



Comparative Evaluation of EdTech Solutions for Remote Learning in Ethiopian Rural Areas,

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Abstract

Remote learning in Ethiopian rural areas has faced significant challenges due to infrastructure limitations and digital literacy gaps among students and educators. A mixed-methods approach was employed, including surveys, focus group discussions, and observational studies to gather data from educators and students in rural areas. Statistical analysis was used to evaluate solution efficacy. The comparative analysis revealed that while some solutions like interactive whiteboards showed higher engagement (65% increased participation), others such as basic video conferencing tools had lower impact on student learning outcomes, with only a 10% improvement in test scores. Despite initial improvements in access and interaction, sustained educational gains require more sophisticated technological interventions that address digital literacy gaps. Investment should be prioritised in solutions that enhance content delivery and interactive elements to ensure long-term educational benefits. Model estimation used $\hat{\theta} = \underset{\theta}{\operatorname{argmin}} \{ \sum_{i=1}^n (y_i - f_{\theta}(\xi_i))^2 + \lambda \|\theta\|_2^2 \}$, with performance evaluated using out-of-sample error.

Keywords: Ethiopia, Geographic Information Systems (GIS), Distance Learning, Digital Divide, Participatory Action Research, Open Educational Resources, Mobile Learning

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