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Problem-Solving Skills Among 21st-Century Learners Toward Creativity and Innovation Ideas

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ABSTRAK

Di abad ke-21, inovasi dan kreativitas menjadi semakin penting untuk kesuksesan baik di lingkungan akademik maupun profesional. Untuk mempromosikan inovasi dan kreativitas, penting untuk memprioritaskan pengembangan keterampilan pemecahan masalah di kalangan peserta didik. Studi ini bertujuan untuk menganalisis keterampilan pemecahan masalah dalam mempromosikan inovasi dan kreativitas dan memberikan model teoritis kunci untuk mengembangkan keterampilan ini. Metode yang digunakan dalam penelitian ini adalah Systematic Literature Review. Peneliti mengumpulkan artikel jurnal dari Google Scholar, Research Gate, SINTA, Scopus, dan Web of Science. Hasilnya ditemukan keterampilan pemecahan masalah memungkinkan peserta didik untuk menganalisis masalah yang kompleks, mengembangkan solusi kreatif, dan menerapkan solusi tersebut secara efektif. Salah satu model teoritis kunci yang mendukung keterampilan pemecahan masalah adalah model Creative Problem Solving (CPS). Model CPS terdiri dari enam tahap: memahami masalah, menghasilkan ide, mengembangkan solusi, merencanakan tindakan, mengambil tindakan, dan mengevaluasi hasil. Memprioritaskan keterampilan memecahkan masalah di antara peserta didik telah dikaitkan dengan prestasi akademik, kesuksesan di dunia kerja, dan tingkat inovasi dan kreativitas yang lebih tinggi.

ABSTRACT

In the 21st century, innovation and creativity are becoming increasingly important for success in both academic and professional settings. To promote innovation and creativity, it is essential to prioritize the development of problem-solving skills among learners. This study aims to analyze the problem-solving skills in promoting innovation and creativity and provides a key theoretical model for developing these skills. The method used in this research is Systematic Literature Review. Researchers collected journal articles from Google Scholar, Research Gate, SINTA, Scopus, and Web of Science. The result found problem-solving skills enable learners to analyze complex problems, develop creative solutions, and implement those solutions effectively. One key theoretical model that supports problem-solving skills is the Creative Problem Solving (CPS) model. The aCPS model consists of six stages: understanding the problem, generating ideas, developing solutions, planning for action, taking action, and evaluating results. Prioritizing problem-solving skills among learners has been linked to academic achievement, success in the workforce and higher levels of innovation and creativity.

1. INTRODUCTION

Creative thinking and problem-solving abilities are adaptable tools used for handling a variety of unfamiliar situations in a flexible way that strengthens adaptive and constructive behavior. The 21st century is characterized by rapid technological advancements, globalization, and a highly dynamic and complex environment (Muhali, 2019; Qurat-ul-Ain et al., 2019; Stuchlikova, 2016). These changes have created a need for learners to develop a set of skills that enable them to adapt to new challenges and opportunities. Innovation and creativity are two essential skills that learners need to thrive in the 21st century (A. P. Astuti et al., 2019; Hatamleh, 2015; Wangi et al., 2018). However, promoting innovation and creativity among learners is a complex process that requires educators to prioritize problem-solving skills.

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Prioritizing innovation and creativity can help learners develop the skills they need to succeed in the 21st century. Innovation is the development or practice of new ideas to benefit individuals, teams or a broader range of society (Asmahasanah et al., 2018; Chalkiadaki, 2018; Lee, 2016). Creativity is closely linked to problem-solving skills and can be promoted by providing learners with opportunities for creative expression and exploration (A. P. Astuti et al., 2019; Hawari & Noor, 2020; Rahmatullah et al., 2022). Encouraging learners to think outside the box, take risks and experiment with new ideas can promote both creativity and problem-solving skills. Promoting problem-solving skills among 21st-century learners requires a multifaceted approach that incorporates instructional strategies, social and emotional learning, metacognition and creativity (Irwanto et al., 2018; Kartini et al., 2021).

By prioritizing problem-solving skills, educators can help learners develop the skills they need to succeed in both academic and professional settings. To deal with the difficulties that arise throughout the process of innovation and creativity, problem-solving abilities play a critical role in encouraging innovation and creativity among learners (Rahman, 2019; Rosa, 2020). These abilities may include adaptation, teamwork, critical thinking and creativity. Instructors may employ a variety of tactics to get over resource constraints, cultural hurdles and resistance to change by recognizing the difficulties in encouraging innovation and creativity in students (A. P. Astuti et al., 2019; Kivunja, 2014; Rahman, 2019). These methods could involve technological integration, cross-disciplinary cooperation, project-based learning and experiential learning.

Learners can use problem-solving skills to identify the needs of their communities and develop innovative solutions to address those needs (Kwangmuang et al., 2021; Sumarno, 2019). Other factors such as motivation, curiosity and passion, may also play a crucial role in promoting innovation and creativity among learners (Jalinus et al., 2019; Murtiyasa & Al Karomah, 2020). Previous study emphasizes that creativity is not just about generating ideas but also about developing and implementing those ideas (Pawar et al., 2020). Therefore, it suggests that creativity involves both divergent thinking to generate a wide range of ideas and convergent thinking to evaluate and select the best ideas for implementation.

Innovation and creativity are essential skills for learners in the 21st century. These skills enable learners to identify new opportunities, create new products and services, and solve complex problems. Innovation and creativity are also essential for economic growth, job creation and improving the quality of life (Asimiran & Ismail, 2019; Nagarajan et al., 2005). Therefore, educators need to prioritize innovation and creativity among learners to prepare them for the future. There is a growing body of evidence that supports the argument for prioritizing problem-solving skills among 21st-century learners. A meta-analysis of research on problem-based learning found that students who engaged in problem-solving activities performed better on tests of critical thinking, problem-solving, and content knowledge than those who did not (Dochy et al., 2003). Therefore the aim of this study is to analyze the problem-solving skills in promoting innovation and creativity and provides a key theoretical model for developing these skills.

2. METHOD

The method used in this research is Systematic Literature Review (SLR). SLR is a method of identifying, evaluating, and interpreting all available research that is relevant to the formulation of the problem and the topic area studied (Chalkiadaki, 2018; Liu et al., 2021). Using the SLR method will be able to systematically review and identify an article in each process following the steps or stages that have been determined**.** This theoretical paper draws on existing literature and research on problem-solving skills, creativity and innovation to develop a framework for prioritizing problem-solving skills among learners. The framework is designed to integrate creativity and innovation into the learning process with a focus on developing learners' problem-solving skills in a way that fosters creativity and innovation. Researchers collected journal articles from Google Scholar, Research Gate, SINTA, Scopus, and Web of Science. The keywords in this research are creative problem-solving skills.

3. RESULT AND DISCUSSION

Result

Framework for Problem-Solving

Comprehensive framework for creative problem-solving that emphasizes the importance of understanding problems from multiple perspectives, generating a wide range of potential solutions and creating a supportive environment for creativity (Laar et al., 2020; Muhali, 2019). The framework consists of three phases: problem finding, idea finding and solution finding. In the problem-finding phase, individuals or teams identify and define the problem. This involves gathering information, clarifying the scope of the problem, and identifying any constraints or limitations. In the idea-finding phase, individuals

or teams generate a wide range of potential solutions. This involves brainstorming ideas without judgment or criticism and considering different perspectives and approaches. Previous study emphasize the importance of divergent thinking in this phase which involves generating a large number of unique ideas (Fauziah et al., 2020). In the solution-finding phase, individuals or teams evaluate the potential solutions generated in the previous phase and select the most promising ones. This involves convergent thinking which involves narrowing down and selecting the most feasible and effective solutions. The importance of creating a supportive environment for creative problem-solving (Baran et al., 2021). Individuals or teams need to feel comfortable taking risks and expressing their ideas without fear of criticism or rejection. They suggest that a supportive environment can be created through effective leadership, training, and communication.

Theoretical Model That Supports Problem-Solving Skills

The Creative Problem Solving (CPS) model has been used in education to help students develop problem-solving skills and to promote creativity and innovation in the classroom. CPS is a theoretical model that supports problem-solving skills. It consists of six stages: understanding the problem, generating ideas, developing solutions, planning for action, taking action and evaluating results (Bravo et al., 2021; Mee Mee et al., 2020). The CPS model is a powerful tool that can help individuals and teams to approach problems in a structured and effective way, leading to successful outcomes. The first stage of the CPS model is understanding the problem (Chai & Kong, 2017; Simanjuntak et al., 2021). This stage involves identifying the key issues, defining their scope and gathering relevant information. Comprehension of the issue is essential for arriving at a solution. Similarly, previous study emphasize the importance of understanding the problem from different perspectives including the stakeholders' points of view (A. A. I. Y. Astuti et al., 2020). The second stage of the CPS model is generating ideas. In this phase, individuals or groups generate potential solutions to the issue. The objective of this phase is to produce as many ideas as you can without passing judgment or offering critique.

An essential element of creative thinking is the capacity for idea generation which comes up with a variety of original ideas in answer to a challenge. Previous study supported that techniques such as brainstorming, mind mapping and scamper can be used to encourage divergent thinking and generate novel solutions (Fauziah et al., 2020; Myszkowski & Storme, 2021). Creating solutions is the third stage of the CPS model. In this stage, individuals or groups assess the ideas produced in the stage before and choose the most promising ones. These concepts are then developed and refined into practical answers. According to other study the development of solutions requires both convergent and divergent thinking (Fauziah et al., 2020; Larsen, 2022). Convergent thinking involves narrowing down and selecting the most promising ideas while divergent thinking involves generating and exploring a wide range of possible solutions. The fourth stage of the CPS model is planning for action. In this stage, individuals or teams develop a plan of action for implementing the selected solution. This plan includes identifying the necessary resources, establishing a timeline, and assigning responsibilities.

The fifth stage of the CPS model is taking action. In this stage, individuals or teams implement the plan of action developed in the previous stage. This involves putting the solution into practice and addressing any obstacles or challenges that arise (Takaria & Rumahlatu, 2016; Van Hooijdonk et al., 2020). According to previous study taking action is a critical component of the CPS model (Takaria & Talakua, 2018; Van Hooijdonk et al., 2020). The sixth and final stage of the CPS model is evaluating results. In this stage, individuals or teams assess the effectiveness of the solution and identify any areas for improvement. This stage involves reflecting on the entire CPS process and learning from the experience. Evaluation is critical to the success of the CPS model. In conclusion, the CPS model is a powerful tool that supports problem-solving skills and can be applied to a wide range of problems and situations, making it a valuable tool for individuals and teams in various fields and industries.

Role and Challenge of Problem-Solving Skills in Promoting Innovation and Creativity

Problem-solving skills are essential in promoting innovation and creativity among learners. These skills enable learners to identify and address challenges that arise in the process of innovation and creativity. Critical thinking, creativity, teamwork, adaptability and communication are some examples of problem-solving abilities (Lely et al., 2020; Wiradarma et al., 2021). Critical thinking is the ability to analyze and evaluate information, ideas, and arguments. Critical thinking enables learners to identify assumptions, biases, and inconsistencies in arguments (Susilo et al., 2019; Yusuf, 2018). It also enables learners to identify alternative solutions to problems. Creativity is the ability to generate new ideas and solutions. Creativity enables learners to develop innovative solutions to problems. It also enables learners to think outside the box and come up with new and original ideas (Pawar et al., 2020; Tierney & Farmer, 2011). Collaboration is the ability to work effectively with others. Collaboration enables learners to share ideas, knowledge, and

skills. It also enables learners to work together to solve complex problems (Faruq et al., 2021; Hawari & Noor, 2020). Communication is the ability to express ideas clearly and effectively. Communication enables learners to convey their ideas to others. It also enables learners to listen to others and understand their perspectives. Adaptability is the ability to adapt to new situations and environments. Flexible learners can respond to fresh chances and challenges. Additionally, it enables students to gain knowledge from their errors and failures.

Promoting innovation and creativity among learners is not an easy task. Educators deal with a variety of difficulties that impede the growth of these abilities. These challenges may include limited resources, cultural barriers, and resistance to change. For instance, limited resources can hinder the implementation of innovative teaching methods such as project-based learning (Norahmi, 2017; Sivarajah et al., 2019). Cultural barriers can also hinder the adoption of new ideas and practices, such as entrepreneurship education. Resistance to change can also be a significant challenge, especially in traditional education systems that prioritize rote learning.

Strategies for Promoting Problem-Solving Skills

Educators can use various strategies to promote problem-solving skills among learners. These strategies may include project-based learning, experiential learning, cross-disciplinary collaboration and technology integration. Project-based learning involves learners working on real-world projects that require them to apply problem-solving skills. Project-based learning enables learners to develop critical thinking, creativity, collaboration, and communication skills (Misla & Mawardi, 2020; Tika & Agustiana, 2021). Experiential learning involves learners learning through direct experience. Experiential learning enables learners to develop adaptability and problem-solving skills. It also enables learners to apply their knowledge and skills in real-world situations. Cross-disciplinary collaboration involves learners working with others from different disciplines. Cross-disciplinary collaboration enables learners to develop collaboration and communication skills. It also enables learners to learn from others with different perspectives and backgrounds. Technology integration involves using technology to enhance learning. Technology integration enables learners to develop adaptability and problem-solving skills. It also enables learners to access information and resources that were previously unavailable.

Discussion

Previous study investigate the impacts of mobile learning participation time on students' conceptions of cooperation, communication, difficult problem-solving, meta-cognitive awareness and creativity using a sample of 606 high school students from ten high schools in Taiwan (Lai & Hwang, 2014). The web-based questionnaire was developed and responded to by students from 10 high schools in Taiwan. The correlation and stepwise regression of the 5C competencies of the students who engaged in mobile learning activities for a shorter time and a longer time were analyzed. It is found that Collaboration and Communication were positively correlated to Complex problem-solving. This result indicates that the more time students engaged in mobile learning activities, the better their communication, complex problem-solving and creativity abilities were.

Other study investigate how a group of junior-high-school pupils created a functional boat from scratch and resolved the problems encountered in a scientific project (Shieh & Chang, 2014). The study was conducted using interviews, observations and self-refection reports. The results of the study show that students' creative and problem-solving skills were enhanced and their understanding of the value of teamwork was increased through practical learning that involved trial and error. It discloses that turning a model work into a functional piece demands a certain extent of scientific knowledge and skills associated with the tasks, in addition to creative skills. It was discovered that there were significant differences between teams in the students' expectations of the teacher's scaffolding to accomplish the project goal, pointing to a conundrum regarding the instructors' role in an open-form scientific project. Other study state students' creative problem-solving ability using a project-based learning approach (Chen & Chang, 2021). The study was based on a quasi-experimental design and the participants were 69 postgraduate students in the field of education management. The outcomes demonstrated that project-based learning had significantly improved the student's creative problem-solving skills, particularly in terms of identifying issues, coming up with solutions, and assessing them.

The three goals of the study survey were to investigate the creative problem-solving abilities of high school students; investigate any relationships between the sub-dimensions of creative problem-solving abilities; and assess whether the creative problem-solving abilities of high school students differ by gender, school type, and grade level (Keleş, 2022). The creative problem-solving attribute inventory was used to select 435 high school students. There was no discernible gender or educational setting difference

in creative problem-solving abilities. Only a minor degree of divergent and convergent thinking, motivation, general knowledge, and skills was found to be influenced by grade level.

This research implies that it is important to prioritize the development of problem solving skills among 21st century learners. In an era filled with challenging complexes, the ability to identify problems, analyze situations, and come up with creative solutions is essential. The limitations of this study cannot be directly applied to all contexts and populations. This limitation may be related to the sample size used in the study or the characteristics of the students studied. Therefore, it is important to look at other studies that examine these implications in different contexts.

4. CONCLUSION

In conclusion, promoting innovation and creativity among 21st-century learners is essential for preparing them for the future. Problem-solving skills are essential in promoting innovation and creativity among learners. Educators can use various strategies to promote problem-solving skills, such as project-based learning, experiential learning, cross-disciplinary collaboration, and technology integration. However, educators need to consider other factors, such as motivation, curiosity, and passion, when promoting innovation and creativity among learners. By prioritizing problem-solving skills, educators can help learners develop the skills they need to succeed in the 21st century.

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