


Chapter 8

The Role of Artificial Intelligence in Personalized STEAM Education: Enhancing Student-Centered Learning

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ABSTRACT

This study aims to explore the transformative potential of artificial intelligence (AI) in personalizing STEAM (science, technology, engineering, arts, and mathematics) education. Utilizing a systematic review methodology, the research analyzes existing literature on AI applications in educational settings, focusing on their impact on student engagement, critical thinking, and creativity. Key findings indicate that AI technologies can significantly enhance personalized learning experiences, allowing for tailored educational content that meets diverse student needs. The study concludes that effective integration of AI in STEAM education can foster a more inclusive and engaging learning environment, preparing students for future challenges in a technology-driven world. These insights underscore the importance of ongoing research and collaboration among educators, researchers, and policymakers to maximize the benefits of AI in education.

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1. INTRODUCTION

1.1. Background of STEAM Education

In recent years, the educational landscape has evolved significantly, with a growing emphasis on interdisciplinary learning that integrates Science, Technology, Engineering, Arts, and Mathematics (STEAM). This approach not only fosters critical thinking and creativity but also prepares students for the complexities of the modern workforce. As the demand for innovative problem-solving skills increases, STEAM education has emerged as a vital framework for equipping learners with the necessary competencies to thrive in a rapidly changing world.

1.2. The Role of Artificial Intelligence in Education

Artificial Intelligence (AI) has become a transformative force across various sectors, including education. By harnessing the power of AI, educators can create personalized learning experiences that cater to the diverse needs of students. AI technologies, such as adaptive learning systems and intelligent tutoring, enable real-time feedback and tailored instructional strategies, enhancing student engagement and learning outcomes. This integration of AI into STEAM education presents a unique opportunity to revolutionize traditional teaching methodologies.

1.3. Objectives of the Study

The objectives of the chapter are as follows:

- ✓ To investigate how AI can be effectively leveraged to personalize STEAM education, tailoring learning experiences to meet individual student needs.
- ✓ To examine specific AI technologies that foster critical thinking and creativity within the STEAM framework.
- ✓ To review and analyze case studies that showcase the successful implementation of AI-driven personalized learning in STEAM education.
- ✓ To address the challenges educators face when adopting AI tools and offer strategies for overcoming these obstacles.
- ✓ To discuss how AI can contribute to the sustainability of STEAM education by preparing students to tackle environmental and societal challenges.
- ✓ To contribute to the existing body of research by identifying gaps in the current literature on AI-based personalized STEAM education and offering recommendations for future research.
- ✓ To demonstrate how AI can enhance student engagement, critical thinking, and problem-solving abilities through personalized learning experiences.

By achieving these objectives, the chapter aims to provide valuable insights and practical guidance for educators and curriculum designers in the integration of AI into STEAM education.

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