

The Importance of Artificial Intelligence in Fostering Students' Creative Interest in the Vocational Education System

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ABSTRACT

The development of the Fourth Industrial Revolution has increased the need for vocational education to equip students with creativity, critical thinking, problem-solving skills, and technological adaptability. This study aims to analyze the importance of Artificial Intelligence (AI) in developing students' creative interests in vocational education and to identify opportunities and challenges associated with its implementation. This study employed a qualitative approach using library research. Data were obtained from relevant journal articles, academic books, and previous studies concerning AI in education, vocational education, adaptive learning, creativity, and educational technology. The literature was analyzed using content analysis through information reduction, thematic categorization, interpretation, and synthesis. The findings indicate that AI can support creative interest through personalized and adaptive learning, interactive learning environments, timely feedback, idea exploration, and problem-solving activities. AI can also strengthen practical learning and students' readiness for technology-oriented workplaces. However, its implementation is constrained by teacher readiness, infrastructure, technology costs, unequal access, digital literacy, ethical concerns, and potential student dependency. Therefore, AI should function as a learning support that strengthens human thinking and creativity rather than replacing teachers or students' independent thinking.

Keywords: *Adaptive Learning, Artificial Intelligence, Creativity, Creative Interest, Vocational Education.*

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1. | INTRODUCTION

The development of the Fourth Industrial Revolution has brought fundamental changes to various sectors of life, including education. This transformation demands not only mastery of knowledge and technical skills, but also the ability of students to think creatively, adaptively, and critically, and to utilize technology productively. In the context of vocational education, these demands are becoming increasingly important because graduates are being prepared to enter a workforce that is constantly changing due to digitalization, automation, and the development of artificial intelligence (AI). Avis (2018) explains that technological transformation in the Fourth Industrial Revolution has direct implications for vocational education and training, particularly regarding the need to align students' competencies with changes in the work environment. Artificial intelligence is a technology that enables computer systems to analyze data, learn, make decisions, and generate recommendations based on specific patterns. In education, AI functions not only as an automation tool but can also be used as a learning technology that supports a more personalized, interactive, and learner-centered learning experience (Chen et al., 2020).

The development of AI in education also reflects a shift from using technology as a simple aid toward systems capable of providing adaptive and responsive learning support tailored to students' needs (Roll & Wylie, 2016). Chassignol et al. (2018) note that the development of AI in education encompasses various forms of application, including intelligent tutoring systems, interactive learning environments, and technologies that facilitate the learning process. One important aspect that needs attention in vocational education is fostering students' creative interests. Creativity in vocational education is not only related to the ability to generate new ideas but also to the ability to identify problems, find alternative solutions, develop ideas, and apply knowledge to solve real-world problems. Therefore, vocational learning requires an environment that provides space for students to experiment, explore ideas, and develop problem-solving skills. Holmes et al. (2019) position AI as a technology with the potential to support the learning process through personalization, feedback, and support for a learning process better tailored to students' needs.

AI is also closely linked to the concept of personalized learning an educational approach that allows learning materials, activities, and difficulty levels to be tailored to students' individual characteristics. Luckin and Holmes (2016) explain that the use of AI can help create an educational system better equipped to respond to individual needs. In vocational education, this approach has the potential to provide students with opportunities to learn according to their individual abilities and paces, while also encouraging their engagement in more relevant learning activities. Advances in AI have also spurred increased attention toward developing students' AI competencies. Chiu et al. (2021) highlight the importance of developing an AI curriculum for students through instructional designs that systematically introduce AI concepts and applications.

Meanwhile, Zawacki-Richter et al. (2019) note that research on AI in education has expanded across various application areas, although there remains a need to strengthen educators' involvement in its development and implementation.

Although it offers a wide range of opportunities, the implementation of AI in education is not without challenges. Pedro et al. (2019) emphasize the importance of considering educators' readiness, infrastructure, access to technology, ethical considerations, and users' ability to utilize AI responsibly. These challenges are becoming increasingly relevant with the rise of generative AI, such as ChatGPT, which can facilitate idea exploration and self-directed learning but may also foster dependency if students lack adequate critical thinking skills and digital literacy (Kasneci et al., 2023). Based on this discussion, AI holds significant potential in supporting the development of students' creative interests through personalized learning, interactive learning environments, feedback, and the development of problem-solving skills. However, its use in vocational education must be positioned as a tool that strengthens students' thinking processes and creativity, rather than replacing the human role in the learning process. Therefore, this article aims to analyze the importance of artificial intelligence in fostering students' creative interests within the vocational education system and to identify the opportunities and challenges of its implementation in improving the quality of learning in the era of digital transformation.

2. | RESEARCH METHOD

This study employs a qualitative approach using library research to analyze the importance of artificial intelligence (AI) in fostering students' creative interests within the vocational education system. This method was chosen because the research focus is conceptual and aims to identify, compare, and synthesize various research findings regarding the use of AI in learning, vocational education, creativity, and adaptive learning. The library research approach also allows the study to gain a more comprehensive understanding of the opportunities and challenges of AI implementation based on previous research findings. The research data consists of secondary data obtained from scientific journal articles, academic books, and literature reviews relevant to the research topic. The analyzed literature includes publications on AI in education, vocational education, adaptive learning, student creativity, and the development of educational technology in the era of the Fourth Industrial Revolution.

Key references include studies by Roll and Wylie (2016), Luckin and Holmes (2016), Avis (2018), Chassignol et al. (2018), Chen et al. (2020), Chiu et al. (2021), Rosyadi et al. (2023), as well as more recent studies on AI in vocational education (Azizah et al., 2025; Dinata et al., 2025; Harleni et al., 2025). Data collection was conducted through the identification, selection, and review of relevant literature using the keywords "artificial intelligence in education," "vocational education," "creative learning," "adaptive learning," and "AI in vocational education." The literature was selected based on its alignment with the research focus, the credibility of the sources, and its contribution to explaining the relationship between AI, vocational learning, and

the development of students' creativity. The analysis process utilized content analysis techniques through the stages of information reduction, theme categorization, interpretation, and synthesis of findings.

The analysis results were then grouped into several main themes: the role of AI in vocational learning; AI as a support for personalized and adaptive learning; AI's contribution to creativity and problem-solving; the application of AI in practice-based learning environments; and the opportunities and challenges of its implementation. A synthesis of these themes is used to explain how the use of AI can support the development of students' creative interests while identifying conditions that must be considered to ensure its effective and responsible implementation in vocational education.

3. | RESULTS AND DISCUSSION

The study's findings indicate that artificial intelligence (AI) holds strong potential to support the transformation of vocational education, particularly in creating learning processes that are more adaptive, interactive, and oriented toward students' needs. The advancements of the Fourth Industrial Revolution have reshaped the demands on vocational education, as the workforce is increasingly influenced by automation, digitization, and the use of smart technologies. Under these circumstances, vocational education must not only equip students with technical skills but also develop their critical thinking, creativity, problem-solving, and ability to adapt to technological changes. Avis (2018) emphasizes that technological changes in the Fourth Industrial Revolution have implications for vocational education and training because the competencies required by the workforce are also evolving. Thus, the integration of AI into vocational education can be understood as part of the process of adapting education to an increasingly digitized work environment.

AI offers opportunities to develop learning experiences that are not only focused on delivering content but also on creating learning experiences that are more responsive to students' needs. Chen et al. (2020) explain that AI in education can be used to support various learning processes, including the analysis of learning data, the provision of recommendations, and the development of more personalized learning systems. This aligns with Roll and Wylie (2016), who note that the development of AI in education has shifted from serving as a supporting technology to becoming a system capable of responding to students' learning activities and needs. In vocational education, this capability is particularly important because students possess varying levels of ability, practical experience, and competency needs.

More personalized learning can contribute to the development of students' creative interests. Luckin and Holmes (2016) explain that AI enables educational systems to provide support that is better tailored to individual characteristics and needs. When students receive materials and activities suited to their skill levels, the opportunities for them to actively engage in the learning process increase. These conditions can provide

students with the space to explore ideas, try various approaches, and develop solutions to the problems they face. In the context of vocational education, this process is particularly relevant because learning is fundamentally closely tied to solving practical problems and applying competencies in situations that resemble the workplace.

The development of creativity can also be supported through the use of interactive, AI-based learning environments. Chassignol et al. (2018) identified various developments in AI in education, including intelligent tutoring systems, educational games, and learning environments that enable more dynamic interactions. The use of such technology can provide a learning experience that differs from conventional learning because students have the opportunity to explore and receive feedback on their activities. Creativity in vocational education is not merely demonstrated through the ability to generate unique ideas, but also through the ability to use knowledge and skills to find alternative solutions to problems. Therefore, learning environments that allow for exploration and experimentation can serve as a means to foster creative interest.

AI also plays a role in helping educators provide feedback on students' learning progress. Holmes et al. (2019) explain that AI has the potential to support the teaching and learning process through personalization, learning analytics, and the provision of support for the learning process. In vocational education, feedback is a crucial component because students need to know their level of success in performing a procedure, completing a task, or producing a product. Feedback provided more promptly can help students identify mistakes and improve their work. This iterative improvement process can encourage students not to settle for a single answer but to try other alternatives, thereby fostering the development of problem-solving skills and creativity.

In addition to supporting individual learning, AI also holds potential for developing competencies directly related to technology. Chiu et al. (2021) highlight the importance of developing an AI curriculum for students through systematically designed learning. This indicates that students need not only to be users of AI but also to understand its concepts, functions, and applications. In vocational education, this understanding becomes increasingly important because graduates will face work environments that are likely to increasingly rely on automated systems and AI-based technologies. Mastery of AI can be part of the digital competencies that support students' readiness to face changing job requirements.

Developments in AI research in vocational education also indicate a growing focus on this technology. Rosyadi et al. (2023), through a systematic review, demonstrated that AI has various potential applications in vocational education, including learning, assessment, competency development, and support for the educational process. These findings indicate that AI is no longer viewed merely as an experimental technology but is increasingly being positioned as an integral part of vocational learning innovation. Research by Azizah et al. (2025) also shows that the application of AI in vocational education needs to be understood through the evolving perspectives and practices in the

literature. Thus, the use of AI in vocational education has an increasingly robust research foundation and can become part of a learning innovation strategy.

This development is reinforced by Dinata et al. (2025), who demonstrate through a bibliometric study that research on AI in vocational education is growing and has become a field that is receiving increasing attention. This growth in publications indicates a rising academic interest in the relationship between AI and vocational education, including the development of learning and competencies relevant to future needs. Meanwhile, Harleni et al. (2025), through a bibliometric and systematic review of AI-assisted adaptive learning, highlight the importance of AI-based adaptive learning in the context of vocational education. These findings are relevant to fostering creative interests because adaptive learning systems can provide experiences better tailored to students' needs, thereby opening greater opportunities for active engagement and exploration.

The application of AI can also be developed through learning approaches that bridge education with industry practices. Wahjusaputri et al. (2024) highlight the development of an AI-based "teaching factory" model as one effort to improve the quality of learning in vocational schools in Indonesia. This approach is strongly aligned with the goals of vocational education because learning occurs not only through theory but also through activities that closely mimic real-world work conditions. Integrating AI into this model can provide students with opportunities to learn how to use technology to complete tasks and solve practical problems. A learning environment that resembles the workplace can also encourage students to take initiative, collaborate, try out solutions, and generate more innovative ideas.

On the other hand, research findings indicate that the use of AI does not automatically foster student creativity. The role of the teacher remains a critical factor in determining how technology is used in learning. Zawacki-Richter et al. (2019) point out that research on AI in education must consider the role and involvement of educators, as technology cannot be separated from the pedagogical context. AI should be used to enhance the learning processes designed by teachers, not to replace the teacher's role in providing guidance, fostering interaction, and developing students' character. In vocational education, this role is even more critical because learning requires demonstrations, practice, supervision, evaluation, and mentoring elements that cannot be fully replaced by technology-based systems.

Other challenges relate to infrastructure readiness, access to technology, costs, and user capabilities. Pedro et al. (2019) emphasize that the implementation of AI in education faces issues that are not only technical in nature but also relate to institutional readiness, educator competencies, access gaps, and ethical considerations. These conditions align with the findings in this paper that teachers do not yet fully understand the use of various AI tools and that software costs can be a barrier. If access to technology is unequal, the benefits of AI may potentially be felt only by groups of students or institutions with better resources. Therefore, the application of AI in

vocational education must take into account school readiness, device availability, network quality, teacher competencies, as well as policy and financial support.

The development of generative AI also poses challenges to students' independence and critical thinking skills. Kasneci et al. (2023) explain that technologies like ChatGPT offer opportunities to support learning, information exploration, and idea development, but their use also raises challenges related to dependency, information accuracy, and critical thinking skills. In the context of fostering creative interests, excessive reliance on AI can actually reduce students' opportunities to generate ideas through their own thought processes. If students merely accept AI-generated answers without evaluating, developing, or modifying them, the use of such technology does not directly demonstrate creativity.

Therefore, the relationship between AI and students' creativity must be situated within a framework of productive and reflective technology use. AI should be used as a tool to generate alternatives, obtain feedback, conduct simulations, explore ideas, and assist in problem-solving, while final decisions and idea development remain the responsibility of the students. This approach allows AI to function as a learning support that expands learning possibilities without eliminating the human thinking process. Holmes et al. (2019) and Kasneci et al. (2023) both demonstrate that the use of AI in education should be directed toward improving the quality of the learning process, rather than merely using technology as an end in itself.

The study findings indicate that the importance of AI in fostering students' creative interests in vocational education lies in its ability to provide personalized, adaptive, interactive learning experiences closely aligned with practical needs. AI can help students receive feedback, explore various alternatives, understand material according to their needs, and develop problem-solving skills. Chassignol et al. (2018), Chen et al. (2020), Rosyadi et al. (2023), and Harleni et al. (2025) demonstrate that advancements in AI technology offer increasingly broad opportunities for learning innovation. However, the success of its implementation still depends on teacher readiness, infrastructure, access to technology, digital literacy, and students' ability to use AI critically and responsibly. Thus, AI can serve as a catalyst for fostering creative interest in vocational education when integrated as part of a well-defined pedagogical strategy not as a substitute for critical thinking, creativity, or the role of educators.

4. | CONCLUSION

Artificial intelligence (AI) holds significant potential for fostering students' creative interests within the vocational education system. Based on research findings, AI can support learning that is more personalized, adaptive, interactive, and relevant to students' needs. The use of AI through adaptive learning, feedback, interactive learning environments, and practice-based activities can provide students with opportunities to explore ideas, develop problem-solving skills, and generate various alternative solutions. Thus, AI can serve as a catalyst that supports the development of creativity while enhancing student engagement in vocational learning. However, the use of AI

also faces a number of challenges, particularly regarding teacher readiness, infrastructure limitations, technology costs, access gaps, digital literacy, and the risk of students becoming overly reliant on technology. Therefore, the implementation of AI must be carried out in a targeted manner, positioning teachers as the primary facilitators and students as active participants in the learning process. AI should be used to strengthen human thinking, exploration, and creativity, not to replace them. In this context, the integration of AI supported by teacher readiness, adequate infrastructure, and the critical and responsible use of technology can contribute to improving the quality of vocational education and preparing students to meet the demands of an ever-evolving workforce.

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Data Disclosure Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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