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Virtual Reality Integration in Surgical Training at South African Teaching Hospitals: A Paradigm Shift

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Abstract

Virtual reality (VR) technology has shown promise in enhancing surgical training by providing realistic simulation environments that can be safely and cost-effectively used for skill development. A mixed-methods approach involving pre- and post-training assessments, surveys, and observational studies was employed. Surgeons and medical students participated in VR simulations, and their performances were evaluated using a validated surgical proficiency scale. Analysis of the data indicated that VR training significantly improved surgeons' performance metrics by an average of 15% (95% CI: 0.12-0.18) compared to traditional training methods, with learners showing strong engagement and positive feedback across all study groups. The integration of VR technology into surgical training at South African teaching hospitals has demonstrated substantial benefits in terms of skill development and learner satisfaction. Further research should explore the scalability and sustainability of VR training programmes in different hospital settings, while healthcare administrators should consider funding such initiatives to enhance medical education globally. Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Virtual Reality, Surgical Simulation, Medical Education, Geographic Information Systems, Geographic Profiling, Augmented Reality, Anatomy Modelling*

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