Chapter 23
IEDP Framework for STEAM and Teacher Education

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ABSTRACT

The intelligent educational digital pedagogy (ieDP) framework is a transformative force in integrating technology into STEAM education and the professional development of educators. This chapter explores the principles that underlie advanced technologies such as AI and data analytics, showcasing their roles in personalizing learning, enhancing engagement, and promoting interdisciplinary collaboration. It emphasizes inquiry-based approaches and real-world applications to bridge the gap between theory and practice. The authors also address critical challenges such as infrastructure deficiencies, the need for continuous professional development, and practical strategies for successful implementation. Through research and case studies, they demonstrate the framework's ability to improve outcomes and equip educators with essential digital competencies. By embracing ieDP, they can revolutionize education into a dynamic, innovation-driven field, inspiring and motivating learners to excel in a technology-centric world.

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INTRODUCTION

The "Integrated Intelligent Educational Digital Pedagogy (ieDP)" framework embodies a revolutionary method for enhancing STEAM education through advanced digital technologies and instructional methodologies. It aims to develop customized learning experiences using artificial intelligence (AI), machine learning (ML), and data analytics. This framework increases student involvement and equips instructors with professional development opportunities to effectively embrace innovative teaching approaches.

STEAM education, which integrates science, technology, engineering, arts, and mathematics, equips students for real-world issues by cultivating creativity, critical thinking, and problem-solving abilities. The ieDP framework enhances this foundation by integrating blended learning settings and facilitating flexible, dynamic, and inclusive educational experiences. Integrating conventional pedagogical techniques with digital resources facilitates a more adaptable learning process, addressing varied student requirements and fostering collaboration.

Furthermore, the ieDP framework emphasizes the significance of data-informed decision-making in education. Analyzing student performance and learning patterns offers actionable insights to improve teaching efficacy and meet specific student needs. The SDP framework enhances instructors' capabilities in digital pedagogy through ongoing professional development and personalized learning paths, creating an engaging and future-orientated educational environment (Johnson et al., 2019; Laurillard, 2012; Schleicher, 2018; Fadel et al., 2015); (Pal et al., 2024).

The Integrated Intelligent Educational Digital Pedagogy (ieDP) framework combines data-driven decision-making, personalized Learning, blended learning environments, educator professional development, and collaborative Learning.

a) **Data-Driven Decision-Making** is crucial in schooling today. West (2012) emphasizes gathering and analyzing educational data to inform instruction, student development, and best practices. This concept enables teachers to use evidence to improve student outcomes and instruction.
b) **AI and machine learning have made personalized learning** mainstream. Pane et al. (2015) demonstrate how personalized learning paths tailored to individuals' pace, interests, and abilities improve comprehension. AI can help educators create individualized learning experiences for each student, making learning more inclusive and prosperous (Nehru, et al. 2023).
c) **Blended learning** environments combine traditional classroom instruction with digital resources for a flexible education strategy. Garrison and Vaughan (2008) define blended Learning as face-to-face interactions with online flexibility and