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PROBLEM SOLVING ABILITY: ITS IMPORTANCE, INFLUENCING FACTORS, DEVELOPMENT STRATEGIES, AND IMPACT ON ACADEMIC AND PROFESSIONAL PERFORMANCE

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ABSTRACT

Problem-solving ability is considered one of the most essential competencies required for effective learning, informed decision-making, and successful adaptation to changing environments. In the twenty-first century, individuals regularly encounter academic, professional, technological, and social challenges that demand systematic analysis, logical reasoning, creativity, and sound judgment. Consequently, the development of problem-solving ability has become a major objective of contemporary education and workforce preparation.

This paper examines the concept of problem-solving ability by reviewing its theoretical foundations, educational significance, major influencing factors, and practical strategies for improvement. The discussion highlights that successful problem solving extends beyond intelligence alone; it involves critical thinking, prior knowledge, creativity, motivation, communication, and reflective learning. The paper also explores how educational institutions can cultivate these competencies through learner-centred instructional methods, collaborative activities, inquiry-based learning, and technology-supported teaching practices.

The review suggests that problem-solving ability is a learnable and continuously developing skill rather than an innate characteristic possessed by only a few individuals. Appropriate educational experiences, supportive learning environments, and regular practice enable learners to improve their analytical thinking and decision-making capabilities. Furthermore, strong problem-solving competence contributes significantly to academic success, workplace efficiency, innovation, leadership, and lifelong learning.

Overall, strengthening problem-solving ability is essential for preparing individuals to respond effectively to complex and unpredictable situations. Educational systems should

therefore integrate structured opportunities that encourage critical inquiry, creativity, collaboration, and reflective thinking, thereby equipping learners with the competencies necessary for sustainable personal, academic, and professional development.

KEYWORDS: Problem-solving ability, critical thinking, analytical thinking, decision-making, creativity, education, cognitive skills, lifelong learning.

1. INTRODUCTION

The rapid advancement of science, technology, globalization, and digital communication has transformed the knowledge and skills expected from learners and professionals. Modern society increasingly values individuals who can evaluate information critically, identify challenges, generate innovative solutions, and make informed decisions. Consequently, problem-solving ability has emerged as one of the most important competencies required for academic achievement, professional success, and responsible citizenship [1].

Problem-solving ability refers to the capacity to recognize a problem, understand its underlying causes, analyze relevant information, formulate alternative solutions, select the most suitable option, and evaluate the effectiveness of the chosen solution. It is a structured cognitive process that combines logical reasoning, creativity, experience, and reflective judgment to overcome obstacles and achieve desired objectives [2].

Unlike routine tasks that depend primarily on memorization, effective problem solving requires individuals to apply existing knowledge in unfamiliar situations. It demands flexibility of thought, systematic inquiry, and evidence-based reasoning. Individuals with strong problem-solving skills are generally more capable of adapting to changing circumstances, making informed decisions, and addressing complex issues in both personal and professional contexts [3].

The importance of problem-solving ability has grown considerably with the emergence of knowledge-based economies. Employers consistently identify analytical thinking, creativity, and complex problem solving among the most valuable employability skills. Organizations increasingly seek professionals who can diagnose operational challenges, evaluate multiple alternatives, and develop practical solutions that enhance organizational performance and innovation [4].

Educational institutions have also shifted their focus from traditional memorization-based instruction toward competency-based learning. Contemporary teaching approaches encourage students to investigate real-world issues, participate in collaborative discussions, engage in

project-based learning, and develop independent thinking. Such learner-centred practices enable students to strengthen higher-order cognitive abilities while improving their confidence in solving complex problems [5].

The theoretical foundations of problem solving have been established by several influential scholars. John Dewey described reflective thinking as a disciplined process involving careful observation, inquiry, evidence-based reasoning, and thoughtful judgment. According to Dewey, reflective thinking enables learners to move beyond passive acceptance of information and develop meaningful understanding through systematic investigation [6]. George Pólya further contributed by proposing a four-stage framework consisting of understanding the problem, developing a solution plan, implementing the plan, and reviewing the final outcome. His model continues to guide mathematics education and general problem-solving instruction worldwide [7].

Constructivist educational theory also provides valuable insights into the development of problem-solving ability. According to this perspective, knowledge is actively constructed through interaction with experiences rather than passively received from teachers. Students develop stronger analytical abilities when they participate in authentic learning experiences, collaborative projects, inquiry-based activities, and reflective discussions that require them to apply concepts in practical situations [8].

Research further indicates that problem-solving ability is influenced by numerous cognitive, emotional, social, and environmental factors. Intelligence, motivation, prior knowledge, self-efficacy, emotional regulation, communication skills, family environment, teaching methods, and access to educational resources collectively contribute to an individual's ability to solve problems effectively. Understanding these factors enables educators to design learning environments that foster independent thinking and meaningful learning experiences [9].

In the digital era, problem-solving ability has become increasingly interdisciplinary. Individuals are expected to address challenges related to artificial intelligence, environmental sustainability, healthcare, cybersecurity, business management, and technological innovation. Consequently, educational frameworks worldwide now emphasize critical thinking, creativity, collaboration, communication, and digital literacy as core competencies that support effective problem solving and lifelong learning [10].

Despite its recognized importance, many learners continue to experience difficulties in solving complex problems because educational practices often emphasize rote memorization rather than conceptual understanding and analytical reasoning. Students who receive limited opportunities to investigate, question, experiment, and reflect may struggle when confronted

with unfamiliar situations requiring independent judgment. Therefore, educational institutions must adopt instructional strategies that encourage inquiry, creativity, and evidence-based reasoning to prepare learners for future academic, professional, and societal challenges.

The present paper aims to examine the concept of problem-solving ability, identify the major factors influencing its development, discuss effective methods for enhancing this competency, and evaluate its significance in education, employment, and lifelong personal development.

2. Concept of Problem-Solving Ability

Problem-solving ability is a higher-order cognitive competency that enables individuals to recognize challenges, analyze situations systematically, generate alternative solutions, and implement the most appropriate course of action. It is regarded as a fundamental life skill because individuals continuously encounter academic, professional, social, and personal situations that require effective decision-making. Rather than relying on memorized responses, successful problem solving involves applying knowledge, reasoning, experience, and creativity to unfamiliar or complex situations [11].

Researchers have described problem solving as a goal-directed cognitive process that begins with identifying a problem and concludes with evaluating the effectiveness of the chosen solution. Lovett (2002) explains that problem solving involves three major cognitive processes: representation of the problem, selection of appropriate strategies, and learning from the solution process. These processes enable individuals to refine their thinking and improve future performance through experience [11].

George Pólya's classical framework remains one of the most influential models of problem solving. According to Pólya, effective problem solving consists of four sequential stages: understanding the problem, devising a plan, carrying out the plan, and reviewing the results. Although originally developed for mathematics education, this model has been widely applied in engineering, management, science, healthcare, and educational research because of its practical and systematic nature [12].

John Dewey's theory of reflective thinking also provides a significant conceptual foundation for understanding problem-solving ability. Dewey argued that genuine learning occurs when individuals carefully examine problems, collect relevant evidence, formulate hypotheses, test possible solutions, and evaluate outcomes through reflective inquiry. This process transforms learning from passive memorization into active knowledge construction [13].

From a psychological perspective, problem-solving ability involves multiple cognitive functions working together. These include attention, memory, reasoning, perception, creativity, metacognition, and decision-making. Individuals possessing strong problem-solving abilities demonstrate flexibility in thinking, adaptability to changing situations, and the capacity to evaluate evidence objectively before reaching conclusions [14].

Modern educational research emphasizes that problem-solving ability is not an innate talent restricted to exceptionally intelligent individuals. Instead, it is a competency that develops gradually through education, guided practice, collaborative learning, and continuous reflection. Inquiry-based instruction, project-based learning, case studies, simulations, and real-world applications provide learners with opportunities to strengthen their analytical and decision-making skills [15].

The growing complexity of contemporary society has further increased the significance of problem-solving ability. Professionals working in healthcare, education, engineering, business, public administration, and information technology frequently encounter situations requiring evidence-based decisions under uncertain conditions. Consequently, problem-solving competence has become one of the most desirable employability skills identified by employers worldwide [16].

3. Components of Problem-Solving Ability

Problem-solving ability consists of several interconnected cognitive and behavioural components that collectively enable individuals to respond effectively to challenging situations. These components develop through education, experience, and reflective practice rather than through memorization alone.

3.1 Problem Identification

The first stage of effective problem solving involves accurately recognizing and defining the nature of the problem. Incorrect identification often leads to ineffective solutions because attention is directed toward symptoms rather than underlying causes. Skilled problem solvers carefully gather information, distinguish relevant facts from irrelevant details, and formulate a clear problem statement before attempting a solution [12].

3.2 Critical Thinking

Critical thinking forms the foundation of problem-solving ability. It enables individuals to evaluate evidence objectively, question assumptions, recognize logical relationships, and reach reasoned conclusions. Rather than accepting information at face value, critical thinkers assess the reliability and validity of available evidence before making decisions. Research

consistently demonstrates a positive relationship between critical thinking and successful problem-solving performance across educational settings [17].

3.3 Analytical Reasoning

Analytical reasoning refers to the ability to organize information systematically, identify patterns, compare alternatives, and draw logical conclusions. Individuals with strong analytical skills can simplify complex situations into manageable components, making it easier to evaluate potential solutions. Analytical reasoning is particularly important in scientific research, engineering, financial analysis, and policy development [11].

3.4 Creativity

Creativity contributes significantly to effective problem solving by encouraging the generation of innovative and original solutions. Creative thinking enables individuals to explore multiple perspectives rather than relying solely on conventional approaches. Educational environments that promote brainstorming, inquiry, experimentation, and open discussion often enhance both creativity and problem-solving performance [15].

3.5 Decision-Making

Decision-making represents the stage where individuals evaluate available alternatives and select the most appropriate solution based on evidence, feasibility, and anticipated outcomes. Effective decision-makers consider both short-term and long-term consequences before implementing their chosen strategy. This component is essential for leadership, management, healthcare, and educational administration [16].

3.6 Reflection and Evaluation

The final component involves evaluating the effectiveness of the implemented solution. Reflection enables learners to identify strengths, recognize mistakes, and improve future performance. According to Dewey, reflective thinking transforms experience into meaningful learning by encouraging continuous improvement through self-evaluation [13].

Overall, these components operate as an integrated system rather than independent skills. Individuals who successfully combine critical thinking, analytical reasoning, creativity, decision-making, and reflective evaluation demonstrate greater adaptability when confronted with complex academic and professional challenges.

4. Factors Affecting Problem-Solving Ability

Problem-solving ability is influenced by a combination of cognitive, psychological, educational, social, and environmental factors. These factors interact with one another and determine how effectively an individual can identify problems, analyze information, generate

solutions, and make appropriate decisions. Understanding these determinants is essential for educators, researchers, and policymakers because it helps in designing effective teaching strategies and learning environments that foster higher-order thinking skills.

4.1 Cognitive Ability

Cognitive ability is one of the primary determinants of problem-solving performance. It includes reasoning, memory, attention, information processing, and logical thinking. Individuals with strong cognitive abilities are generally better able to analyze complex situations, recognize relationships among variables, and evaluate multiple alternatives before making decisions. Cognitive flexibility also enables learners to adapt their thinking when conventional approaches fail. Sternberg and Sternberg emphasized that successful problem solving depends on the coordinated functioning of analytical, practical, and creative intelligence, all of which contribute to effective decision-making [18].

4.2 Prior Knowledge and Experience

Previous knowledge provides the foundation for solving new problems. Learners who possess adequate conceptual understanding can relate new information to existing knowledge structures, making it easier to interpret situations and generate appropriate solutions. Experience also improves problem-solving efficiency because individuals learn from previous successes and failures. According to Bransford, Brown, and Cocking, meaningful learning occurs when learners actively connect new experiences with prior knowledge, enabling them to transfer learning to unfamiliar situations [19].

4.3 Academic Motivation

Motivation significantly influences the willingness of individuals to engage in challenging tasks. Highly motivated learners invest greater effort, persist when difficulties arise, and actively search for alternative solutions. Conversely, low motivation often results in avoidance of complex tasks and reduced persistence. Recent research has demonstrated that academic motivation positively predicts both critical thinking and problem-solving ability, suggesting that motivated learners are more likely to develop higher-order cognitive skills [20].

4.4 Self-Efficacy

Self-efficacy refers to an individual's belief in their capability to perform specific tasks successfully. Learners with high self-efficacy approach problems with greater confidence, demonstrate resilience during failure, and employ more effective learning strategies. Numerous studies indicate that self-efficacy has both direct and indirect effects on problem-

solving ability through critical thinking and metacognitive processes. Students who believe in their abilities are more likely to persist until satisfactory solutions are achieved [21].

4.5 Critical Thinking

Critical thinking enables individuals to evaluate evidence objectively, identify assumptions, distinguish facts from opinions, and make logical judgments. It serves as one of the strongest predictors of successful problem-solving performance because it encourages systematic analysis rather than impulsive decision-making. Research has consistently shown that students with well-developed critical thinking dispositions demonstrate superior problem-solving skills across various academic disciplines [22].

4.6 Creativity

Creativity enhances problem-solving ability by encouraging individuals to generate original and innovative solutions. Creative thinkers explore multiple possibilities, challenge conventional assumptions, and develop alternative strategies for addressing complex situations. Modern educational practices increasingly integrate creativity with inquiry-based learning because both competencies contribute significantly to innovation and effective decision-making [20].

4.7 Teaching Methods and Learning Environment

Educational practices play a crucial role in developing problem-solving ability. Traditional lecture-based instruction often emphasizes memorization, whereas learner-centred approaches encourage inquiry, collaboration, experimentation, and reflective thinking. Methods such as project-based learning, case studies, simulations, cooperative learning, and problem-based learning provide authentic opportunities for students to develop analytical and decision-making skills. A supportive classroom environment further encourages learners to ask questions, explore ideas, and learn from mistakes without fear of failure [19].

4.8 Family and Social Environment

The family environment significantly influences the development of problem-solving skills. Parents who encourage independent thinking, curiosity, and responsible decision-making help children develop confidence in addressing challenges. Similarly, positive peer interactions and collaborative learning experiences expose students to diverse viewpoints, enhancing their ability to evaluate multiple perspectives before selecting appropriate solutions. Social support therefore contributes to both cognitive and emotional aspects of problem solving.

4.9 Technology and Digital Learning Resources

The widespread availability of digital technologies has transformed the way individuals acquire and apply problem-solving skills. Educational software, virtual laboratories, online simulations, artificial intelligence tools, and interactive learning platforms provide learners with opportunities to practice solving authentic problems in dynamic environments. Technology also promotes self-directed learning by allowing learners to access information, evaluate evidence, and collaborate with others regardless of geographical location. However, effective use of technology requires digital literacy and critical evaluation of online information sources.

4.10 Emotional Intelligence and Stress Management

Emotional intelligence influences an individual's ability to remain calm, regulate emotions, and make rational decisions under pressure. High levels of stress or anxiety may impair concentration, reasoning, and judgment, thereby reducing problem-solving effectiveness. Individuals with stronger emotional regulation are generally better able to analyze problems objectively, communicate effectively with others, and persist despite obstacles. Consequently, emotional intelligence is increasingly recognized as an important component of successful problem solving in educational and workplace settings.

SUMMARY

Problem-solving ability develops through the interaction of multiple personal and environmental factors rather than through intelligence alone. Cognitive ability, prior knowledge, motivation, self-efficacy, critical thinking, creativity, educational practices, family support, technological resources, and emotional intelligence collectively influence an individual's capacity to solve problems effectively. Educational institutions should therefore adopt comprehensive instructional strategies that strengthen these factors simultaneously to prepare learners for the complex challenges of modern society.

5. Strategies for Improving Problem-Solving Ability

Problem-solving ability can be enhanced through systematic instruction, continuous practice, and supportive learning environments. Modern educational research emphasizes that effective problem-solving skills are developed when learners actively engage in authentic tasks that require reasoning, creativity, collaboration, and reflection. Consequently, educational institutions should adopt instructional approaches that move beyond rote memorization and encourage students to become active participants in the learning process.

5.1 Problem-Based Learning (PBL)

Problem-Based Learning (PBL) is one of the most effective instructional approaches for developing problem-solving ability. In this method, students work collaboratively to solve real-life or simulated problems while applying theoretical knowledge to practical situations. PBL promotes independent learning, analytical reasoning, communication, and teamwork. Research has shown that students exposed to problem-based learning demonstrate higher levels of critical thinking and problem-solving competence than those taught through traditional lecture-based methods [23].

5.2 Critical Thinking Activities

Critical thinking serves as the foundation of effective problem solving. Teachers should encourage learners to analyze evidence, evaluate arguments, compare alternative viewpoints, and justify their decisions using logical reasoning. Classroom activities such as debates, case analyses, reflective discussions, and inquiry-based assignments help students strengthen their critical thinking skills, which directly contribute to better problem-solving performance [24].

5.3 Collaborative Learning

Collaborative learning provides opportunities for students to exchange ideas, discuss alternative solutions, and learn from diverse perspectives. Working in groups enables learners to improve communication skills, negotiate solutions, and develop greater confidence in addressing complex problems. Cooperative learning also enhances creativity by exposing students to different ways of thinking and reasoning [25].

5.4 Technology-Enhanced Learning

Digital technologies have significantly expanded opportunities for developing problem-solving ability. Virtual laboratories, educational simulations, interactive software, artificial intelligence tools, and online collaborative platforms allow learners to solve authentic problems in dynamic environments. Technology-supported learning also encourages self-directed learning, immediate feedback, and continuous improvement of analytical skills [26].

5.5 Reflective Practice

Reflection is an essential component of effective problem solving because it enables learners to evaluate the effectiveness of their decisions and identify areas for improvement. Reflective journals, portfolios, self-assessment, and peer feedback encourage learners to analyze their thinking processes and learn from previous experiences. Reflection promotes metacognition, enabling students to regulate their learning strategies more effectively [27].

5.6 Creativity-Oriented Instruction

Educational environments that encourage brainstorming, innovation, experimentation, and open-ended inquiry contribute significantly to the development of creative problem-solving skills. Teachers should create classroom environments where students feel comfortable proposing original ideas without fear of criticism. Recent meta-analytic evidence indicates that problem-solving pedagogy has a significant positive effect on learners' creativity across educational settings [28].

6. Importance of Problem-Solving Ability in Education and Professional Life

Problem-solving ability has become an indispensable competency in contemporary education and employment. In educational settings, it enables students to understand concepts deeply, apply knowledge to unfamiliar situations, and develop independent learning habits. Students with strong problem-solving skills generally demonstrate higher academic achievement because they are capable of analyzing information critically, integrating knowledge from multiple disciplines, and making informed decisions.

In professional environments, employers consistently identify problem-solving as one of the most valuable workplace competencies. Professionals encounter challenges that require evidence-based decisions, innovation, adaptability, and effective communication. Employees who possess strong problem-solving skills contribute to improved organizational productivity, higher-quality decision-making, enhanced customer satisfaction, and continuous organizational improvement [29].

Problem-solving ability also promotes leadership development. Effective leaders analyze complex situations objectively, evaluate risks, manage uncertainty, and make strategic decisions that benefit organizations and society. Furthermore, the rapid advancement of digital technologies has increased the demand for professionals capable of solving interdisciplinary problems involving artificial intelligence, sustainability, cybersecurity, healthcare, engineering, and business management.

Beyond education and employment, problem-solving ability contributes to personal development by improving confidence, resilience, emotional regulation, and decision-making in everyday life. Individuals who possess effective problem-solving skills are generally better prepared to adapt to changing circumstances, resolve interpersonal conflicts, and make responsible life choices.

7. CONCLUSION

Problem-solving ability is one of the most essential higher-order cognitive skills required for success in the twenty-first century. It enables individuals to identify challenges, analyze information systematically, evaluate alternative solutions, and implement appropriate decisions across academic, professional, and personal contexts. The literature reviewed in this paper demonstrates that problem-solving ability is influenced by multiple interacting factors, including cognitive ability, prior knowledge, motivation, self-efficacy, creativity, critical thinking, educational practices, and supportive learning environments.

The review further indicates that effective instructional approaches such as problem-based learning, collaborative learning, inquiry-based teaching, reflective practice, and technology-enhanced education significantly improve learners' problem-solving competence. Educational institutions should therefore prioritize learner-centered pedagogies that encourage active participation, creativity, critical inquiry, and continuous reflection.

As societies become increasingly dependent on innovation and knowledge-based economies, problem-solving ability will remain a fundamental competency for lifelong learning and sustainable development. Future educational policies should continue emphasizing the systematic development of higher-order thinking skills so that learners are equipped to address the complex challenges of an ever-changing global environment.

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