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PROBLEM-BASED LEARNING TECHNOLOGY AS A TOOL FOR DEVELOPING LOGICAL THINKING SKILLS

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Abstract: This article examines the role of problem-based learning technology in developing students' logical thinking skills. In modern education, fostering learners' ability to analyze, compare, reason, and make evidence-based conclusions has become one of the primary objectives. Problem-based learning creates an educational environment in which students actively participate in solving real-life and educational problems, thereby enhancing their cognitive abilities and logical reasoning. The study analyzes the theoretical foundations, pedagogical significance, and practical implementation of problem-based learning technology. The findings indicate that problem-based learning contributes significantly to the development of critical and logical thinking, independent decision-making, and problem-solving skills.

Keywords: problem-based learning, logical thinking, critical thinking, educational technology, problem-solving, cognitive development, active learning.

Introduction

The rapid development of science and technology in the twenty-first century has significantly transformed educational systems worldwide. Modern society requires individuals who are capable of critical analysis, logical reasoning, problem-solving, and independent decision-making. Consequently, educational institutions are expected not only to provide knowledge but also to cultivate higher-order thinking skills among students.

Logical thinking is one of the essential cognitive abilities that enables learners to analyze information systematically, establish relationships between concepts, evaluate evidence, and draw valid conclusions. The development of logical thinking has become particularly important in an era characterized by information overload and rapid technological advancement.

Traditional teaching methods often emphasize memorization and reproduction of information, which may not adequately promote students' reasoning abilities. In contrast, problem-based learning (PBL) technology encourages students to engage actively with complex problems and seek solutions through inquiry, investigation, and collaboration. This pedagogical approach creates opportunities for learners to develop analytical and logical thinking skills while acquiring subject knowledge.

Problem-based learning originated in medical education during the 1960s and has since been widely adopted across various educational disciplines. The central principle of PBL is that learning occurs through the process of solving authentic and meaningful problems. Students become active participants in the learning process rather than passive recipients of information.

The importance of logical thinking in education cannot be overstated. Logical reasoning enables students to evaluate arguments, identify assumptions, recognize patterns, and solve problems effectively. Educational researchers have emphasized that logical thinking forms the foundation for critical thinking, scientific inquiry, and lifelong learning.

Therefore, investigating the potential of problem-based learning technology in developing logical thinking skills is both theoretically and practically significant. This study aims to explore the pedagogical foundations of problem-based learning and its contribution to enhancing students' logical reasoning abilities.

Literature Review

Problem-based learning has attracted considerable attention from educational researchers over the past decades. Scholars have highlighted its effectiveness in promoting active learning, critical thinking, collaboration, and independent inquiry.

According to educational theorists, learning becomes more meaningful when students encounter real-world problems that require analysis and solution. Problem-based learning encourages learners to construct knowledge through exploration and reflection rather than passive reception of information.

Research findings indicate that students participating in PBL environments demonstrate higher levels of analytical thinking compared to those taught through traditional methods. They develop the ability to identify relationships among concepts, evaluate alternative solutions, and justify their decisions using logical arguments.

Several studies have shown that problem-based learning enhances metacognitive awareness, allowing learners to monitor and regulate their own thinking processes. This self-regulation contributes to the development of logical reasoning and independent learning skills.

Educational psychologists argue that logical thinking develops most effectively when students face cognitive challenges that require systematic analysis. Problem-based learning provides such opportunities by presenting learners with open-ended problems that have multiple possible solutions.

Furthermore, collaborative problem-solving activities encourage students to articulate their reasoning, defend their viewpoints, and evaluate the arguments of others. These interactions contribute significantly to the development of logical and critical thinking skills.

Research Methodology

This study employed a qualitative research approach based on the analysis of educational literature and pedagogical practices related to problem-based learning.

The following research methods were utilized:

Analysis of scientific and pedagogical literature;

Comparative analysis of traditional and problem-based teaching methods;

Observation of educational practices;

Generalization of theoretical findings;

Pedagogical interpretation of research results.

The study focused on identifying the mechanisms through which problem-based learning contributes to the development of logical thinking skills among students.

Results and Discussion

The findings indicate that problem-based learning technology creates favorable conditions for the development of logical thinking through several pedagogical mechanisms.

1. Analysis and Evaluation of Information

In problem-based learning environments, students are required to analyze available information, distinguish relevant facts from irrelevant details, and evaluate the reliability of evidence. These activities strengthen analytical reasoning and logical judgment.

2. Development of Problem-Solving Skills

Problem-based learning requires students to identify problems, formulate hypotheses, test possible solutions, and evaluate outcomes. These stages correspond closely to the processes involved in logical reasoning.

Students learn to approach challenges systematically rather than relying on intuition alone. As a result, they become more capable of making evidence-based decisions.

3. Enhancement of Critical and Logical Thinking

Logical thinking and critical thinking are closely interconnected. Through problem-based learning, students are encouraged to question assumptions, evaluate evidence, and consider alternative perspectives.

Research demonstrates that students engaged in problem-solving activities become more reflective and analytical. They learn to support their conclusions with logical arguments and empirical evidence.

4. Collaborative Learning and Reasoning

Problem-based learning often involves teamwork and collaborative inquiry. During group discussions, students exchange ideas, evaluate arguments, and negotiate solutions.

Such interactions provide opportunities to practice logical reasoning in social contexts. Learners become more aware of different perspectives and improve their ability to construct coherent arguments.

Conclusion

Problem-based learning technology plays a crucial role in developing students' logical thinking skills. By engaging learners in meaningful problem-solving activities, PBL promotes analysis, reasoning, evaluation, and decision-making.

The study demonstrates that problem-based learning enhances students' ability to think logically, solve problems independently, and justify their conclusions through evidence-based arguments. Furthermore, collaborative learning activities within PBL environments contribute to the development of communication and reasoning skills.

Educational institutions should therefore integrate problem-based learning technologies into teaching practices to foster higher-order thinking skills and prepare students for the challenges of modern society. The implementation of PBL can significantly contribute to the formation of intellectually competent, creative, and logically minded individuals.

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