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Bridging the Educational Gap: A Curriculum Framework for Mass Timber Construction Education and Comparative Analysis of Physical vs. Virtual Prototypes in Construction Management

Authors : Farnaz Jafari

Abstract : The surge in mass timber construction represents a pivotal moment in sustainable building practices, yet the lack of comprehensive education in construction management poses a challenge in harnessing this innovation effectively. This research endeavors to bridge this gap by developing a curriculum framework integrating mass timber construction into undergraduate and industry certificate programs. To optimize learning outcomes, the study explores the impact of two prototype formats -Virtual Reality (VR) simulations and physical mock-ups- on students' understanding and skill development. The curriculum framework aims to equip future construction managers with a holistic understanding of mass timber, covering its unique properties, construction methods, building codes, and sustainable advantages. The study adopts a mixed-methods approach, commencing with a systematic literature review and leveraging surveys and interviews with educators and industry professionals to identify existing educational gaps. The iterative development process involves incorporating stakeholder feedback into the curriculum. The evaluation of prototype impact employs pre- and post-tests administered to participants engaged in pilot programs. Through qualitative content analysis and quantitative statistical methods, the study seeks to compare the effectiveness of VR simulations and physical mock-ups in conveying knowledge and skills related to mass timber construction. The anticipated findings will illuminate the strengths and weaknesses of each approach, providing insights for future curriculum development. The curriculum's expected contribution to sustainable construction education lies in its emphasis on practical application, bridging the gap between theoretical knowledge and hands-on skills. The research also seeks to establish a standard for mass timber construction education, contributing to the field through a unique comparative analysis of VR simulations and physical mock-ups. The study's significance extends to the development of best practices and evidence-based recommendations for integrating technology and hands-on experiences in construction education. By addressing current educational gaps and offering a comparative analysis, this research aims to enrich the construction management education experience and pave the way for broader adoption of sustainable practices in the industry. The envisioned curriculum framework is designed for versatile integration, catering to undergraduate programs and industry training modules, thereby enhancing the educational landscape for aspiring construction professionals. Ultimately, this study underscores the importance of proactive educational strategies in preparing industry professionals for the evolving demands of the construction landscape, facilitating a seamless transition towards sustainable building practices.

Keywords : curriculum framework, mass timber construction, physical vs. virtual prototypes, sustainable building practices
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