INVESTIGATING THE IMPACT OF ARTIFICIAL INTELLIGENCE-SUPPORTED STEAM-INTEGRATED INSTRUCTION ON STUDENTS' TRANSFER ABILITY

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Abstract - In today's intelligent education landscape, cultivating students' higher-order thinking and cross-domain transfer abilities is crucial for 21st-century learning. However, Traditional methods often fail to develop these skills effectively,Highlighting the need for innovative pedagogical strategies that leverage cutting-edge technologies. This research aims to address this significant gap by examining the impact of AI-supported STEAM-integrated instruction on students' transfer abilities within the context of secondary education. Drawing upon constructivist learning theory and cognitive transfer theory, this study integrates advanced AI technologies, including adaptive learning platforms, intelligent feedback systems, and generative tools, into project-based STEAM teaching frameworks. Utilizing a quasi-experimental design, the research involves 180 Grade 8 students from a secondary school in Guangxi, China. The experimental group engages in an 8-week AI-empowered STEAM-integrated teaching program, while the control group receives conventional instruction. Data collection encompasses pre- and post-intervention assessments of students' transfer abilities, complemented by classroom observations and student interviews to provide qualitative insights. The study is expected to reveal a statistically significant enhancement in the experimental group's transfer performance, particularly in problem-solving across unfamiliar contexts. Studies have shown that AI tools significantly bolster students' self-regulated learning, interdisciplinary reasoning, and metacognitive awareness. These outcomes suggest that AI can serve as both a cognitive scaffold and an instructional catalyst, effectively nurturing students' capacity to apply knowledge beyond disciplinary and situational boundaries. The research on AI-integrated teaching highlights AI's potential in facilitating cognitive transfer through interdisciplinary learning. It provides actionable insights for educators and policymakers to design future-ready classrooms aligned with national education transformation, equipping students to meet the complex challenges of the 21st century.

Keywords - Artificial Intelligence, STEAM Education, Cognitive Transfer, Interdisciplinary Learning, Secondary Education.