

**Technology integration, engagement and contextual challenges
among Grade VI learners in selected rural elementary schools in Cebu**

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ABSTRACT

This study investigated the state of technology integration and its impact on pupil engagement in Mompeller Elementary School and Colawin Elementary School, Grade VI pupils. Specifically, this focused on how technology usage affected learners' behavioral, emotional, and cognitive engagement in rural pupils and the context of users lived experience they faced, including teachers. The study was premised on the assumption that technology integration enhances student engagement when integrated appropriately into instruction. Quantitative data which have been collected through a survey questionnaire, administered to selected pupils, have been analyzed descriptively. In-depth data were drawn from semi-structured interviews with teachers. Within the convenience of a descriptive and correlational study, the findings suggested that the state of technology integration and student engagement is perceived very high in both schools. This implies that digital tools are widely embraced and utilized in classroom settings with pupils who showed attention, motivation, and curiosity either to utilize new types of digital learning tools and participated while using the tools in learning activities. Moreover, the relationship between technology and integration factors, and student engagement was seen to be a weak and not significant statistical linkage so technology use per se don't influence learners in learning in the classroom. Contextually, the challenges involving effective technology integration were limited devices, unstable internet connections, insufficient technical concerns, lack of teacher training, and class with large pupils. With the technology integration context acknowledged and accepted, this study constitutes Element of technology integration highly beneficial, however depending on teacher preparedness and resources, for which recommendation for future study remains tiny encompassed about other factor which affect engagement of pupils in rural pupils.

Keywords: Technology integration, student engagement, rural education, digital tools, contextual challenges.

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INTRODUCTION

This study is conducted to address the lack of localized research on technology integration in rural elementary schools, particularly focusing on Grade VI pupils in Mompeller Elementary School and Colawin Elementary School. It seeks to determine the level of technology integration, assess student engagement, examine the relationship between the two variables, and identify the contextual challenges encountered during implementation (Ismail, Rahman, Hamid & Mutalib, 2024).

These findings imply that this research will benefit teachers, school administrators, and policymakers in designing strategies that are responsive to the needs of rural schools. By understanding both the strengths, such as high technology usage and engagement, and the limitations, such as weak correlation and existing challenges, this study supports the development of practical, inclusive, and sustainable educational practices that promote meaningful learning experiences for all students. Likewise, this study aims to examine the level of technology integration and its impact on student engagement among Grade VI pupils in Mompeller Elementary School and Colawin Elementary School. These two elementary schools were selected because they are the prime rural schools in the District of Argao 2, Province of Cebu. It also seeks to identify the contextual challenges experienced by both students and teachers in using technology in the classroom. While both technology integration and engagement were found to be high, the relationship between the two variables was weak and statistically not significant. These findings imply that other factors may also influence student engagement. By understanding these factors, the study hopes to contribute to the development of effective and context appropriate strategies for improving technology integration in rural elementary education (Mustafa, Nguyen & Gao, 2024)

In elementary education, particularly at the grade VI level, pupils are at a stage where they begin to develop deeper understanding and independence in learning. The use of multimedia resources, educational applications, and online platforms can support different learning styles and make lessons more meaningful and engaging. This is evident in the findings where pupils reported very high engagement across behavioral, emotional, and cognitive domains when technology was used in instruction (Astin & Bond 2020). However, the successful implementation of technology in the classroom depends on several factors, including the availability of resources, teacher competence, and the learning environment (Buabeng-Andoh, 2012). In this study, technology integration in terms of both operational and pedagogical aspects was rated very high by pupils, indicating that digital tools are accessible and actively utilized by teachers (Koehler & Mishra 2022). Teachers also reported using various tools such as laptops, videos, and online quizzes along with interactive strategies to engage students.

In rural schools, the integration of technology presents unique challenges. Limited access to devices, unstable internet connectivity, and insufficient technical support often hinder the effective use of digital tools. These challenges were strongly affirmed by both students and teachers, with issues such as lack of training, poor internet connections, and limited resources emerging as major concerns (Trucano, 2022). Despite these challenges, many educators continue to explore innovative ways to incorporate technology into their teaching practices. The rapid advancement of technology has significantly transformed the landscape of education, making digital literacy and technology integration essential components of effective teaching and learning (Falloon, 2020). Students are expected to develop not only academic knowledge but also technological skills that prepare them for future academic and professional environments. While many studies highlight the benefits of technology-enhanced instruction, this study provides localized evidence showing that technology integration is already highly

practiced in rural schools, as reflected by the very high ratings in both operational and pedagogical aspects (Eynon, 2023).

These findings imply that student engagement is also very high when technology is integrated into instruction, particularly in terms of emotional and cognitive engagement (Bond, 2020). Pupils demonstrated increased motivation, curiosity, and persistence when using digital tools, indicating that technology plays a meaningful role in enhancing the learning experience. However, despite these positive outcomes, the statistical analysis revealed that the relationship between technology integration and student engagement is strong and significant (Yigit, Artun & Okur, 2022). This suggests that technology alone does not guarantee improved engagement and that other factors, such as teaching strategies and learning environment, may have a greater influence.

In the Philippine context, this gap is particularly evident in rural schools where resources, infrastructure, and access to digital tools are limited. The findings of this study strongly support this reality, as both students and teachers identified major contextual challenges such as unstable internet connection, limited devices, lack of training, and insufficient technical support (Mishra & Koehler). These barriers hinder the full potential of technology integration and limit its effectiveness in enhancing student engagement.

Statement of the problem

This study aims to investigate the technology integration, student engagement, and contextual experiences encountered by the Grade VI pupils in Mompeller Elementary School and Colawin Elementary School during the School Year 2025-2026 as bases for a proposal.

To achieve these objectives, the study seeks to answer the following research questions:

1. What is the level of technology integration in terms of operational technologies and pedagogical technologies?
2. What is the level of student engagement in terms of behavioral, emotional, and cognitive engagement?
3. Is there a significant relationship between the level of technology integration and the level of student engagement?
4. What are the primary contextual experiences encountered by students and teachers in Mompeller Elementary School and Colawin Elementary School in integrating technology into the classroom?
5. What proposal can be crafted based on the findings of the study?

METHODOLOGY

This study employed an embedded mixed-methods research design, specifically a quantitative dominant design with an embedded qualitative component. According to Creswell and Clark, an embedded mixed-methods design is appropriate when one type of data serves as the primary source of evidence while another type of data is integrated to provide deeper explanation, clarification, and contextual understanding of the results. In this study, the quantitative component served as the primary method, while the qualitative component was embedded to support and enrich the interpretation of the statistical findings. The quantitative phase focused on determining the level of technology integration and the level of student engagement among Grade VI pupils of Mompeller Elementary School and Colawin Elementary School. Specifically, the study measured operational and pedagogical technology integration as well as behavioral, emotional, and cognitive engagement through the use of a

modified survey questionnaire. Quantitative data were analyzed using weighted mean and Pearson r correlation.

The use of the embedded mixed-methods design was justified because the study did not only aim to measure variables statistically but also sought to understand the contextual realities behind the numerical results (Yu & Khazanchi, 2017). While the quantitative data identified the extent of technology integration and student engagement, the qualitative data explained the experiences, barriers, and contextual challenges encountered by both teachers and students in integrating technology in rural classroom settings. The qualitative findings therefore served to complement, validate, and deepen the interpretation of the quantitative results. The qualitative component was embedded within the quantitative phase through semi-structured interviews conducted with teacher respondents. These interviews explored the actual experiences of teachers regarding technology utilization, instructional practices, internet connectivity, availability of devices, technical support, and challenges encountered during technology integration. The qualitative data were analyzed using thematic analysis. In this study, thematic analysis refers to the systematic process of identifying, organizing, analyzing, and interpreting recurring themes and patterns from the interview responses of teacher participants from Mompeller Elementary School and Colawin Elementary School. Through thematic analysis, the common issues and experiences related to technology integration were categorized into meaningful themes, allowing the researcher to explain and support the quantitative findings more comprehensively.

Furthermore, the Pearson r correlation was utilized in the quantitative phase to determine whether a significant relationship existed between the level of technology integration and the level of student engagement (Swayne, 2017). Pearson r was appropriate because the study examined the relationship between two measurable variables gathered through Likert scale responses. Specifically, the test measured both the strength and direction of the relationship between technology integration and student engagement. Through Pearson r , the researcher was able to determine whether higher levels of technology integration were associated with higher levels of student engagement among the participants of the survey questionnaire. By integrating the statistical findings with qualitative explanations, the embedded mixed-methods design strengthened the overall interpretation of the study and provided a more comprehensive understanding of technology integration and student engagement in rural elementary school contexts (Thaung, 2025).

The study was conducted in two rural public schools in the District of Argao 2, Argao, Province of Cebu, namely Mompeller Elementary School and Colawin Elementary School, where 20 Grade VI pupils from each school served as respondents during the School Year (SY) 2025–2026. The study involved Grade VI pupils from two rural public elementary schools in Argao, Cebu, Mompeller Elementary School and Colawin Elementary School. One section from each school was selected to participate, ensuring representation of learners from both institutions. In Mompeller Elementary School, twenty (20) Grade VI pupils and one (1) teacher participated in the study. Similarly, in Colawin Elementary School, twenty (20) Grade VI pupils and one (1) teacher were also included as respondents. Overall, the study consisted of forty (40) pupil respondents and two (2) teacher respondents, for a total of forty-two (42) respondents. This distribution provided balanced representation from both schools, allowing a more reliable comparison of technology integration and student engagement within similar rural educational settings.

The study employed two research instruments, a modified survey questionnaire and an interview guide. The questionnaire, adapted from existing validated tools, was designed to measure the level of technology integration and student engagement among Grade VI pupils. It consisted of two parts: technology integration, which covered operational technologies such as devices and connectivity, and pedagogical technologies related to instructional use of digital

tools; and student engagement, which examined behavioral, emotional, and cognitive dimensions using a Likert scale. To complement the quantitative data, a semi-structured interview guide was used to explore the contextual challenges teachers and students face in integrating technology, focusing on open-ended questions that captured their perceptions, experiences, and difficulties. Together, these instruments provided both measurable and descriptive insights into how technology integration affected student engagement in rural elementary schools.

The data collected in this study were analyzed using both quantitative and qualitative methods to provide a comprehensive understanding of technology integration, student engagement, and contextual challenges in rural elementary schools. For the quantitative data obtained from the modified survey questionnaire, descriptive statistics such as frequency counts, percentages, and weighted means were used to determine the levels of technology integration and student engagement (Swayne, 2017). To examine the relationship between technology integration and student engagement, the Pearson r correlation coefficient was employed. This statistical tool identified whether a significant relationship existed between the two variables and the strength of such association.

For the qualitative data gathered through semi-structured interviews, responses were transcribed and analyzed using a thematic analytical framework. In analyzing the qualitative data gathered from semi-structured interviews, this study employed a thematic analysis framework to systematically identify, organize, and interpret patterns of meaning related to technology integration and contextual challenges. The process followed a structured set of steps to ensure credibility, consistency, and depth of interpretation. First, data familiarization was conducted by carefully reading and reviewing the interview transcripts multiple times. This step allowed the researcher to gain a comprehensive understanding of the participants' responses and to become immersed in the data. Initial observations and recurring ideas were noted during this stage. Second, initial coding was performed by identifying significant statements, phrases, and keywords from the responses. These codes represented meaningful units of information related to the research objectives, such as types of technology used, engagement strategies, and challenges encountered by teachers and students. Third, the researcher proceeded with searching for themes, where related codes were grouped together to form broader categories. For instance, codes related to internet issues, device shortages, and lack of access were clustered under a common theme of infrastructure challenges, while codes related to lack of skills and training were grouped under capacity building concerns.

Fourth, reviewing and refining themes was undertaken to ensure that each theme accurately represented the data. Themes were checked against the original responses to confirm their relevance and consistency. Any overlapping or unclear themes were revised or merged to improve clarity. Fifth, defining and naming themes was carried out by clearly describing the essence of each theme and assigning appropriate labels. These themes were aligned with the study's focus on technology integration and contextual challenges, ensuring that they directly addressed the research questions. Finally, interpreting and presenting the themes involved linking the identified themes to the quantitative findings and existing literature. The themes were used to explain and support the results of the study, particularly in understanding the contextual challenges faced by teachers and students in integrating technology. Recurring themes and patterns were identified to highlight the contextual challenges faced by teachers and students in integrating technology into classroom instruction. This process provided deeper insights into the lived experiences of the participants, complementing the quantitative findings.

RESULTS AND DISCUSSION

This chapter presents a detailed data presentation, analysis, and interpretation of data gathered from forty (40) pupil respondents in Mompeller Elementary School and Colawin Elementary School, and two (2) teacher respondents, to assess the impact of technology integration in classroom instruction on student engagement and learning outcomes.

The level of technology integration as perceived by the respondents was measured across two categories, namely Operational Technology, which pertains to access and infrastructure, and Pedagogic Technology, which pertains to teaching and learning application. Results were presented using mean scores and verbal interpretations, with all statements rated on a scale that classified scores as strongly agree across all items. The overall grand mean of 4.49 indicated a very high level of integration, with both operational and pedagogical aspects rated very high. Within the Operational Technology category, which focused on access, availability, and functional support of technology for learning, the availability of digital devices such as computers, tablets, and phones obtained a mean score of 4.75, rated as strongly agree, representing the most positively rated item and indicating that pupils strongly confirmed that digital tools were readily accessible for their schoolwork. The actual mean for Operational Technology Integration was 4.51, rated as strongly agree, indicating that pupils strongly agreed that the school provided functional and accessible technology infrastructure. Within the Pedagogic Technology category, which focused on how technology is used in teaching and completing learning tasks, teachers' use of technology such as PowerPoint, videos, and online platforms for lessons obtained a mean score of 4.70, rated as strongly agree, indicating that pupils strongly confirmed that their teachers actively incorporated technology into instruction, making this the top-rated pedagogic practice. The actual mean for this category was 4.43, rated strongly agree, indicating strong agreement that technology was effectively integrated into teaching and learning activities. The grand mean of 4.49, verbally interpreted as Very High across all measures, indicated that Grade VI pupils from Mompeller and Colawin Elementary Schools held a highly positive perception of technology integration, with access to digital devices and teachers' use of technology in lessons emerging as the most highly rated areas, reflecting strong infrastructure and teacher engagement.

The findings imply a very high level of technology integration with a grand mean of 4.49, with both the operational mean of 4.51 and the pedagogical mean of 4.43 rated as strongly agree. The highest rated indicators included access to digital devices with a mean score of 4.75 and teachers' use of technology in instruction with a mean score of 4.70. These results indicate that both schools successfully integrated technology in terms of availability and instructional use, with teachers actively incorporating digital tools into their teaching and students having sufficient access to these resources. However, the slightly lower rating on technology improving understanding suggests that access alone does not automatically translate to improved learning outcomes. This finding supports the study of Eynon (2023) and other scholars who argue that technology integration is most effective when aligned with pedagogy, and it is consistent with the TPACK framework of Koehler and Mishra, which emphasizes that effective technology use requires the integration of content, pedagogy, and technology.

With respect to technology integration as perceived by teachers, the technologies used in the classroom included laptops, televisions, PowerPoint presentations, videos, online quizzes, and mobile phones, while the strategies employed to engage students using technology included interactive activities, group tasks, and video-based discussions. The responses from the two teachers of Mompeller Elementary School and Colawin Elementary School showed that technology integration was present in their classrooms through the use of various digital tools and teaching strategies. In terms of technology used, both teachers reported utilizing devices such as laptops, televisions, and mobile phones, along with instructional materials like

PowerPoint presentations, videos, and online quizzes, indicating that teachers incorporated both hardware and software to support lesson delivery. These tools were commonly used to present information, demonstrate concepts, and assess student learning in a more interactive and modern way. Regarding strategies to engage students, the teachers highlighted the use of interactive activities, group tasks, and video-based discussions, suggesting that technology was used not only for presentation but also for active learning, with interactive activities and online quizzes encouraging participation, group tasks promoting collaboration among students, and video-based discussions helping students better understand lessons by connecting visual content with guided conversation. These findings imply that teachers integrate technology in a practical and student-centered manner, and by combining digital tools with interactive strategies, they are able to create a more engaging and collaborative learning environment that supports both participation and understanding.

The level of student engagement was assessed across three dimensions, namely Behavioral, which covered pupils' actions and participation, Emotional, which covered pupils' feelings and motivation, and Cognitive, which covered pupils' mental effort and thinking. Results were measured using mean scores and verbal interpretations, with all items rated as Strongly Agree, indicating consistently high engagement when technology is integrated. The overall grand mean of 4.50 indicated a very high level of engagement, with cognitive engagement receiving the highest rating. Within the Behavioral dimension, which focused on active participation, attention, and task completion, paying more attention during lessons with digital tools obtained a mean score of 4.50, implying that technology was most effective in capturing and holding pupils' focus, making this the strongest behavioral indicator. The actual mean for this dimension was 4.45, verbally interpreted as very high, signifying that overall, pupils demonstrated strong positive behavioral responses to technology in learning. Within the Emotional dimension, which focused on enjoyment, motivation, and curiosity, excitement to explore new applications or platforms introduced in class obtained a mean score of 4.70, rated as strongly agree, representing the highest rated item across the whole table and indicating that pupils were highly curious and enthusiastic about new digital tools, showing strong intrinsic interest. The actual mean for this dimension was 4.52, verbally interpreted as very high, signifying that technology created a highly positive emotional learning experience, with curiosity being the strongest driver. Within the Cognitive dimension, which focused on effort, deep understanding, and persistence, continuing to work on difficult tasks if technology helps obtained a mean score of 4.60, rated as strongly agree, implying that technology acted as a powerful support for persistence, with pupils willing to tackle hard work when digital tools made learning easier. The actual mean for this dimension was 4.53, verbally interpreted as very high, signifying that technology effectively supported deeper thinking and sustained learning effort. The grand mean of 4.50, rated strongly agree and verbally interpreted as very high, indicated that across all areas, Grade VI pupils from both Mompeller Elementary School and Colawin Elementary School reported very high engagement when technology was part of learning, with pupils being most excited about exploring new digital tools, obtaining a mean score of 4.70 and showing strong curiosity and openness to innovation. All three engagement dimensions scored above 4.40, meaning technology positively impacted what pupils did, how they felt, and how they thought during lessons.

It is evident from the study that the use of technology successfully drives meaningful engagement, keeping pupils attentive, making learning enjoyable, and encouraging them to put in mental effort and persist through challenges, confirming that integrating technology is an effective strategy to boost learner engagement in these schools. The results show a very high level of student engagement with a grand mean of 4.50, with emotional engagement at a mean

of 4.52 and cognitive engagement at a mean of 4.53 slightly higher than behavioral engagement at a mean of 4.45. The highest rated indicator was students' excitement in exploring new digital tools with a mean score of 4.70. These findings imply that technology integration significantly enhances students' motivation, curiosity, and persistence in learning, and the strong emotional and cognitive engagement suggests that students are not only participating but also deeply involved in the learning process. This aligns with the Engagement Theory of Astin, which emphasizes that students learn more effectively when actively involved, and it also supports the findings of Bond (2020), who found that technology enhanced environments increase motivation and participation. Technology is therefore an effective tool for promoting holistic student engagement, and schools should continue integrating interactive and multimedia-based strategies to sustain high levels of learner involvement.

The following actual statements were gathered from the semi structured interviews conducted with the two teacher participants from Mompeller Elementary School and Colawin Elementary School regarding student engagement during technology integrated instruction. In terms of behavioral engagement, Teacher A from Mompeller Elementary School stated, "The students are more active when technology is used in the classroom. They really participate, especially when there are videos and online activities." Teacher B from Colawin Elementary School also shared, "If we use PowerPoint and online quizzes, they become more attentive and they can finish their tasks faster." These statements indicate that students became more participative, attentive, and willing to complete classroom activities when digital tools were integrated into instruction. Regarding emotional engagement, Teacher A from Mompeller Elementary School expressed, "The pupils get excited whenever there are new apps or videos that we show. It seems like they become more motivated to attend class." Similarly, Teacher B from Colawin Elementary School mentioned, "It can really be seen that they are motivated when the activity is technology based because they enjoy while learning." These responses suggest that technology integration creates enjoyment, excitement, and motivation among learners, making the classroom experience more engaging and meaningful. For cognitive engagement, Teacher A from Mompeller Elementary School explained, "When technology is used, the children become more curious. They ask questions and want to better understand the lesson." Teacher B from Colawin Elementary School further stated, "Even if the activity is difficult, they still make an effort as long as there are videos or digital activities that can help them." These statements reveal that students exert greater effort, show persistence in difficult tasks, and demonstrate deeper understanding when technology supports the learning process. Therefore, the actual statements of the teacher participants confirm that technology integration positively influences students' behavioral, emotional, and cognitive engagement, with teachers observing that learners become more active, motivated, curious, and persistent when digital tools and interactive activities are incorporated into classroom instruction.

The significant relationship between the level of technology integration and the level of student engagement was examined based on the study of 40 Grade VI pupils from Mompeller Elementary School and Colawin Elementary School. This analysis examined whether there was a meaningful link between how much technology was integrated in learning and how engaged pupils were, using correlation analysis through the r value and significance testing through the p value, with a standard significance level set at 0.05 or 5%. The grand mean of technology integration of 4.49 and student engagement of 4.50 both fell under strongly agree, confirming that pupils perceived high levels of both technology use and engagement in their learning.

The contextual challenges encountered by students and teachers in the integration of technology in classroom instruction were also examined. The overall grand mean of 4.53, verbally interpreted as Very High, indicated that respondents strongly agreed that the identified challenges were seriously and consistently experienced in the teaching and learning process. In terms of severity, this result means that the barriers affecting technology integration were not

minimal or occasional but were considered highly evident and severe enough to affect the effectiveness of digital learning implementation in Mompeller Elementary School and Colawin Elementary School. Among the indicators, the lack of training obtained the highest mean score of 4.60, which signifies that insufficient knowledge and skills in technology utilization was the most severe challenge experienced by both students and teachers, meaning that although technology was available and being used in class, many users still felt inadequately prepared to maximize digital tools effectively in classroom instruction and learning activities. This finding implies that the success of technology integration does not depend solely on the presence of devices but also on the capability and readiness of users to utilize them properly. The second highest challenge was poor internet connectivity with a mean score of 4.55, also interpreted as Very High, indicating that unstable or weak internet connection was a major barrier that disrupted classroom activities, delayed access to online resources, and limited the continuity of technology supported instruction, since many digital tools and platforms require stable connectivity, and unreliable internet service reduces the effectiveness of technology integration in rural classroom settings. Similarly, the lack of technical support obtained a mean score of 4.52, indicating that respondents experienced significant difficulty whenever technical problems arose, meaning that teachers and students had limited access to immediate assistance for troubleshooting devices, software, or connectivity issues, resulting in interruptions during lessons and reduced confidence in using technology consistently. The indicator limited devices received a mean score of 4.50, interpreted as Very High, implying that the availability of gadgets and digital tools remained insufficient for the number of learners, which limits equal participation among students and prevents the full implementation of technology-based activities, especially in large classroom settings. Meanwhile, large class size obtained the lowest mean score of 4.48, although it still fell under the Very High interpretation, meaning that managing technology integration becomes more difficult when teachers handle many learners at the same time, as monitoring students, assisting those with technical concerns, and ensuring active participation become more challenging in crowded classrooms. Hence, the grand mean of 4.53 confirms that the contextual challenges experienced by both students and teachers are highly severe and significantly affect the implementation of technology integration in the classroom. These findings imply that while technology integration and student engagement are both rated highly, the effectiveness and sustainability of technology supported learning are greatly constrained by infrastructure limitations, insufficient training, lack of technical support, and resource shortages, and addressing these severe challenges is essential to improve the quality, consistency, and effectiveness of technology integration in rural elementary schools.

These items were identified following the semi structured interviews conducted, namely weak or unstable internet connection, limited devices available, unavailability of WIFI connection in school, lack of training in technology utilization, and lack of technical support for technology troubleshooting. The semi structured interviews with teachers validated the students' experiences and identified additional operational barriers. First, weak or unstable internet connection matched the pupils' top infrastructure concern, and teachers found it hard to deliver smooth lessons when connectivity was inconsistent. Second, limited devices available reinforced the students' finding that hardware shortages restricted regular and equal use of technology. Third, unavailability of school WiFi meant that even when devices existed, the lack of dedicated school wide internet access further limited usage. Fourth, lack of training in technology utilization meant that teachers themselves reported needing more professional development to effectively integrate tools into lessons, which explains why students also reported a lack of guidance. Lastly, lack of technical support for troubleshooting meant that

when devices or internet failed, there was no immediate assistance available, causing delays and interruptions during teaching. Both students and teachers face the same core issues with limited devices, poor connectivity, and lack of training and skills, creating a double barrier in which students struggle to use tools while teachers struggle to deliver them effectively. Skill gaps are critical for students, needing more training is the top challenge for teachers, and lack of training is a key issue, suggesting that capacity building for both learners and educators is essential. In addition, infrastructure remains a bottleneck, as connectivity and device shortages are consistently ranked high, meaning improvements in hardware and internet access are necessary before the full benefits of technology can be realized. Large class sizes and lack of technical support further reduce the effectiveness of technology use, compounding the other challenges. While technology integration is well received and engagement is high, these challenges prevent the schools from fully maximizing its impact, and addressing training needs, improving connectivity and device availability, and providing technical and instructional support will help overcome these barriers and create a more seamless and effective technology enhanced learning environment for both students and teachers.

The findings imply that both students and teachers experience significant challenges with a grand mean of 4.53, with the most critical issue being the need for more training, having a mean score of 4.60, followed by poor internet connectivity and lack of guidance. Despite high levels of technology integration, these challenges hinder its full effectiveness, and the lack of training affects both teachers and students, limiting their ability to maximize digital tools for learning. This supports the findings of Trucano, who highlighted that infrastructure and capacity building are major barriers in rural technology integration, and it also aligns with local studies emphasizing issues in connectivity and teacher readiness. It is implied that addressing these challenges is critical to improving the effectiveness of technology integration, and schools must invest in training, infrastructure, and technical support to fully realize the benefits of digital learning.

The qualitative data gathered from teacher interviews revealed several key contextual challenges affecting the effective integration of technology in the classroom, including weak or unstable internet connection, limited availability of devices, absence of school wide Wi Fi access, lack of training in technology utilization, and insufficient technical support for troubleshooting. These findings are consistent with the quantitative results reported by students, indicating a shared experience of barriers that hinder the optimal use of technology in teaching and learning. The issue of unstable internet connectivity and lack of Wi Fi access significantly limits teachers' ability to deliver uninterrupted, technology supported instruction. Even when teachers are willing to integrate digital tools such as videos, online quizzes, and interactive platforms, poor connectivity disrupts lesson flow and reduces the effectiveness of these tools. This challenge justifies why, despite high levels of technology integration, the relationship between technology use and student engagement remains strong, as consistent access is a critical factor in sustaining meaningful learning experiences. Similarly, the limited availability of devices restricts the extent to which teachers can implement student centered, technology-based activities. When devices are insufficient, teachers are often forced to rely on teacher centered approaches, such as presentations instead of interactive tasks, thereby reducing opportunities for active participation and collaboration among students, a limitation that affects the depth of engagement, particularly in the behavioral and cognitive domains. Another major concern is the lack of training in technology utilization, which directly affects teachers' confidence and competence in integrating digital tools effectively, since without adequate professional development, teachers may use technology only at a basic level, such as for presentation, rather than as a tool for facilitating higher order thinking and interactive learning. Effective technology integration requires not only access to tools but also the integration of technological, pedagogical, and content knowledge, and the lack of training

therefore explains why high availability of technology does not necessarily lead to significantly higher engagement outcomes (Mishra & Koehler). Furthermore, the absence of technical support creates additional challenges, as teachers have no immediate assistance when technical issues arise, resulting in delays, interruptions, and, in some cases, the abandonment of technology-based activities altogether, and as a result, teachers may become less motivated to consistently integrate technology, despite recognizing its potential benefits. These findings are supported by the work of Michael Trucano, who highlighted that infrastructure limitations, lack of capacity building, and insufficient support systems are common barriers to successful technology integration, particularly in rural educational settings, and the alignment between teacher reported challenges and student experiences further strengthens the validity of the findings, indicating that these issues are systemic rather than isolated.

The findings imply that the challenges identified among teachers suggest that improving technology integration requires more than just providing devices. Schools must adopt a comprehensive approach that includes strengthening internet infrastructure, ensuring equitable access to devices, providing continuous professional development, and establishing reliable technical support systems, as addressing these factors will enable teachers to use technology more effectively, thereby enhancing student engagement and maximizing the educational benefits of digital tools. Taken together, the findings of this study demonstrate a very high level of technology integration with a grand mean of 4.49, a very high level of student engagement with a grand mean of 4.50, and a shared perception of severe contextual challenges with a grand mean of 4.53, all of which directly address the objectives of the study concerning the level of technology integration, the level of student engagement, the relationship between these two variables, and the contextual challenges encountered by students and teachers in rural elementary school settings. These results contribute to the broader understanding of technology supported instruction by illustrating that while access to devices and active teacher use of digital tools are strongly established, the sustainability and full effectiveness of technology integration remain constrained by infrastructure limitations, insufficient training, and inadequate technical support, underscoring the need for a comprehensive and capacity driven approach to digital learning in rural educational contexts. These findings, together with their implications, provide the empirical foundation for the summary, conclusions, and recommendations presented in the succeeding chapter.

CONCLUSION

The current study was able to prove that while use of quick technology in the schools as applied to the operation of the rural elementary schools is apparent, nevertheless, its essence lies not in perhaps the presence of the technology, but in the quality of its use for instructional purposes and its utility in the context were intended due to other overheads required for efficient optimum use. It was found that when Grade VI learners from Mompeller Elementary School and Colawin Elementary School, use technology in classroom instruction, their behavioral, emotional and cognitive engagement are very high, meaning they are more alert, participative, motivated, curious, and determined to finish the learning tasks assigned for them; the learning environment becomes interactive and more meaningful.

Although the participants are generally favorable in their perceptions towards use of technology in the classroom or perceived that they easily adapted to its use, t-test showed only a negligible correlation exists in both and so it is not statistically significant. This indicates that technology does not automatically guarantee a better learner's engagement and performance of learning tasks without the teacher's capability to use technology to her own advantage or the

readiness of the learners themselves or ecologic support from the community. Hence, the researcher agrees with those in favor of stating, that it is the favorable attitudes or meaningful engagement that results in the use of technology in school not the technology itself. One learns as an active partner in the process, thus, engagement also relies on other factors. Various studies assert that the integration of technology in basic education, especially in the rural areas of the Philippines, can help the learner achieve what they intend to be in the future, although some pointed out that like we've mentioned earlier, there are still a lot of struggles that could hinder. Particularly, unstable internet connection, not enough digital devices, no technical support, or training, and teacher-pupil ratio very high makes it hard to sustain let alone adapt. The study also finds that merely thrusting the technology to the schools, may not solely help -a balance of offices handling necessary, as well that provide sustainability operating situations. It gives emphasis on this phenomenon, particularly in rural areas where there are many barriers each day. Would be much appreciate to incorporate not only pedagogy where it befalls mostly on their part, but also on infrastructure, teacher training, computer literacy of the teacher and pupil, and institutional and community support.

Ultimately, this study contributes to the growing discourse on technology integration in basic education by providing localized empirical evidence from rural Philippine schools. It advances the understanding that technology integration should not be viewed as a purely technical intervention, but as a transformative educational process, that requires the convergence of pedagogy, accessibility, teacher preparedness, and contextual responsiveness. Hence, strengthening these interconnected dimensions is essential in achieving inclusive, engaging, and sustainable technology-enhanced education capable of responding to the evolving demands of 21st-century learning.

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