

Research Topic and Literature Review

A Model for Delivering Sustainable Digital Learning in Resource-Constrained
School Settings

Fessehaye Yehdego

The University of Texas Rio Grande Valley

Educational Technology, EDFR 6300

Instructor: Prof. Seokmin "Chandler" Kan

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Proposed Research Topic

A Model for Delivering Sustainable Digital Learning in Resource-Constrained School Settings

Proposed Research Question

How can a sustainable digital learning delivery model be designed and implemented to support teaching and learning in resource-constrained school settings?

Operational Definition of Sustainable Digital Learning Delivery

For this study, sustainable digital learning delivery refers to an educational technology model that integrates affordable digital devices, offline-capable learning resources, curriculum-aligned instructional materials, teacher professional development, classroom organization, reliable power solutions, periodic content updating, and long-term maintenance to support continuous teaching and learning in resource-constrained school settings.

Background and Rationale

This proposed study responds to the challenge of providing equitable digital learning opportunities for learners in schools with limited connectivity, devices, and educational resources. Previous research consistently demonstrates that technology alone does not improve learning; meaningful outcomes depend on instructional design, teacher capacity, leadership, and sustainable implementation. The proposed study builds upon this evidence by designing a sustainable digital learning delivery model suitable for resource-constrained schools.

Ten Peer-Reviewed References (APA 7th)

- Aguilar, S. J. (2020). Guidelines and tools for promoting digital equity in education. Educational Technology Research and Development.
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- Kaumba, M., Mphahlele, R. S. S., Muleya, G., & Simui, F. (2021). Disablers and enablers in the uptake of information communication technologies in rural primary schools of Mwinilunga District, Zambia. *Journal of Educational Technology and Online Learning*, 4(1), 1–10.
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- Miras, A., et al. (2023). Digital divide in education: A systematic review. *Education and Information Technologies*.
- Mustafa, F., Nguyen, H. T. M., & Gao, X. (2024). The challenges and solutions of technology integration in rural schools: A systematic literature review. *International Journal of Educational Research*, 126, 102380.
- Selwyn, N. (2016). Minding our language: Why education and technology is full of bullshit... and what might be done about it. *Learning, Media and Technology*.

Shambare, B., & Simuja, C. (2024). Unveiling the TPACK pathways: Technology integration and pedagogical evolution in rural South African schools. *Computers and Education Open*, 7, 100206.

Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. *Review of Research in Education*, 34(1), 179–225.

Selected Five Articles

1. Warschauer, M., & Matuchniak, T. (2010). New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. *Review of Research in Education*, 34(1), 179–225. <https://doi.org/10.3102/0091732X09349791>
2. Mustafa, F., Nguyen, H. T. M., & Gao, X. (2024). The challenges and solutions of technology integration in rural schools: A systematic literature review. *International Journal of Educational Research*, 126, 102380.
3. Johnston, J., & Ksoll, C. (2022). Effectiveness of interactive satellite-transmitted instruction: Experimental evidence from Ghanaian primary schools. *Economics of Education Review*, 91, 102306. <https://doi.org/10.1016/j.econedurev.2022.102306>
4. Kaumba, M., Mphahlele, R. S. S., Muleya, G., & Simui, F. (2021). Disablers and enablers in the uptake of information communication technologies in rural primary schools of Mwinilunga District, Zambia. *Journal of Educational Technology and Online Learning*, 4(1), 1–10.
5. Shambare, B., & Simuja, C. (2024). Unveiling the TPACK pathways: Technology integration and pedagogical evolution in rural South African schools. *Computers and Education Open*, 7, 100206.

Literature Review

Current State of Knowledge

Warschauer and Matuchniak (2010) established the theoretical foundation for digital equity through the concepts of access, use, and outcomes. Mustafa et al. (2024) synthesized evidence showing that successful technology integration requires coordinated action at macro, meso, and micro levels. Johnston and Ksoll (2022) demonstrated through a randomized controlled trial in Ghana that interactive technology-supported instruction improved student learning when paired with expert teaching and classroom facilitation. Kaumba et al. (2021) reported that rural schools in Zambia overcame resource limitations through collaboration and creative ICT use. Shambare and Simuja (2024) concluded that teachers' TPACK, continuous professional development, and supportive school cultures are essential for successful technology integration.

Synthesis of Common Trends

Across the five studies, educational technology is consistently presented as a comprehensive educational system rather than simply hardware or internet access. Common themes include equitable access, teacher professional development, instructional design, leadership, and sustainable implementation.

Although the studies differ in methodology and context, they complement one another by demonstrating that effective digital learning depends on coordinated support from policy makers, schools, teachers, and communities. Collectively, the literature supports affordable, context-sensitive, and sustainable approaches to digital learning.

Knowledge Gaps

The literature does not yet provide a comprehensive model for sustainable digital learning delivery in resource-constrained school settings. Limited attention has been given to curriculum alignment, offline-first instructional design, shared-device learning, local instructional design capacity, renewable energy, and sustainable content updating. Addressing these gaps provides the rationale for the proposed study.

Declaration of AI Use in the Writing Process

This paper was developed with support from AI tools. ChatGPT (OpenAI, 2024) was used to assist with grammar refinement, sentence structure, organization, and clarity of instructional design content. The ideas, instructional goals, analysis, and project direction were developed by the student.