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TRANSFORMING HOTS-ORIENTED LEARNING THROUGH PROBLEM-BASED LEARNING AMONG MADRASAH IBTIDAIYAH STUDENTS: A LITERATURE REVIEW

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Abstract:

Strengthening Higher Order Thinking Skills (HOTS) at the Madrasah Ibtidaiyah level is essential because basic education can no longer rely only on memorization, but must also develop students' ability to analyze, evaluate, and create. This article aims to analyze the concept of implementing Problem-Based Learning (PBL) and its effectiveness in improving HOTS among Madrasah Ibtidaiyah students based on findings from previous studies. This study employed a literature review method using theoretical books, official documents, conceptual articles, classroom action research, and systematic reviews relevant to PBL, HOTS, and Islamic primary education. Data were collected through documentation and analyzed using content analysis through theme identification, classification of findings, comparison across literature, and synthesis. The review indicates that PBL is effective in improving HOTS when learning begins with contextual problems, followed by student organization, guided inquiry, solution presentation, and reflection on the learning process. The effectiveness of PBL is influenced by the quality of problems, teacher facilitation, group collaboration, student readiness, and the alignment of HOTS assessment. This article affirms that PBL can serve as a learning transformation strategy in Madrasah Ibtidaiyah that not only improves higher-order cognitive abilities but also develops students' independence, collaboration, and responsibility

Keywords: *Problem-Based Learning; Higher Order Thinking Skills; Madrasah Ibtidaiyah; 21st-century learning; literature review*

INTRODUCTION

The changing demands of twenty-first-century education require learning that develops not only mastery of factual knowledge but also the ability to reason, solve problems, evaluate information, and generate new ideas. These abilities are known as Higher Order Thinking Skills (HOTS), which, in the revised Bloom's taxonomy, are related to the abilities to analyze, evaluate, and create (Anderson & Krathwohl, 2001). In the context of Madrasah Ibtidaiyah, HOTS needs to be developed from the early stages of schooling because it provides the foundation for critical, creative, reflective, communicative, and collaborative thinking. The strengthening of HOTS-oriented learning is also in

line with the direction of improving learning quality, which requires students to transfer knowledge into new situations (Ariyana et al., 2018).

The reality of learning at the basic education level still presents several challenges. Some learning processes remain teacher-centered, emphasize memorization, and provide insufficient space for students to investigate problems independently. This pattern may lead students to rely on single answers from teachers or textbooks rather than to build reasoning through questioning, selecting information, examining evidence, discussing ideas, and drawing conclusions. Therefore, a learning model is needed to shift classroom activities from the mere reception of information toward learning experiences that encourage higher-order thinking activities.

Problem-Based Learning (PBL) is considered relevant to address this need because it places real or contextual problems as the starting point of learning. Hmelo-Silver (2004) explains that in PBL students learn through teacher-facilitated problem solving, identify learning needs, conduct self-directed learning, apply new knowledge, and reflect on the strategies used. Savery (2006) also emphasizes that PBL is learner-centered, integrates theory and practice, and encourages the application of knowledge in formulating solutions. With these characteristics, PBL has a strong conceptual relationship with the development of HOTS.

Studies on PBL and HOTS have been conducted in various basic education contexts. Afandi and Handayani (2020) showed an improvement in HOTS through PBL in MI science material, while Zainal (2022) emphasized the relevance of PBL in Mathematics learning at elementary school and Madrasah Ibtidaiyah levels. Ramadhanti et al. (2022), through a review of 78 primary studies, found that PBL has a positive impact on students' mathematical HOTS. Recent studies also indicate that PBL can be strengthened through learning technology, as shown in ICT-based IPAS learning in Madrasah Ibtidaiyah (Khairullina & Prastowo, 2024). However, these findings are still distributed across different subjects, levels, and approaches, making it necessary to synthesize them by specifically positioning PBL as a strategy for strengthening HOTS among Madrasah Ibtidaiyah students.

Based on this gap, this article aims to analyze the concept and procedure of implementing PBL that are relevant for improving HOTS among Madrasah Ibtidaiyah students and to examine its effectiveness based on previous studies. This article argues that PBL is effective in developing HOTS when it is designed through contextual problems, guided inquiry, collaborative discussion, solution presentation, reflection, and assessment that makes students' thinking processes visible. Thus, the contribution of this article lies in developing a conceptual-practical synthesis of how PBL can be realistically adapted to MI learning.

RESEARCH METHODS

This article used a literature review approach, or library research, with narrative synthesis. Library research is understood as research that uses written sources to obtain data, build conceptual understanding, and develop scientific arguments regarding a research problem (Zed, 2014). This approach was chosen because the objective of this article was not to test field data directly, but to analyze the concepts, procedures, and effectiveness of PBL in improving HOTS based on relevant academic sources. The object of this study was Problem-Based Learning as a learning strategy and Higher Order Thinking Skills as higher-

order thinking competencies among Madrasah Ibtidaiyah students.

The data sources consisted of primary and secondary sources. Primary sources included research articles on PBL, HOTS, elementary school or MI learning, science or IPAS learning, and Mathematics learning at the basic education level. Secondary sources included theoretical books, HOTS learning guidebooks, conceptual articles, and systematic reviews. The selection of sources was carried out to obtain relevant, credible, and comparable materials, in line with the principle of qualitative research that emphasizes the correspondence between data sources and the research focus (Miles et al., 2014). The main literature analyzed included the works of Hmelo-Silver (2004), Savery (2006), Anderson and Krathwohl (2001), Brookhart (2010), Ariyana et al. (2018), Afandi and Handayani (2020), Zainal (2022), Ramadhanti et al. (2022), Khairullina and Prastowo (2024), and Surya et al. (2025).

Data were collected through documentation. The literature was selected based on several criteria: it discussed PBL, HOTS, or the relationship between the two; it was relevant to basic education, Madrasah Ibtidaiyah, or prospective MI teachers; it came from scholarly articles, academic books, or official documents; it contained concepts, procedures, or findings that could answer the objective of this article; and it prioritized recent publications without neglecting classical sources that serve as theoretical foundations. Documentation was used because the data in library research are in the form of texts, concepts, research findings, and scientific arguments that can be read, classified, and analyzed (Zed, 2014).

Data analysis was conducted using content analysis. Content analysis is used to interpret the meaning of texts systematically through identification, categorization, and inference from document content (Krippendorff, 2019). The analytical stages in this article included reading the literature, identifying main ideas, grouping the literature by theme, comparing findings across sources, and developing a synthesis. The validity of the review was maintained through source triangulation by comparing major theories, empirical research findings, and systematic reviews. Triangulation was used to strengthen the credibility of findings because it allows researchers to examine the consistency of information from various data sources and perspectives (Miles et al., 2014). Through these procedures, the conclusions of this article were formulated proportionally and were not based on a single source.

RESULTS AND DISCUSSION

The review shows that PBL can be positioned as a strategy for transforming HOTS-oriented learning because learning begins with problems that require thinking activities rather than one-way material delivery. In the context of Madrasah Ibtidaiyah, the problems used in learning should be concrete, simple, close to students' experiences, and solvable through teacher guidance. Problems such as classroom cleanliness, division of group tasks, wilted plants, or waste management in the madrasah can serve as meaningful triggers for training students' reasoning. Thus, PBL is relevant not only as an active learning model but also as a pedagogical framework for changing learning habits from memorization toward reasoning.

Theoretically, the discussion in this article is based on three main book-based foundations. First, Vygotsky's (1978) social constructivism is used to explain that learning develops through social interaction, assistance from more capable others, and scaffolding within the zone of proximal development.

Second, the syntax of PBL refers to Arends (2012), namely orienting students to problems, organizing students for learning, guiding investigation, developing and presenting work, and analyzing and evaluating the problem-solving process. Third, the concept of HOTS uses the revised Bloom's taxonomy by Anderson and Krathwohl (2001), particularly the dimensions of analyzing, evaluating, and creating, and is strengthened by Brookhart (2010), who emphasizes that HOTS assessment should make students' reasoning, explanations, products, or actions visible. These theoretical foundations show that PBL can provide an appropriate learning space for developing HOTS because students do not merely receive knowledge but construct understanding through problems, discussion, and reflection.

The relationship between PBL and HOTS is evident in the learning process that takes place during problem solving. When students encounter a problem, they need to analyze the situation, select important information, connect it with prior knowledge, evaluate alternative solutions, and make decisions. From Vygotsky's (1978) perspective, this process becomes stronger when students learn through group interaction and receive scaffolding from the teacher. Meanwhile, from the perspective of Anderson and Krathwohl (2001), these activities operate at the level of higher-order thinking because students do not stop at remembering or understanding but use knowledge to analyze relationships, evaluate choices, and create solutions. In other words, PBL provides learning conditions that allow HOTS to emerge more naturally and observably.

The empirical literature analyzed in this article shows a relatively consistent pattern. PBL tends to be effective in improving HOTS when learning problems are contextual, students are involved in inquiry, teachers act as facilitators, and learning outcomes are assessed through thinking processes rather than merely final answers. The synthesis of previous studies used in this article is presented in Table 1.

Table 1. Synthesis of previous studies on PBL and HOTS in basic education/MI

No.	Source	Research Focus	Findings and Contribution
1	Afandi & Handayani (2020)	PBL in MI science learning	PBL gradually improved HOTS from cycle I to cycle III, although teachers needed to manage problem focus, discussion, time allocation, and learning products.
2	Zainal (2022)	PBL in Mathematics at elementary school/MI level	PBL is recommended because it supports inquiry, problem solving, and the development of higher-order thinking abilities.
3	Ramadhanti et al. (2022)	Review of 78 primary studies	PBL has a positive impact on mathematical HOTS when learning is student-centered, teachers act as facilitators, and students collaborate in small groups.
4	Khairullina & Prastowo (2024)	ICT-based PBL in IPAS learning at MI	Technology-based PBL makes students more active and motivated, but its effectiveness depends on infrastructure readiness and teacher facilitation.
5	Surya et al.	PBL in elementary	The PBL-based experimental group showed better

No.	Source	Research Focus	Findings and Contribution
	(2025)	science learning	post-test and n-gain results than the control group in reflective-critical thinking skills.

Based on Table 1, the effectiveness of PBL is not limited to one subject area, but appears in MI science learning, elementary school or MI Mathematics, IPAS, and elementary science. Afandi and Handayani (2020) show that the implementation of PBL in MI science material improved HOTS from one cycle to the next. This finding strengthens the argument that HOTS can develop when students are given opportunities to investigate problems, discuss ideas, and present results gradually. Zainal (2022) also positions PBL as an appropriate approach for Mathematics learning at the elementary school or MI level because students are encouraged to understand reasons, strategies, and concept application rather than merely perform calculation procedures.

The findings of Ramadhanti et al. (2022) reinforce these results through a synthesis of 78 primary studies. The positive impact of PBL on mathematical HOTS mainly appears when learning is student-centered and the teacher acts as a facilitator. This finding is consistent with Arends (2012), who places the teacher as a guide in the inquiry process rather than as the main provider of answers. In the MI context, the facilitator role is highly important because students still need guiding questions, clear task distribution, and direction in constructing reasons. Therefore, the effectiveness of PBL is strongly influenced by the quality of teacher scaffolding during the learning process.

Furthermore, Surya et al. (2025) provide empirical support that PBL produces better outcomes than conventional learning in the context of elementary science. The experimental group that learned through PBL obtained higher post-test scores and moderate n-gain improvement, while the control group remained in the low category. This finding is important because it shows that the effectiveness of PBL is not only visible in more active classroom processes but also in measurable changes in learning outcomes. When read through the taxonomy of Anderson and Krathwohl (2001), this improvement can be understood as the result of students' involvement in analyzing problems, evaluating alternative solutions, and constructing answers or problem-solving products. Thus, the findings of Surya et al. (2025) strengthen the position of PBL as a relevant model for developing HOTS at the basic education level, including in Madrasah Ibtidaiyah.

The procedure for implementing PBL among MI students can follow the syntax of Arends (2012), but it needs to be simplified according to students' developmental characteristics. The first stage is orienting students to problems through stories, pictures, short videos, demonstrations, or events around students. The second stage is organizing students into small groups and explaining the tasks to be completed. The third stage is guiding inquiry through questions such as what the problem is, who is affected, what causes it, what information is needed, and what solution is most possible. The fourth stage is presenting solutions through presentations, posters, brief reports, simple products, or demonstrations. The fifth stage is reflection, namely evaluating the accuracy of the solution, the reasons used, group cooperation, and improvements that need to be made.

When linked to social constructivist theory, these stages indicate that MI

students construct knowledge through social interaction and gradual guidance. Vygotsky (1978) emphasizes the importance of assistance in the zone of proximal development so that learners can perform tasks they could not previously complete independently. In PBL, this assistance appears through teacher questions, peer discussion, examples of reasoning, and feedback on solutions. Therefore, effective PBL is not learning that leaves students to work without direction, but learning that provides structure so that students can progress from simple thinking abilities toward HOTS.

Assessment is an important component in ensuring that PBL genuinely develops HOTS. Brookhart (2010) emphasizes that HOTS assessment needs to make students' thinking processes visible through reasons, explanations, products, or actions. Therefore, MI teachers need to use instruments such as essay questions, argumentation rubrics, problem-solving worksheets, group presentations, or simple projects. Assessment should not focus only on the correctness of final answers, but also on the quality of analysis, the accuracy of reasoning, the ability to compare alternatives, and students' creativity in producing ideas. Without such assessment, PBL may become only an ordinary group activity that does not necessarily measure HOTS improvement.

Mechanistically, the effectiveness of PBL can be explained through four processes. First, PBL creates cognitive conflict because students realize the gap between the knowledge they already have and the problem they must solve. Second, PBL encourages knowledge elaboration because students connect new information with previous experiences. Third, PBL develops argumentation through group discussion so that students learn to provide reasons and evaluate peers' opinions. Fourth, PBL fosters reflection because students review the process and results of problem solving. These four processes create the main space for the development of analysis, evaluation, and creation as explained in the taxonomy of Anderson and Krathwohl (2001).

Nevertheless, the effectiveness of PBL is not automatic. PBL will not significantly improve HOTS if teachers merely rename classroom activities as problem-based learning while continuing to dominate explanations and use memorization-based questions. PBL becomes effective when teachers select meaningful problems, provide learning resources, offer sufficient guidance, manage time, build a culture of discussion, and assess students' thinking processes. Among MI students, effectiveness is also influenced by students' confidence in expressing opinions, reading ability, group dynamics, and learning habits. Therefore, PBL needs to be implemented gradually and consistently.

The main implication of this review is the need for MI teachers to design PBL as a realistic learning strategy. Problems do not have to be large or complex, but they must be close to students' lives and require reasoning. For example, teachers may use classroom cleanliness problems to train causal analysis, problems of sharing learning tools to train the evaluation of fairness, or wilted plant problems to train solution development. With simple but meaningful problems, students can develop HOTS without being burdened by complexity that is not yet appropriate for their developmental stage.

PBL can also be integrated with Islamic values that characterize Madrasah Ibtidaiyah. Problems related to cleanliness, honesty, responsibility, cooperation, and social care can be connected to character formation. This integration makes problem-based learning not only train cognitive abilities but also develop more independent, collaborative, and responsible learning

attitudes. Thus, PBL can be understood as a learning model that supports the balance of knowledge, thinking skills, and character in madrasah education.

CONCLUSION

Based on the review, PBL can be understood as a relevant learning model for improving HOTS among Madrasah Ibtidaiyah students because its process places students in problem situations that require analysis, evaluation, and creation. The PBL procedure suitable for MI students includes orientation to contextual problems, group organization, guided inquiry, solution presentation, and analysis and reflection on the problem-solving process. These stages need to be implemented with clear scaffolding so that they correspond to the developmental characteristics of MI students.

Previous studies show that PBL is effective in improving HOTS in basic education and MI contexts, especially when learning is student-centered, teachers act as facilitators, problems are contextual, and assessment is directed toward thinking processes. This evidence appears in classroom action research, systematic literature reviews, technology-based PBL implementation, and experimental findings showing that the post-test scores and n-gain of PBL groups are better than those of conventional learning groups. Therefore, MI teachers need to implement PBL gradually through simple problems, clear guidance, group discussion, and HOTS assessment rubrics so that learning does not stop at group activities but genuinely develops students' abilities to analyze, evaluate, and create

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