



Increasing Cognitive Abilities Through Problem Solving-Based Learning

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ABSTRACT

Enhancing Cognitive Abilities through Problem-Solving-Based Learning: A Literature Review Education plays a crucial role in the intellectual development of students, and problem-solving-based learning methods have emerged as a promising approach. This research is qualitative research approach with literature review. Literature review is investigates the positive impact of problem-solving-based methods in enhancing students' cognitive abilities across various educational levels. Data analysis technique are reduction data, display data, verification and analysis. The study provides a comprehensive examination of empirical evidence highlighting the key benefits of problem-solving methods, including the development of critical thinking, problem-solving skills, and creativity. Through careful analysis, it is found that this approach has been proven to be effective in improving students' cognitive abilities. The review also encompasses several case studies illustrating successful implementations of problem-solving methods within formal educational contexts. In conclusion, this literature review offers strong evidence of the advantages of integrating problem-solving methods in education. The development of robust cognitive abilities is a vital key to assist students in meeting the demands of the future. Therefore, the findings in this review serve as a foundation supporting the development of curriculum that focuses on strengthening students' cognitive abilities.

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Introduction

Cognitive abilities, which encompass various mental skills such as thinking, learning, memory, problem-solving, and decision-making, are fundamental to human development and functioning. Enhancing these abilities has been a focus of educational research for decades, aiming to improve not only academic performance but also real-world problem-solving skills. One effective approach to fostering cognitive development is through problem solving based learning (PSBL), a pedagogical strategy that engages learners in active problem-solving tasks to enhance their cognitive functions.

Problem-solving-based learning is rooted in the constructivist theory of education, which posits that learners construct knowledge through experiences and interactions with their environment. This approach encourages students to engage deeply with content, think critically, and apply knowledge in practical situations. By actively engaging in problem-solving activities, students develop higher-order thinking skills, including analysis, synthesis, and evaluation, which are crucial for cognitive development.

Research indicates that PSBL not only improves academic performance but also enhances cognitive abilities. For instance, a study by Jonassen (2011) highlighted that problem solving tasks help students develop metacognitive skills, enabling them to regulate their learning processes more effectively. Similarly, a meta-analysis by Hmelo-Silver (2004) found that problem-based learning (a subset of PSBL) significantly enhances students' critical thinking and problem-solving abilities.

Moreover, PSBL can be applied across various educational levels and disciplines, from elementary education to higher education, and in fields ranging from science and mathematics to social sciences and humanities. The versatility and effectiveness of PSBL make it a valuable strategy for educators aiming to develop students' cognitive skills.

Education is the main foundation in students' intellectual development, and educators and educational scientists continue to search for the most effective learning approaches to improve their cognitive abilities. One approach that is gaining increasing attention is problem-solving based learning methods. In a world of rapid change and increasingly complex demands, problem-solving skills, critical thinking and creativity are becoming increasingly important. Problem-solving-based learning, with a focus on developing these skills, is emerging as an attractive alternative in education (Yanti 2023).

This approach encourages students to think independently, explore diverse solutions, and solve real problems in the learning context. In this literature review, we aim to investigate the positive impact of using problem-solving methods in improving students' cognitive abilities. We conducted a careful analysis of the existing empirical literature to identify the main benefits of this approach, including the development of critical thinking skills, problem-solving abilities, and creativity (Hayani, 2021).

We also involve several case studies that describe successful experiences in implementing problem-solving methods in formal education at various levels. In doing so, we hope to provide a deeper understanding of the contribution of problem-solving methods to students' cognitive progress. The findings in this study can play a role in supporting decision making in designing curricula that promote strong cognitive development, facing a challenging future.

Literature Review

1. Learning

The learning process is an educational interaction that occurs between teachers and students in the classroom environment. This process consists of two main activities: the learning conducted by students and the teaching conducted by teachers (Hayani, 2023). The primary goal of this learning process is to create changes in students' knowledge, skills, and understanding (Widodo & Munandar, 2021).

2. Key Components of the Learning Process

According to Corey (as cited in Syaiful, 2020), the learning process is a deliberate effort to create specific conditions in an individual's environment, prompting active involvement in certain behaviors. The learning process occurs in the context of interaction between teachers and students, involving several interrelated components, such as:

- a. Learning Objectives: Goals to be achieved through the learning process.
- b. Role of Educators: Teachers as facilitators and guides.
- c. Role of Students: Students as active participants in the learning process.
- d. Curriculum: The material and structure used for learning.
- e. Learning Strategies: Methods employed to achieve learning objectives.
- f. Learning Media: Tools and resources used to support the learning process.
- g. Learning Evaluation: Processes for assessing and providing feedback on student progress (Sari & Sugiman, 2022).

3. Interaction and Communication in Learning

These interconnected components form what is known as the learning process. This process is crucial in determining student learning success (Utami et al., 2021). Throughout the learning process, beneficial interactions occur between teachers and students to achieve better learning outcomes (Nurjanah et al., 2022).

4. Factors Supporting Learning Effectiveness

Effective communication in the learning process requires various means to convey material and achieve sustainable knowledge change (Hayani, 2023). Therefore, the use of appropriate learning media, student-centered learning strategies, and suitable evaluation methods are essential for creating an optimal learning process (Rahmawati et al., 2020).

5. Student-Centered Approaches

An effective learning process must also consider various factors, such as student characteristics, the learning environment, and the learning context (Wulandari et al., 2021).

Student-centered learning approaches, such as problem-based learning and project-based learning, have proven effective in increasing student engagement and developing higher-order cognitive skills, such as critical thinking and problem-solving (Sulistyawati et al., 2023).

6. Role of Teachers in Learning

The learning process should be designed to actively involve students in constructing their own knowledge and understanding through experiences, explorations, and interactions (Prayogi & Muslim, 2020). Teachers' roles are to facilitate and guide students through this process, providing support and creating learning environments that promote inquiry, collaboration, and the development of cognitive and metacognitive skills (Sari & Sugiman, 2022).

7. Assessment and Feedback

An effective learning process should also incorporate ongoing assessment and feedback mechanisms to monitor student progress, identify areas for improvement, and adjust instructional strategies accordingly (Utami et al., 2021). By considering these aspects, the learning process can become a transformative experience that fosters not only subject mastery but also the development of essential skills and competencies necessary for success in the 21st century (Nurjanah et al., 2022).

Method

The method utilized in this study is qualitative. Qualitative research is an investigative approach aiming to comprehend phenomena or issues deeply by collecting and analyzing descriptive, unstructured data, without quantitative measurements. This method emphasizes narrative data collection, observation, interviews, and textual analysis (Sarwono, 2011).

The primary objective of qualitative research is to achieve a profound understanding of the context, processes, and significance behind the phenomenon being studied. This approach seeks not only to elucidate what occurred but also why and how it transpired. By delving into the social, cultural, and historical context surrounding a phenomenon, qualitative research aids in grasping the complexities and subtleties involved. In qualitative research, researchers endeavor to capture the perspectives, beliefs, values, and experiences of individuals or groups involved in the phenomenon (Sugiyono, 2011).

Through methodologies such as participant observation, in-depth interviews, or textual analysis, alongside the utilization of questionnaires, this research explores the underlying meanings of actions and interactions, as well as investigates how contextual factors influence the phenomena under examination.

Discussion

1. Application of problem-solving learning methods to enhance learning

In the teaching process, educators often encounter various challenges, such as students facing difficulties in understanding learning materials. Therefore, teachers need to adapt learning strategies that cater to the needs and abilities of students, and one effective way to overcome this is by applying problem-solving methods.

The application of problem-solving methods in learning yields significant benefits in improving student learning outcomes. Through group work methods, students are placed as the subjects of learning aimed at honing their critical thinking skills in problem-solving. This method also encourages students to communicate with their peers, enabling them to explore various information sources and engage in discussions, with the hope that students will gain a deeper understanding of the core issues they face.

Problem-solving methods are an effective way to engage students in learning that directly involves them. This method encourages students to actively seek solutions to the problems they face collectively, through collaboration in groups. The result is increased student mastery and better understanding, making learning more meaningful for students. Thus, this method contributes to achieving curriculum goals.

2. Advantages and disadvantages of problem-solving learning methods

Every learning method has its strengths and weaknesses, including problem-solving methods. The advantages of problem-solving methods include:

- a. Enhancing students' critical and creative thinking abilities.
- b. Increasing students' motivation and interest in learning.
- c. Improving students' collaboration skills.

However, problem-solving methods also have drawbacks:

- a. They require a considerable amount of time.
- b. They necessitate competent teachers.

Conclusion

Based on the results and discussions above, it can be concluded that the use of problem-solving methods in the learning process indeed can positively influence students' learning outcomes. The importance of nurturing individuals who are smarter for the nation's progress is supported by delivering materials using learning methods that suit their needs, thus facilitating the improvement of learning outcomes. To achieve targets in accordance with the existing curriculum, the selection

of learning methods must be carefully considered. However, it must be acknowledged that each learning method has its own strengths and weaknesses, including group work methods. Although problem-solving methods emphasize active student participation, teachers must still closely monitor the progress of the learning process. One notable advantage of group work methods is the enhancement of students' social and communication skills through collaboration in problem-solving. Therefore, by utilizing learning methods appropriate to the learning environment and context, educational objectives can be effectively achieved.

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