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Conceptual Framework for the Development of AI-enhanced Electronic Training System (AI-TaS)

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Abstract

The advancement of educational technology has transformed the professional development landscape, highlighting the need for more adaptive, accessible and effective training for educators. This paper proposes a conceptual framework for an AI-enhanced Electronic Training System (AI-TaS) that integrates Artificial Intelligence (AI) into professional development to address limitations of conventional e-training systems, such as lack of personalization and real-time adaptability. AI-TaS leverages adaptive learning, intelligent content recommendation, and data-driven feedback to provide educators with flexible and personalized training opportunities. The framework is grounded in three theoretical foundations: Design-Based Research (DBR), which ensures iterative design, implementation, and refinement in authentic contexts; Technological Pedagogical Content

Knowledge (TPACK), which emphasizes the integration of pedagogy, content, and technology for effective AI use; and the Unified Theory of Acceptance and Use of Technology (UTAUT), which informs strategies to foster user adoption and sustainability. By aligning technological innovation with pedagogical soundness and user-centered adoption, the AI-TaS framework offers a structured pathway for designing and implementing AI-driven professional development systems in higher education. The model contributes both as a theoretical foundation and as a practical roadmap for enhancing educators' competencies, supporting institutional innovation, and ensuring continuous professional growth in the digital era. © 2025 IEEE.

Author keywords

artificial intelligence; Design-Based Research; electronic training system; Technological Pedagogical Content Knowledge; Unified Theory of Acceptance and Use of Technology

Indexed keywords

Engineering controlled terms

Computation theory; E-learning; Educational technology; Employment; Engineering education; Iterative methods; Knowledge management; Learning systems; Personnel training; Professional aspects; Sustainable development; Teaching; User centered design

Engineering uncontrolled terms

Conceptual frameworks; Design-based research; E training; Electronic training system; Personalizations; Professional development; Technological pedagogical content knowledge; The unified theory of acceptance and use of technology(UTAUT); Theoretical foundations; Training Systems

Engineering main heading

Artificial intelligence

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