating that when the case-based learning model is used, it is predicted to be able to develop higher-order thinking skills by 0.506 (50.6%). Likewise, if the case-based learning model is not used, it is also predicted that it will automatically reduce higher-order thinking skills by 0.506 (50.6%).

Table 5. Coefficients

Model	Unstandardized Coefficient		Standardized Coefficients	t	Sig
	B	Std. Error	Betta		
Model Case-based Learning	1.880	3.715		.506	.613
	.506	.036	.664	14.219	.000

The results of the study describe the level of mastery of the case-based learning model by the lecturers' perceptions of students of the madrasa in Southern Thailand in the high category. Meanwhile, students' high-level thinking skills are also in the high category. Based on the data analysis carried out, it can be seen that there is a significant influence between the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand. This is in accordance with the simple linear regression test which states that if the significant value is less than 0.05, namely $0.000 < 0.05$, it means that there is an influence of the case-based learning model on the high-level thinking skills of students of the madrasa in Southern Thailand. This is based on the ANOVA table obtained a significance probability value of 0.000.

The data obtained also shows that higher order thinking skills are affected by 44% by the case-based learning model. This is based on table summary. To find out the level of relationship between case-based learning model variables and higher level thinking skills can be seen in the Summary table. The table displays the value of the correlation coefficient (R) = 0.664 which shows a moderate relationship between the case-based learning model and the variable higher order thinking skills.

5. Discussion

The results of the study illustrate that the case-based learning model is able to influence the high-level thinking skills of students of the madrasa in Southern Thailand. The case-based learning model involves students on a problem that provides a project and then students determine answers to problems that have been submitted in finding their own so that in this way students are able to gain complete knowledge by using new ideas obtained both theory, concepts, information developed into something new and different. Innovative learning focuses students with the ultimate goal in learning, namely students produce a product, this model requires students to be active. In its application, students can ask the teacher so that there is discussion or interaction between the teacher and students, the teacher is required to provide input, support if students experience difficulties during the learning process (Alizadeh et al., 2024; Siregar, 2018; Ilgun Dibek, Sahin Kursad, & Erdogan, 2025). Arab, & Saeedi (2024) the case-based learning model can help students to develop mastery of case-based learning involving students and teachers to learn to retrieve information and demonstrate their knowledge, then implement it in the real world. The case-based learning model influences higher order thinking skills. The results of this study were reinforced by researchers Sambite et al. (2019) who revealed that the case-based learning model had an effect on higher-order thinking skills. So that the case-based learning model is better used in improving higher-order thinking skills (Wu et al., 2025; Faturahman, 2015; Rahayu, Purwanto & Hasanah, 2017).

The findings of this study offer substantial empirical evidence that case-based learning (CBL) serves as a meaningful pedagogical approach for advancing higher-order thinking skills (HOTS) among madrasa students in southern Thailand. The consistently high levels of both teacher mastery of CBL (93.8%) and student HOTS (95%) indicate that the educational environment in these madrasas is shifting toward more cognitively demanding and student-centered learning practices. These results corroborate global research demonstrating that CBL enables learners to interpret complex scenarios, analyze data, justify decisions, and apply conceptual understanding in novel situations (Shi et al., 2025; Thistlethwaite et al., 2019; Kania, & Kusumah, 2025).

Central to this study is the finding that CBL exerts a statistically significant influence on HOTS development, with a moderate effect size of 44%. While CBL does not wholly account for students' cognitive performance, its contribution is pedagogically meaningful, especially considering the multifactorial nature of higher-order reasoning. The moderate effect size suggests that while CBL is a powerful instructional tool, HOTS development also depends on additional contextual factors—such as teacher quality, curriculum coherence, student motivation, and institutional support—which have been acknowledged in prior research within Islamic education (Chen et al., 2025; Tambak & Sukenti, 2020; Rasyidi et al., 2025).

In the context of southern Thailand's madrasa system, these findings carry particular significance. The dual-curriculum structure and linguistic complexity of the region often constrain opportunities for students to engage in analytical and evaluative thinking. Traditional pedagogical norms also tend to emphasize content transmission rather than inquiry or interpretation. Yet, the high levels of HOTS demonstrated in this study suggest that CBL may help mitigate these constraints by cultivating active engagement, collaborative reasoning, and contextual problem-solving. This aligns with the culturally grounded pedagogical traditions of Islamic education, where reasoning (*ijtihad*), analogy (*qiyas*), and reflective inquiry (*tafakkur*) have long been integral to intellectual formation. In this respect, CBL harmonizes with established epistemological values while responding to contemporary learning demands. The quantitative results further reinforce the theoretical argument that HOTS flourish when students are immersed in meaningful, context-rich tasks that demand cognitive autonomy. By presenting students with authentic cases, CBL transforms learning from passive reception into sustained intellectual engagement (Ilgun Dibek, Sahin Kursad, & Erdogan, 2025). This finding echoes empirical studies noted in the manuscript, which affirm that project- and case-based approaches stimulate creativity, problem-solving, and metacognitive awareness (Chen, 2024; Suranti et al., 2016; Pratama & Prastyaningrum, 2016). The regression analysis, indicating a predictive contribution of 0.506 (50.6%) for HOTS when CBL is implemented, illustrates the potential of CBL to catalyze long-term cognitive growth when systematically embedded in the curriculum.

According to Fathurrohman (2015: 118–119), case-based learning is a learning model that incorporates project work into the instructional process. The projects undertaken by students may be completed individually or in groups and are carried out collaboratively within a specified timeframe, ultimately producing a product for presentation. According to Saenab, Yunus, and Husain (2019), case-based learning can be effectively applied in educational settings because it provides authentic experiences that mirror workplace demands. These experiences help students develop the ability to work with others efficiently and professionally. Istarani (2014: 156), stated that case-based learning is an innovative learning model or approach that emphasizes contextual learning through complex activities. Its focus lies in core concepts and disciplinary principles, engaging students in investigative problem-solving tasks and other meaningful learning activities. This model allows students to work autonomously to construct their own knowledge, culminating in the creation of tangible products. Sani (2019), stated that case-based learning broadens students' skills and knowledge by engaging them in projects that relate to learning materials and build relevant competencies, particularly when the projects address community needs.

Zhao, Dai, & Chen (2024) stated that the case-based learning model promotes productive learning interactions between students and teachers. Teachers serve as facilitators and motivators who encourage students to conduct investigations, collaborate, and apply their knowledge to produce new insights, utilize technology, and solve problems. Case-based learning involves assignments structured around problems or challenging questions that require students to gather information, solve problems, make decisions, and evaluate outcomes. This approach grants students autonomy within a defined timeframe and concludes with the presentation of their work. In such learning environments, students play an active role in problem-solving and demonstrate attentiveness in decision-making (Suranti, Gunawan, & Sahidu, 2016; Daniel, 2016). Sulaeman (2020) notes that the case-based learning model requires students to complete assignments within a predetermined time frame, beginning with preparation, followed by data collection, processing, creation, and presentation of the final product. This learning model plays a significant role in developing students' higher-order thinking skills. According to Maula, Prihatin, & Fikri (2014), case-based learning uses real-world problems as a framework for students to think critically, creatively, and at higher cognitive levels, while enhancing problem-

solving skills and acquiring fundamental knowledge for learning design. According to Ardianti, Pratiwi, & Kanzunnudin (2017), case-based learning is characterized by activities involving project design and implementation, which lead to the production of a final product. This model enriches students' experiences by allowing them to apply their abilities to solve problems encountered during task completion.

Shi et al. (2025) stated higher-order thinking skills (HOTS) encompass critical and creative thinking abilities such as decision-making, problem-solving, fluency, observation, exploration, classification, hypothesis development, and metacognitive processes—including awareness, self-monitoring, and self-regulation. These skills correspond to the upper levels of Bloom's taxonomy, equipping students to transfer knowledge through analysis, evaluation, and creation. Higher-order thinking skills lie at the intersection of the highest cognitive process dimensions—analyzing, evaluating, and creating—and the highest knowledge dimensions: conceptual, procedural, and metacognitive. HOTS integrate cognitive, affective, and psychomotor domains into a unified learning process (Xu et al., 2024; Sulaeman, 2020; Fitriani, Bakri, & Sunaryo, 2017; Kim, 2025). According to Anggoro et al. (2025) and Purbaningrum (2017), higher-order thinking ability reflects one's capacity to go beyond provided information through critical evaluation, metacognitive awareness, and problem-solving. Higher-level thinking involves more than memorizing facts or restating information.

Sani (2019) stated that the higher-order thinking skills include logical, critical, creative, reflective, and metacognitive thinking. These skills are essential for problem-solving and decision-making, emerging when individuals integrate stored information with newly acquired knowledge to achieve meaningful learning goals. According to Yulianis et al., (2019), higher-level thinking involves the ability to analyze, evaluate, and create based on acquired knowledge. These skills enable learners to manage information effectively and address complex challenges. Nugroho (2018), stated higher-order thinking skills require individuals to think beyond basic recall, memorization, or routine application of rules, procedures, and formulas. Such skills involve applying factual knowledge creatively to derive new solutions. According to Setiawan & Dafik (2014) and Antonio, & Prudente (2024), higher-order thinking skills entail the ability to connect, manipulate, and transform existing knowledge and experiences to think critically and creatively for decision-making and problem-solving in unfamiliar situations. Helmawati (2020), stated that the high-level thinking skills stimulate students to analyze, interpret, and manipulate prior information to avoid rote, monotonous learning. These skills enable individuals to process, store, and apply new information to solve situational problems.

Moreover, the findings illuminate important implications for teacher professionalism in madrasas. The high mastery of CBL among educators indicates readiness to adopt modern pedagogical frameworks, which corresponds with recent regional initiatives to strengthen instructional innovation (Wijnia et al., 2024; Muhajir et al., 2025; Firdaus et al., 2025; Ramadhani, & Sirait, 2015). However, to maximize the benefits of CBL, teachers must continually refine skills in designing high-quality cases, facilitating guided inquiry, and assessing complex cognitive processes. This suggests a clear need for ongoing professional development that integrates Islamic pedagogical foundations with contemporary instructional design (Zhu et al., 2025). Finally, the moderate—not high—effect size underscores that HOTS development requires a multilayered strategy. While CBL is a valuable instructional method, its impact would likely be amplified through complementary approaches such as inquiry-based learning, problem-based learning, or metacognitive training. These methods have also been shown to improve analytical and evaluative thinking in madrasa contexts (Felemban et al., 2025; Sucipto, 2017; Yasin et al., 2025). The study therefore highlights the need for a comprehensive pedagogical ecosystem that reinforces cognitive challenge across subject areas.

6. Conclusion

This study demonstrates compelling evidence that the implementation of case-based learning (CBL) significantly enhances higher-order thinking skills (HOTS) among madrasa students in southern Thailand. The analysis reveals three principal conclusions. First, students perceive their teachers as possessing a high level of mastery in applying the CBL model, indicating that educators in these madrasas are effectively transitioning toward more innovative and cognitively engaging pedagogical practices. Second, students themselves exhibit high levels of HOTS, suggesting that the learning environment is conducive to advanced cognitive development

and reflective inquiry. Third, the statistical findings confirm a significant and positive influence of the CBL model on HOTS, with a moderate effect size of 44%, signifying that nearly half of the variance in students' higher-order thinking can be attributed to the application of CBL in instructional settings. The predictive analysis further indicates that consistent use of CBL can increase students' HOTS by approximately 50.6%, whereas the absence of CBL is associated with a corresponding decline. These findings underscore the central role of case-based pedagogy in cultivating analytical reasoning, evaluative judgment, and creative problem-solving—competencies essential for the intellectual and moral formation of learners in Islamic educational contexts. While the effect size is moderate, this suggests that CBL must operate alongside other complementary pedagogical approaches, institutional supports, and teacher professional development initiatives to maximize impact. Overall, this study affirms that CBL represents a highly relevant and effective strategy for strengthening cognitive competencies in madrasas, particularly within the socio-cultural complexities of southern Thailand. The research carries important implications for curriculum design, teacher training, and policy development, emphasizing the need for continuous pedagogical innovation to prepare madrasa students for future academic, professional, and societal challenges. Continued research is recommended to explore additional instructional models and contextual factors that may synergistically support the advancement of higher-order thinking in Islamic schooling environments.

Author Contribution Statement

Contributions of the authors in this article: Abdurrohman Chapakiya, contributed as concepts and drafters of the article; Abdul Rashed bin Abdullah, contributed as data analyzers and interpreters; Muhamad Nasir Mohamad Salleh, as the drafter of the manuscript; Saiful Luthfi, and Gandhung Fajar Panjalu, contributed in collecting data and critically revising the article. All authors agree to take responsibility for all aspects of this work.

Disclosure of Interests

We have no conflict of interest to declare.

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