

Implementation of the Problem based Learning Model to Enhance High Order Thinking Skills (HOTS): A Systematic Literature Review

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ABSTRACT

High Order Thinking Skills became the center of attention to achieve the goal, namely that students can think at a high level in any matter, one of which is by using learning models during the teaching and learning process. Therefore, this article discusses an overview of problem based learning and high order thinking skills (HOTS) learning models. This research applies the Systematic Literature Review (SLR) method by collecting data through POP (Publish or Perish) and ERIC. resulting in an initial database of 18,724 articles from ERIC and 116 articles from Scopus. Then the data was filtered based on descriptors with the keyword "thinking skills," resulting in 2,176 articles. Next, data was filtered based on the education level of elementary school students, with a total of 230 articles. Next, the focus was narrowed to five articles for final analysis. Topics studied include education level, year of publication, and analysis results. The relationship between the problem-based learning model and student HOTS is not limited to exact subjects such as mathematics and science. Students are also trained to have high analytical skills in non-exact subjects such as social sciences (IPS), where they are expected to be able to understand large amounts of material effectively.

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INTRODUCTION

Training plays a significant part in getting ready human regular assets to confront future difficulties. An individual high priority different abilities and limits connected with the undeniably mind-boggling requests of life in the 21st hundred years. Wagner and the College's Change Administration Gathering (Zubaidah, 2020) distinguishing the capabilities and abilities to survive required by understudies in confronting life, the universe of work, and citizenship in the 21st century underscores the accompanying seven abilities: (1) decisive reasoning and critical thinking skills, (2) cooperation and authority, (3) dexterity and flexibility, (4) drive and pioneering soul, (5) ready to impart really both orally and recorded as a hard copy, (6) ready to get to and examine data,

and (7) have interest and creative mind. One significant limit that each individual unquestionable requirement is the ability to basically think.

A demonstrable level of reasoning ability, or what is referred to as HOTS (Pramesti et al., 2023; Syahril, 2020), is indicated by decisive reasoning skill. Understudies should begin developing and preparing for decisive reasoning skills as early as primary school. With the help of their ability to reason decisively, students can formulate original ideas or reflections on a subject. Students will be taught how to select various evaluations, enabling them to distinguish between relevant and unnecessary emotions. By considering facts and realities that occur in the field, developing students' critical thinking skills can help them make ends meet. Thinking skills are recalled for achieving learning outcomes in the mind. Blossom's scientific classification makes sense when it says that the mental component includes the ability to remember, understand, apply, analyze, evaluate, and create. According to (Jailani et al., 2017), HOTS helps students apply and make connections between the knowledge they have already acquired and the knowledge they will acquire. HOTS is the part of cognitive processes in Bloom's Taxonomy. The cognitive processes that belong to HOTS are analysis, synthesis, and evaluation. The Bloom's taxonomy was later revised by Anderson et al (2001). In Revised Bloom's Taxonomy, analyze, evaluate, and create are categorized as Higher Order Thinking Skills (HOTS).

The HOTS capacities of Indonesian understudies remain in the low range, as evidenced by a few facts (Rahman et al., 2020; Ramadhanti et al., 2022). As per the 2015 TIMSS results, 54% of Indonesian students possess data related to science and cognitive domain abilities, which include understanding, application, and reasoning. According to Rofiah et al (2013), the thinking perspective is recalled for demonstrable reasoning abilities, whereas the comprehension perspective is recalled for fundamental reasoning abilities. Furthermore, research indicates that students find it challenging to answer HOTS questions because they have trouble understanding the question's directive, the picture's meaning, the answer options, and the meaning of the words (Hariyani et al., 2023). They also struggle with focusing on the questions, making suggestions or solutions, choosing the appropriate answers, and modifying the list of words in the question with the available options.

All subjects are applicable to HOTS questions; one exception is the Sociologies (IPS) subject, which is integrated into the subject. A variety of sociological fields are combined to form Sociologies (IPS), including humanism, history, finance, topography, legislation, regulation, and culture. Students who study social studies in elementary school are taught the value of social studies and how they can help students become contributing members of society.

This cycle is incorporated into the learning process in the study hall as part of the training concept. A few traits that can be integrated into the developing experience are responsibility, mindfulness, teamwork, independence, persistence, challenging work, and confidence. To achieve these learning objectives, a learning model that can support the growth of HOTS and student character is needed. A recommended learning model that aligns with this development is the Problem-Based Learning (PBL) model.

Understudy HOTS can now be used with PBL as a learning model (Ramdiah et al., 2018; Suherman et al., 2020). PBL is a strategy for developing students' problem-solving skills. Its hallmark is that problems become the starting point of the learning experience (Fitriati et al., 2021; Suparman & Putra, 2020). Additionally, PBL problems with a variety of information can prepare all student limits with regard to the environment that will be used and students' critical thinking skills. Naimnule & Corebima (2018) state that the purpose of the learning process's problems is to motivate students to participate in meaningful learning and hone their critical thinking abilities.

Linguistic structure of the PBL-based learning process (Purwanto, 2019) to be specific: (1) arranging understudies to the issue; (2) sorting out understudies to study; (3) directing understudies to complete examinations both separately and in gatherings; (4) create and assess the critical thinking process. The language structure in the PBL-based educational experience can work with understudies to rehearse their decisive reasoning abilities. Students may be able to re-access the knowledge they have learned through investigative activities, which are one of the characteristics of PBL and are related to exploratory activities, determining problem focus, developing problem solving activities, as well as evaluation and reflection. In this situation, students' abilities will be given more weight and will be easier to access when they need to solve problems in different settings.

In the PBL concept, there are two formative learning outcomes that play a central role, namely freedom and obligation. The freedom in PBL creates space for students to take a more active role in their learning process. Teachers are not just transmitters of information; they are facilitators who give students the freedom to determine the direction and way they learn. This freedom gives students the opportunity to explore and develop their own initiative and creativity. Meanwhile, obligations in PBL refer to the responsibilities given to students regarding the learning process. Includes responsibility for actively contributing to discussion groups, organizing ideas, providing feedback, and completing assignments according to time targets. As a result of the balance between freedom and obligation, students in PBL experience more meaningful and contextual learning. By implementing PBL, it creates an environment that stimulates students' critical thinking and creativity while building skills and attitudes that are essential for later life. Based on theoretical surveys and previous analysis, analysts anticipated that the PBL model would effectively engage HOTS in elementary school students.

METHOD

Research Design

Systematic Literature Review (SLR) and Meta examination (PRISMA) techniques are applied in this investigation. Deliberate writing survey, also known as methodical writing survey in Indonesian, is an investigation method that is finished by compiling and reviewing prior research with a focus on the target subject (Eryc, 2022). The SLR technique aims to provide the most comprehensive overview possible of all distributed research or studies related to a particular field. The methods used were screening specific diary abstracts for examination consideration and differentiating proof. With the purposeful writing survey approach, scientists can collect and analyze data from various sources related to the research topic. The PRISMA technique is being investigated in this case as a framework for clearly and effectively organizing and outlining the research steps. The most crucial part of this approach is identifying relevant watchwords and using them to search through published material. After that, abstracts from relevant diaries were selected and sorted based on recently established criteria for consideration. An angle could be included in an incorporation model, such as the year of distribution, the method used, and the subject of the exploration. The next step is to go through each of the selected articles in detail to perform a more detailed analysis after the theoretical has been selected.

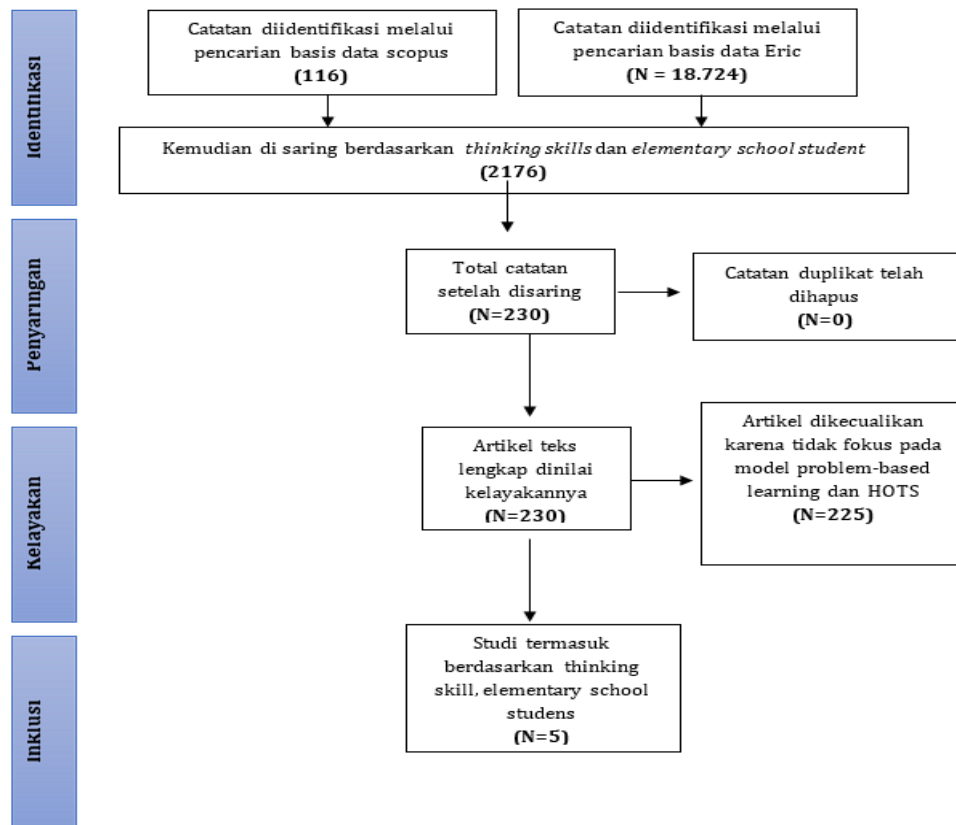
Inclusion Criteria

The consideration steps for this examination are as follows: (1) based on data from the Eric and Scopus databases; (2) see how PBL is implemented in HOTS learning in elementary schools;

(3) based on investigations registered in Scopus; and (4) articles that do not comply with the merger model are not allowed to continue the investigation cycle.

Data collection techniques

Information was gathered by scientists from Eric and Scopus articles. When searching software, use the keywords "higher order thinking skills" (HOTS) and "problem-based learning" (PBL). perused articles spanning the years 2014–2023. Following the initial database's acquisition of 18,724 articles from Scopus and Eric, 116, 2176 article data were screened through the application of descriptor thinking skills. At that point, 230 article details were obtained by screening according to the descriptor, which targeted primary school understudies. From these various articles Considering how reasonable the remaining five articles are in relation to the standard watchwords, they will be kept in mind for the final investigation. In Figure 1, the article choice cycle is presented.



Gambar 1. Diagram Alir

RESULTS

Study Based on Year of Publication in Scopus

The acquired papers are arranged according to the Scopus year: Nine publications were released in 2014, ten in 2015, twenty in 2016, thirty in 2017, twenty in 2018, thirty in 2019, forty in 2020, sixteen in 2021, twenty-six in 2022, twenty-three in 2023. Table 1 ought to show this as follows:

Table 1. Scopus articles

Year	Number of Articles
2014	9
2015	10
2016	25
2017	30
2018	20
2019	30
2020	45
2021	16
2022	26
2023	19

Study Based on Education Level

There are a total of 230 articles that comprehensively discuss educational levels, with the main focus on the elementary school level. The source for this article comes from two leading research platforms, namely ERIC and Scopus. Through in-depth analysis, the articles provide insight into various aspects related to the development of critical thinking skills at the primary education level. Therefore, this collection of articles makes a valuable contribution to broadening our understanding of elementary education and encouraging research and reform in this field. This can be seen in table 2 as follows:

Table 2. Study Based on Education Level

Education level	Article
Elementary School	230

The main body of a scientific paper consists of the results, which don't need any data analysis. Five articles analyzing issue-based learning and HOTS models were found because of the investigation of logical articles moved to Scopus and Eric. The paper was written by Ichsan et al., (2019) specifically, understudy HOTS remains classified as extremely low at all educational levels. There are various tasks that need to be completed in order for understudy HOTS to increase. Understudies' abilities can be strengthened by the course of events and the application of various learning models, learning strategies, learning materials, showing materials, understudy worksheets, and learning media. It is recommended that content be implemented as a creative teaching system. Furthermore, the agreement learning model has the potential to enhance students' critical thinking skills more than traditional learning models (Silva et al., 2022).

Subsequently, the study conducted by Rintayati et al., (2020) specifically assumed that senior educators and clients considered the TTMCT instrument to be appropriate for assessing higher order thinking skills in the concepts of power, movement, and energy in elementary schools. Actually, this strategy needs more guidance and enhancement. Despite receiving instruction at the Indonesian elementary school level, neither of the two students nor the teachers are familiar with

using two-level multiple-choice test assessments. The Two-Level Various Decision Test Improvement model for surveying decision and learning strategies, the two degrees of execution of different decision tests, learning pointers and evaluation markers, and true developmental appraisals that apply to invigorate understudies' abilities to reason should all work well. Since teachers are not yet comfortable creating and using two-level multiple-choice tests, guidance, enhancement, and heading are necessary, presuming that similar assessments should be carried out.

After that, the paper written by Isrokatun et al., (2023) demonstrates that Android-based application improvement (SBL Application) is appropriate for use by grade school understudies based on approval results from media and materials specialists. This is caused by the application's use of clear language, intelligent content, and data that is appropriate given the understudies' current state of development. The educational resources utilized in this investigation were made using researcher smart apps. Overall, the application received positive feedback after being given to understudies in elementary school, both in terms of the understudies' interest and their ability to improve their mastery and critical thinking skills. Understudies' responses indicate that SBL Applications can help them practice making decisions. After using the SBL application, students felt that it was easier for them to formulate problems, collect data, analyze information, pose and respond to questions, and draw conclusions. In this way, the SBL application can serve as an effective learning tool to produce high-caliber understudies.

It was believed that they could support various media to oblige students with creative reasoning after reading an article by Yonanda et al (2019) that revealed that problem-based learning how to use comic books had the potential to further develop understudies' decisive reasoning abilities. Comic books can be used as a teaching tool in the interim to help students improve their ability to reason decisively, especially in elementary school. Table 3 ought to display this in the following manner:

Table 3. Summary of Review Results

No	Author	Keywords	Results
1	Trio Ageng Prayitno, Ilma Zajuli Ichsan, Diana Vivanti Sigit, Mieke Miarsyah, Ahmad Ali, Wiwin Paramita Arif	Higher order thinking skills, students, environmental education, and HOTS-AEP.	According to the study's conclusion, HOTS understudies continue to rank extremely low across all educational levels. To increase the number of HOTS understudies, various tasks should be completed. Further development of HOTS understudies can be achieved through the advancement and application of various learning models, learning strategies, learning materials, showing materials, worksheets for understudies, and learning media.
2	Ahmad Syawaludin, Hafizhah Lukitasari, and Peduk Rintayanti (2020)	higher-request reasoning skills, two-level multiple-choice exam, reasoning skills, elementary school, and understudies	According to the review's aftereffects, the TTMCT's commendable improvement results were 25 in all, with "extremely high" unwavering quality, "very troublesome" level of trouble, "excellent" distinction power, and great substance legitimacy.

			TTMCT is applicable to high and medium models of Indonesian grade schools. This review explains why senior educators and clients consider the TTMCT instrument to be credible for measuring higher order thinking skills in the concepts of power, movement, and energy in primary schools.
3	Eva Morais, Helena Silva, Caroline Dominguez, and Jose Lopes (2022)	Four-Grade Understudies, Decisive Reasoning Abilities, Think-Pair-Offer, Roundtable, and Helpful Learning	The findings indicate that the application of helpful learning was more effective in developing the critical reasoning skills under investigation when compared to a more conventional showing philosophy.
4	Isrokatun, Nurdinah Hanifah, Riri Khoerunnisah, Yusuf Abdul Rahman, and Rosi Rosmiati.	Students in Elementary School Using a Mobile App, Android-Based Learning, and Critical Thinking Skills	As such, the advancement of lower-grade understudies led to the proper planning of this application. In addition, the students enjoyed using the SBL Application and discovered that it made it easier to gather information, formulate insightful questions, and draw conclusions from the content. As a result, it is reasonable to conclude that the SBL Application developed for this review is convincing and plausible to be used as an Android-based learning tool to develop the critical thinking skills of elementary school students.
5	Devi Afriyuni Yonanda, Yuyu Yuliati, and Dudu Suhandi Saputra	learning through media, critical thinking ability, elementary school, understudies, and comic	which revealed that teaching students how to use comic books can help them develop their capacity for critical thought. As a result, it is normal to create various media to support students' creative thinking. In the interim, teachers can use this comic book as one of their teaching tools to help students, especially those in elementary school, develop their critical thinking skills.

DISCUSSION

The article's findings make clear the connection between students' HOTS and the problem-based learning model. Despite their preparation in math, understudies are expected to be highly intelligent, especially in subjects where they will be exposed to a large amount of information. In social studies education, the Problem-Based Learning learning model is used to highlight students' HOTS. The Problem Put Together Finding a solution to a problem by mastering the concept of learning model concentrations (Lely et al., 2020). Understudies experience the most common methods of thinking independently, communicating their ideas, and having the opportunity to connect real-world problems with significant social studies concepts while they are solving problems. Later, understudies' social conceptions will be shaped by this cycle (Riyati & Suparman, 2019). Learning the Social Sciences (IPS) is linked to Higher Order Thinking Skills (HOTS) because social, economic, geographic, historical, political, and cultural concepts necessitate in-depth understanding, analysis, evaluation, and application.

This syntax is designed to provide comprehensive support to students in achieving Higher Order Thinking Skills (HOTS) through PBL. The problem-based learning (PBL) model is implemented by realizing real challenges that encourage students to apply in-depth analysis, problem solving, and collaboration in learning. By integrating PBL, students not only gain knowledge but also improve their critical thinking skills to face real-world problems. PBL places students in relation to the issue in the first stage, after which students conduct issue analysis to understand the given issue (Suryaningsih, 2017). Considering what is going on, students are ready to understand the information they learn from the problem and formulate a hypothesis that they will investigate in light of the primary concern. This will train the critical thinking skills of understudies. Understudies' ability to understand problems will be prepared by this action (Widiawati et al., 2018). This is in line with research results (Elizabeth & Sigahitong, 2018) showing that students who learn using the problem-based learning model show better thinking abilities compared to students who learn using the expository learning model.

Second, there are exercises to guide students through exams both individually and in groups during the third PBL execution period. At this point, students examine and evaluate the critical thinking frameworks they will employ and determine which information is relevant to the critical thinking process. Three specific skills will be developed in this action: examining, breaking down, and assessing. Therefore, third phase PBL activities have the potential to enhance students' critical thinking skills (Amin et al., 2020; Anazifa & Djukri, 2017).

Third, PBL increases students' overall understanding and ability to apply concepts. During the fourth stage of PBL implementation, specifically when generating and addressing problems, understudies develop their scientific skills and generate ideas that they can utilize in the process of critical thinking. Students must develop the problem-solving strategies they have selected by making connections between these concepts and other areas of study or knowledge. Understudies apply all of their limitations and skills related to problem-solving in the critical thinking process, keeping in mind those related to the understudy's critical thinking limit (Utomo et al., 2022; Wijayanto et al., 2023)

Fourth, understudies should review the critical thinking steps that have been introduced and evaluate the reasonableness between these means and the outcomes of the critical thinking process that has been completed during the final PBL period, which focuses on analyzing and evaluating the critical thinking process. At this point, understudies lead a back-and-forth debate to assess the movement's advantages and disadvantages. Students learn how to think critically and express themselves through this (Widiawati et al., 2018).

Sentence structure in PBL is designed to enact students' capacities through activities that can support their HOTS; the problems used in the learning process are also important. The main focus of learning activities is on unstructured problems, which demand a broad range of knowledge and can inspire students to participate in a variety of exploration and investigation activities. (Suherman et al., 2020; Hariadi et al., 2021). Understudies can prepare their logical and assessment skills to determine which disciplines or information are applicable to the problem they will tackle by including a variety of disciplines and information.

In addition, insightful exercises that begin with research, determine the issue's focal point, formulate solutions to problems, assess, and reflect on the comprehension that has been gained have the potential to direct students to revisit the material they have already learned in order to improve their comprehension and make it easier for them to apply it to a variety of situations and problems. Because of this, one of the key factors in determining how to expand understudy HOTS is the characteristics of the issues in PBL.

CONCLUSION

From 2014 to 2023, interest in the development of higher-order thinking skills (HOTS) has increased, as reflected in 230 articles that explore this concept, especially at the elementary school level. HOTS research continues to be carried out widely in various fields, including the exploration of learning model standards. The importance of higher-order thinking skills has been emphasized in five articles, highlighting the role of models, strategies, learning resources, and structured learning frameworks. However, there is still minimal discussion regarding social checks. The use of problem-based learning (PBL) is not only limited to subjects such as science and mathematics but has also been proven to be effective in improving critical thinking skills, especially in general subjects such as social sciences (IPS) at the elementary school level. Through PBL, students engage in solving real-world problems, encouraging in-depth analysis, synthesizing information, and solving complex problems while stimulating critical thinking, creativity, and collaboration, equipping them with essential skills to face real-world challenges.

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