
Strengthening Technology-Enhanced Learning in Multigrade Classrooms

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ABSTRACT

This study explored ways to strengthen Technology-Enhanced Learning (TEL) in multigrade classrooms in Asipulo District, Ifugao. It investigated teachers' experiences with TEL, the challenges they faced, and the strategies they used to meet learners' needs across multiple grade levels. Using a qualitative design, data were collected through semi-structured interviews and were analyzed thematically. Results showed that TEL increased student engagement, supported differentiated learning, and encouraged collaboration. Challenges included unstable internet, limited access to resources, and classroom management difficulties. Teachers addressed these issues through blended instruction, localized digital materials, peer-assisted learning, and contingency plans for technology failures. Based on these findings, a context-specific plan was proposed to enhance TEL through better support, resource access, and professional development. The study emphasizes the importance of adaptable, sustainable TEL practices for improving outcomes across multiple grade settings.

Keywords: Technology-Enhanced Learning, Multigrade Classrooms, Qualitative Study

INTRODUCTION

The rapid advancement of digital technology has transformed teaching and learning globally, enhancing student engagement, personalized learning, and access to resources beyond the classroom (Haleem, 2022). In rural and low-density contexts, technology can support multigrade classrooms, where a single teacher manages multiple grade levels. Research suggests that tools such as learning management systems, digital lessons, and teacher support systems improve instructional efficiency and student outcomes when coupled with adequate training, infrastructure, and contextual adaptation (UNICEF Philippines, 2024).

In the Philippines, multigrade teaching remains a critical strategy for ensuring access to basic education in geographically isolated and disadvantaged (GIDA) areas. Studies indicate that teachers face high workloads, limited resources, and infrastructure challenges, yet the integration of information and communication technology (ICT) has the potential to enhance literacy, numeracy, and learner autonomy when supported by professional development and technical assistance (Napanan & Alinsug, 2021; Lumba & Dioso, 2024; Tindowen, 2020). In Asipulo District, Ifugao, multigrade teachers encounter unstable internet connectivity, scarce digital devices, and unreliable electricity, while also needing to adapt TEL materials to local cultural and linguistic contexts. This study investigates the experiences of these teachers to identify strategies for effective TEL integration, professional training, and culturally responsive digital instruction in multigrade classrooms.

Statement of the Problem

The study aims to strengthen technology-enhanced learning in multigrade classrooms.

Specifically, the study aims to answer the following:

1. How do multigrade teachers in Asipulo District, Ifugao, describe their experiences in implementing technology-enhanced learning (TEL) in their classrooms?
2. What challenges do multigrade teachers face in integrating TEL, particularly regarding connectivity, resources, and classroom management?
3. What strategies do multigrade teachers use to effectively adapt technology to the needs of learners across different grade levels?
4. Based on the findings of this study, what suggested plan can be proposed to strengthen the use of TEL in multigrade classrooms in Asipulo District?

Objectives of the Study

This study determined:

1. the experiences of multigrade teachers in implementing technology-enhanced learning (TEL) in the classrooms;
2. the challenges of multigrade teachers face in integrating TEL, particularly regarding connectivity, resources, and classroom management;
3. the strategies of multigrade teachers use to effectively adapt technology to the needs of learners across different grade levels;
4. the suggested plan that can be proposed to strengthen the use of TEL in multigrade classrooms in Asipulo District.

Significance of the Study

This study has significance to the following:

1. Multigrade Teachers. Findings of this study would serve as a guide in navigating digital instructions.
2. DepEd/University Administrators. Results of this study would provide information and feedback on the perspective of Multigrade teachers on the use of TEL.
3. Faculty Members/Teachers. Results of this study would provide evidence-based insights into how multigrade teaching approaches can positively impact student academic achievement and engagement.
4. Researchers. Findings of this study shed light on the perspective of multigrade teachers on the use of TEL.

Scope and Delimitation of the Study

This study aims to determine the perception of multigrade teachers on technology-enhanced learning through navigating digital instructions.

Delimitation

This study was limited to Multigrade teachers in Asipulo District, Ifugao

REVIEW OF RELATED LITERATURE

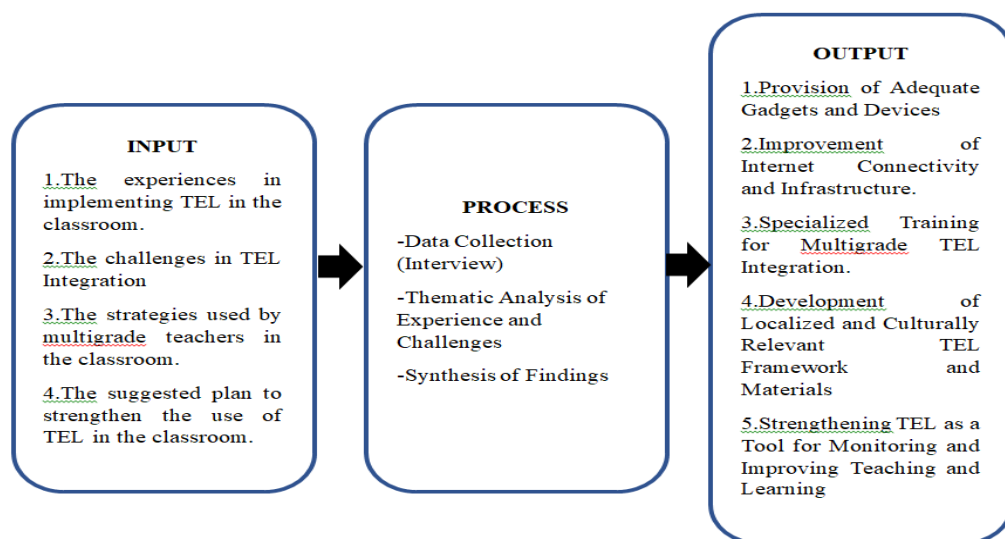
The integration of technology in education has transformed teaching and learning worldwide, providing students with increased engagement, personalized learning, and access to resources beyond the classroom (Haleem, 2022). Technology-Enhanced Learning (TEL) is particularly relevant in multigrade classrooms, where teachers must manage learners from different grades simultaneously. Studies indicate that TEL facilitates differentiated

instruction, independent learning, and classroom management, enabling teachers to attend to multiple grade levels effectively (Taole, 2024; Akram et al., 2022).

Despite its benefits, the implementation of TEL in rural or resource-constrained multigrade settings faces persistent challenges. These include limited infrastructure, poor internet connectivity, insufficient ICT training, scarcity of devices, heavy teacher workload, and lack of administrative support (Taole, 2024; Chan, Marasigan & Santander, 2021; Rayas et al., 2023; Recla & Potane, 2024). Filipino studies corroborate these barriers, showing that teachers often rely on digital tools primarily for lesson preparation rather than active instruction due to these constraints (Naparan & Alinsug, 2021; Lumba & Dioso, 2024).

To overcome these challenges, multigrade teachers employ adaptive strategies such as cooperative learning, resource sharing, differentiated instructional materials, and context-based lesson design (Ondé, 2023; Vigo-Arrazola, 2025; Malinao, 2024). They also leverage technology for lesson planning, professional development, and communication with students and parents when digital resources are available (Duterte, 2024; Viña et al., 2024). Research shows that these strategies improve student engagement, motivation, and learning outcomes, with well-implemented TEL having a positive correlation with academic performance (Duterte, 2024).

Conceptual Framework



This conceptual framework illustrates the flow of the study. The input includes multigrade teachers’ experiences, challenges, strategies, and suggested plans in implementing TEL (Taole, 2024; Naparan & Castaneda, 2021). The process involves data gathering, thematic analysis, and synthesis of findings. The output of the study includes recommendations for the provision of adequate gadgets and devices, improvement of internet connectivity and infrastructure, specialized training for multigrade TEL integration, development of a localized and culturally relevant TEL framework and materials, and enhanced learning in the Asipulo District.

RESEARCH METHODOLOGY

Research Design

The study employs a qualitative research design to explore the perspectives of multigrade teachers on technology-enhanced learning (TEL) in Asipulo District, Ifugao. Qualitative research is suitable for capturing teachers’ lived experiences, challenges, and strategies in their natural teaching environment, allowing the findings to authentically reflect the participants’ voices (Creswell & Poth, 2018).

Research Environment

The study will be conducted in the Asipulo District, focusing on public schools that implement multigrade classes. The district was chosen as the study locale because it has a significant number of multigrade classrooms and represents the rural school context where TEL implementation faces unique challenges.

Participants of the Study

Participants will be purposively selected multigrade teachers who are currently managing multiple grade levels and have experience using TEL tools in their instruction.

Sampling Procedure

The study will employ purposive sampling to select participants who can provide relevant insights on the use of technology-enhanced learning (TEL) in multigrade classrooms. Participants will be required to have at least one year of experience utilizing TEL tools in their teaching practice.

Research Instrument

Data will be collected through semi-structured interviews, allowing teachers to describe their experiences in depth. Classroom observations will provide contextual understanding of technology use, and relevant documents, such as lesson plans and digital resources, will be reviewed to support triangulation.

Data Gathering Procedure

Permission will be obtained from the Schools Division Office and school principals before data collection. Participants will be informed of the study’s purpose, voluntary participation, and their rights to ensure ethical compliance. Interviews and classroom observations will be conducted, supplemented with document review for cross-verification.

Statistical Treatment of Data

The collected data will be analyzed using thematic analysis, as outlined by Braun and Clarke (2006). This process involves thoroughly reviewing interview transcripts, observation notes, and relevant documents, followed by assigning codes to segments of data. These codes will then be examined to identify recurring patterns and common themes that reflect the perspectives, experiences, and strategies of multigrade teachers in using technology-enhanced learning. Finally, the themes will be organized and interpreted to provide a comprehensive understanding of TEL implementation, its challenges, and the adaptive practices employed in multigrade classrooms.

Validity and Trustworthiness

To ensure the credibility and trustworthiness of the study, several strategies will be employed. Member checking will be conducted by sharing interview transcripts and preliminary findings with participants to confirm the accuracy of their responses. Coding validation will be carried out through peer review, in which experienced qualitative researchers will examine the assigned codes and emerging themes to minimize bias and ensure consistency. Additionally, triangulation of data sources—including interviews, classroom observations, and document reviews—will be used to verify consistency across multiple perspectives. An audit trail documenting all research decisions and procedures will further enhance the transparency and dependability of the findings.

RESULTS AND DISCUSSIONS

1. How do multigrade teachers in Asipulo District, Ifugao, describe their experiences in implementing technology-enhanced learning (TEL) in their classrooms?

Major Theme	Core Idea	Participants Mentioning
TEL Improves Student Engagement	TEL increases learners’ attention, interest, and participation in lessons.	1, 2, 3, 4, 5, 6
TEL Facilitates Multigrade Instruction	Technology helps teachers manage multiple grade levels through differentiated activities.	1, 4, 5, 6

TEL Simplifies Lesson Preparation	Technology makes teaching more flexible and reduces the time needed for lesson planning.	1, 2, 3, 4, 5, 6
TEL Faces Implementation Barriers	Teachers experience limitations in internet connectivity, gadget availability, and learner access.	1, 2, 4, 5
TEL Relies on Practical Tools	Teachers prefer accessible tools such as PowerPoint, TV, Smart TV, and downloaded videos.	1, 2, 3, 4, 6

The multigrade teachers in Asipulo District, Ifugao, described their experiences in implementing technology-enhanced learning (TEL) in their classrooms as follows: TEL improves student engagement, TEL facilitates multigrade instruction, TEL simplifies lesson preparation, TEL faces implementation barriers, and TEL relies on practical tools.

Theme 1: TEL Enhances Student Engagement

Teachers reported that TEL increases learners’ attention, interest, and understanding through interactive materials such as videos, presentations, and simulations.

“My learners were more engaged and attentive... helped them visualize solid figures.” (Participant 1)

“About 85% of the class achieved mastery; engagement increased.” (Participant 2)

“Technology allows differentiated tasks and collaboration.” (Participant 5)

Theme 2: TEL Facilitates Multigrade Instruction

TEL helps teachers manage multiple grade levels by allowing some learners to work independently while others receive direct instruction.

“These tools help learners work independently while I teach the other grade.” (Participant 1)

“It helps me manage two groups at the same time.” (Participant 6)

Theme 3: TEL Simplifies Lesson Preparation

Digital resources reduce preparation time and can be reused or adapted across grade levels.

“It makes lesson preparation easier and faster.” (Participant 1)

“I can reuse PowerPoint and videos.” (Participant 2)

Theme 4: TEL Faces Implementation Barriers

Teachers identified challenges such as limited internet connectivity, insufficient devices, and unequal learners' access.

“Internet connection is unstable.” (Participant 1)

“Not all learners have access to gadgets.” (Participant 2)

Theme 5: TEL Relies on Practical Tools

Teachers primarily use accessible tools such as PowerPoint, TVs, laptops, and downloaded videos.

“I use PowerPoint and videos.” (Participant 1)

“TV and laptop are very helpful.” (Participant 4)

2. What challenges do multi-grade teachers face in integrating TEL, particularly regarding connectivity, resources, and classroom management?

Major Theme	Core Idea	Participants Mentioning
Connectivity Limits TEL Integration	Unreliable internet and poor signal hinder consistent use of TEL.	1, 2, 3, 4, 5
Lack of Access to Resources	Insufficient gadgets and limited devices restrict TEL implementation.	2, 3, 4, 5
Inadequate Technical Support	Teachers face difficulties due to limited support for equipment or software issues.	3, 4, 5
Classroom Management Challenges	Managing multiple grade levels during TEL activities can cause distractions or delays for learners.	1, 3
Insufficient Professional Development	Teachers lack training specific to integrating TEL in multigrade classrooms.	1, 2, 3, 4, 5

TEL implementation in multigrade classrooms is constrained by connectivity issues, limited resources, insufficient technical support, classroom management challenges, and inadequate professional development. Addressing these constraints is crucial for sustainable and effective TEL use.

Theme 1: Connectivity

Unstable internet and poor signal, especially in GIDA areas, limit consistent TEL use.

“Being in a GIDA area... we do not rely solely on TEL.” (Participant 1)

“Cloudy weather affects connectivity.” (Participant 2)

Theme 2: Limited Resources

Insufficient devices restrict learners’ access and lesson implementation.

“Not all pupils have gadgets available.” (Participant 2)

“The main challenge is the total lack of devices.” (Participant 4)

Theme 3: Technical Support

Minimal support for equipment or software issues reduces lesson continuity.

“Technical support is very limited.” (Participant 6)

“Software or equipment issues cause delays in lessons.” (Participant 5)

Theme 4: Classroom Management

Managing multiple grades simultaneously causes distractions, delays, and frustration, particularly for faster learners.

“Fast learners complain while waiting for their turn.” (Participant 3)

“Using TEL in one grade sometimes distracts the other.” (Participant 1)

Theme 5: Professional Development

Teachers lack targeted training for multigrade TEL integration, limiting confidence and use of advanced digital tools.

“Most training focused on regular classrooms, not multigrade.” (Participant 1)

“Insufficient training on e-apps makes me rely on PowerPoint.” (Participant 4)

3. What strategies do multi-grade teachers use to effectively adapt technology to the needs of learners across different grade levels?

Major Theme	Core Ideas	Participants Mentioning
Differentiated-Blended Instruction	Teachers use a combination of technology and traditional methods or differentiate tasks to address different grade levels’ needs.	1, 3, 5, 6
Localization of Digital Resources	Digital resources are adapted to learners’ cultural, linguistic, and community context using local stories, beliefs, examples, and scenarios.	1, 2, 3, 5, 6
Technology-Facilitated Collaboration	Teachers use TEL tools to promote collaboration, peer-assisted learning, and group activities across grade levels.	1, 2, 5, 6
Contingency Planning for TEL Failures	Teachers prepare alternative methods such as printed materials, visual aids, or oral instructions to continue lessons when technology is unavailable or fails.	1, 2, 3, 5, 6

Multigrade teachers reported that TEL enhances engagement, supports differentiated and collaborative learning, and reduces lesson preparation time. However, its effectiveness depends on reliable connectivity, adequate resources, technical support, and targeted professional development. Teachers employ strategic approaches, including blended instruction, localized content, collaborative platforms, and contingency planning, to adapt TEL to diverse learner needs and maintain continuity in resource-limited, multigrade classrooms.

Theme 1: Differentiated-Blended Instruction

Teachers combined technology with traditional methods, tailoring tasks to different grade levels.

“I use a blended approach: technology for one grade, printed materials for another.” (Participant 1)

“Differentiated tasks let Grade 5 focus on guided activities while Grade 6 handles analytical work.” (Participant 5)

Theme 2: Localization of Digital Resources

Digital materials were adapted to local culture, language, and community practices to make content relatable.

“I modify resources using local stories, terms, and illustrations familiar to our learners.” (Participant 1)

“Incorporating community beliefs and practices helps students connect with lessons.” (Participant 6)

Theme 3: Technology-Facilitated Collaboration

TEL facilitated peer-assisted learning and group activities across grades.

“Digital platforms like Padlet and Kahoot let Grade 5 and 6 students share ideas and collaborate.” (Participant 5)

“I use technology for group activities were advanced learners support others.” (Participant 1)

Theme 4: Contingency Planning for TEL Failures

Teachers prepared backup strategies, including printed materials, visual aids, and oral instruction, to ensure learning continuity.

“If technology fails, I revert to printed modules or oral instructions.” (Participant 6)

“I use visual aids and DIY tasks to maintain learning continuity.” (Participant 1)

4. Based on the findings of this study, what suggested plan can be proposed to strengthen the use of TEL in multigrade classrooms in Asipulo District?

Major Theme	Core Ideas	Participants Mentioning
Provision of Adequate Gadgets and Devices	Need for tablets, laptops, computers, and devices for both teachers and learners	P1, P2, P3, P4, P5, P6 (6 participants)
Improvement of Internet Connectivity and Infrastructure	Stable, strong, and reliable internet is necessary for TEL effectiveness	P1, P5 (2 participants)
Specialized Training for Multigrade TEL Integration	Teachers need training on e-apps, digital pedagogy, and multigrade-specific TEL strategies	P1, P2, P3, P4, P5 (5 participants)
Development of Localized and Culturally Relevant TEL Framework and Materials	TEL must reflect local culture, context, and be usable offline	P1, P2, P3, P5 (4 participants)
Strengthening TEL as a Tool for Monitoring and Improving Teaching and Learning	TEL can serve as a basis for evaluating outcomes and planning improvements	P2 (1 participant)

Based on the findings, multigrade teachers in Asipulo District proposed a comprehensive plan to enhance TEL integration, focusing on resources, connectivity, professional development, localized content, and monitoring.

Theme 1: Provision of Adequate Gadgets and Devices

Teachers emphasized the urgent need for tablets, laptops, and display devices for both learners and educators to enable effective TEL.

“Provide more devices for learners... tablets, laptops, and TV screens.” (Participant 1)

“Laptops for learners and teachers.” (Participant 2)

Theme 2: Improvement of Internet Connectivity and Infrastructure

Reliable and fast internet was identified as essential for accessing digital platforms, e-modules, and interactive resources.

“Provide a stable internet connection.” (Participant 1)

“Strong and reliable connectivity is necessary.” (Participant 5)

Theme 3: Specialized Training for Multigrade TEL Integration

Teachers requested professional development focused on multigrade strategies, digital pedagogy, and practical use of e-applications to build confidence and competence.

“Training is most useful if they are focused on multigrade settings.” (Participant 1)

“Specialized training on how to use e-applications effectively in a multigrade setting.” (Participant 4)

Theme 4: Development of Localized and Culturally Relevant TEL Frameworks and Materials

TEL resources should reflect local culture, language, and practices and be accessible offline, especially in geographically isolated areas.

“Develop TEL with local content that can be accessed offline.” (Participant 1)

“A localized TEL framework should include culturally relevant content and differentiated tasks.” (Participant 5)

Theme 5: Strengthening TEL for Monitoring and Improving Teaching and Learning

TEL can serve as a tool for evaluating learner progress and instructional effectiveness, supporting evidence-based planning and improvement.

“TEL can be used to evaluate lesson delivery and learner outcomes, guiding improvement.” (Participant 2)

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary

The study explored the perspectives of six multigrade teachers in Asipulo District, Ifugao, regarding Technology-Enhanced Learning (TEL). Using Braun and Clarke’s thematic analysis, the data revealed key themes addressing teachers’ experiences, challenges, adaptive strategies, and recommendations for strengthening TEL in multigrade classrooms.

Overall, teachers had positive experiences with TEL. Five main themes emerged: TEL enhances student engagement, facilitates multigrade teaching, simplifies lesson preparation, faces implementation barriers, and relies on practical tools. TEL improved students’ attention, motivation, and comprehension, particularly through visual and multimedia materials. It also enabled differentiated instruction, allowing teachers to focus on one grade level while others worked independently, and reduced planning time while providing flexibility. Challenges included limited internet connectivity, insufficient devices, low learner participation, inadequate technical support, classroom management difficulties, and a lack of professional development, which were intensified by the district’s geographically isolated and resource-limited context.

Teachers addressed these challenges through adaptive strategies, including blended and differentiated instruction, localization of digital resources, technology-facilitated collaboration, and contingency planning using offline or printed materials. These approaches allowed teachers to maintain continuity of learning, accommodate diverse learners, and make TEL culturally relevant and practical in a multigrade, resource-constrained environment.

Conclusions

The study shows that Technology-Enhanced Learning (TEL) is an effective approach for multigrade classrooms in Asipulo District, Ifugao, enhancing student engagement, supporting differentiated instruction, and simplifying

lesson preparation. TEL enables teachers to manage multiple grade levels simultaneously and deliver more interactive, learner-centered lessons, even in resource-limited settings. However, its implementation is constrained by unstable internet, limited devices, insufficient technical support, classroom management challenges, and inadequate professional development. Teachers address these issues through adaptive strategies, including blended and differentiated instruction, localization of digital content, technology-facilitated collaboration, and contingency planning. Overall, sustainable and effective TEL in multigrade classrooms requires sufficient resources, reliable infrastructure, targeted teacher training, and contextually relevant instructional materials.

Recommendations

In light of the findings and conclusions, the following recommendations are proposed:

For the Department of Education (DepEd) and School Administrators

1. Provide adequate digital devices such as tablets, laptops, and classroom display tools for both teachers and learners in multigrade schools.
2. Strengthen internet connectivity and digital infrastructure, particularly in GIDA areas, to ensure reliable access to TEL resources.
3. Establish on-site or district-level technical support systems to promptly address equipment and software issues.

For Teacher Professional Development

4. Design specialized TEL training programs tailored for multigrade classrooms, focusing on differentiated instruction, practical digital tools, and classroom management strategies.
5. Provide continuous, hands-on training that builds teacher confidence in using both basic and emerging digital applications appropriate for multigrade contexts.
6. Enhance trustworthiness in TEL practices by incorporating:

Member Verification: Teachers should review and confirm lesson plans, digital activities, and student engagement strategies with peers or supervisors to ensure accuracy and suitability.

Triangulation: Validate TEL effectiveness using multiple sources, such as classroom observations, student feedback, and assessment data, to ensure lessons are reliable and effective.

For Curriculum Developers and Policy Makers

7. Develop a localized, culturally responsive, and offline-accessible TEL framework aligned with the realities of Asipulo District and similar rural settings.
8. Encourage context-based digital and printed instructional materials that integrate local culture, language, and community practices.

For Schools and Teachers

9. Sustain blended and differentiated instruction to ensure inclusivity and equitable learning opportunities for all grade levels.
10. Strengthen technology-facilitated collaboration and peer-assisted learning to maximize limited resources and promote social learning.

11. Institutionalize contingency planning by integrating TEL with traditional teaching methods to ensure uninterrupted learning during technological failures.

12. Apply trustworthiness techniques at the classroom level:

Teachers can use member checking by discussing TEL lesson outcomes with colleagues or learners to verify clarity and effectiveness.

Triangulate data from student participation, assessment results, and teacher reflections to continuously improve TEL strategies.

For Future Researchers

13. Investigate the long-term impact of TEL on academic performance and learner autonomy in multigrade settings.

14. Explore perspectives of learners, parents, and school leaders to gain a more comprehensive understanding of TEL implementation in rural multigrade schools.

15. Incorporate trustworthiness measures in future research, such as member verification and triangulation, to enhance the reliability and credibility of findings.

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