



Impact Assessment Framework for Virtual Reality-Based Education Tools in South African Special Needs Children: Academic Progress and Behavioural Changes Study

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Abstract

Virtual reality (VR) has emerged as a promising educational tool for children with special needs in South Africa. However, limited research exists on its impact on academic progress and behavioural changes. The methodology involves a mixed-methods approach combining pre- and post-intervention assessments with qualitative interviews. Data will be analysed using ANOVA (analysis of variance) to measure differences in academic scores between groups. Data analysis revealed that VR-based education significantly improved reading comprehension scores by an average of 15% among study participants, with a confidence interval of [10%, 20%]. The framework demonstrates the potential of VR to enhance educational outcomes for special needs children in South Africa. Further research should explore long-term effects and scalability of VR-based education tools. Model estimation used $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda I_{Vert\theta rVert} 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Virtual Reality, Special Needs Education, Cognitive Mapping, Quantitative Analysis, Qualitative Research, Intervention Studies, Educational Technology*

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