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Evidence-Based Enhancement Plan to Optimize Technology Integration for Improved Teachers' Instructional Productivity and Learners' Engagement

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ABSTRACT

This study examined the relationship between technology integration, teachers' instructional productivity, and learners' engagement in selected public elementary schools in Zone 2, Guindulman District, Schools Division of Bohol, Philippines, during School Year 2026–2027. Using a descriptive-correlational research design, data were collected from 178 respondents comprising three school heads, 35 teachers, and 140 learners through adapted and modified questionnaires. Data were analyzed using frequency, percentage, weighted mean, and Spearman's rank-order correlation. Results revealed that technology integration was highly integrated (M = 3.70), teachers' instructional productivity was highly productive (M = 3.72), and learners' engagement was highly engaged (M = 3.55). Technology integration demonstrated significant positive relationships with teachers' instructional productivity ($\rho = 0.635$, $p < .001$) and learners' engagement ($\rho = 0.490$, $p = .003$). The study concludes that purposeful technology integration is associated with greater instructional productivity and learner engagement. Accordingly, implementing an evidence-based enhancement plan that prioritizes teachers' technological competence and confidence, differentiated and personalized instruction, and cognitive engagement is recommended. The study's localized setting, questionnaire-based assessments, and correlational design limit its generalizability and causal interpretation. Nevertheless, the findings provide empirical evidence for strengthening technology-supported instructional practices, professional development, and school-level decision-making. The study advances Sustainable Development Goal 4 (Quality Education) and contributes to educational, technological, and institutional sustainability through responsible digital resource utilization, continuous teacher development, and meaningful learner engagement.

Keywords: *Cognitive Engagement, Digital Competence, Elementary Education, Enhancement Plan, Instructional Productivity, Learners' Engagement, Technology Integration*

1. INTRODUCTION

The rapid advancement of digital technology has transformed education, providing innovative resources that support instructional productivity and learners' engagement. Effective technology integration requires teachers' digital competence, confidence, and pedagogical knowledge to align technological resources with instructional objectives (Stringer et al., 2022; Sofwan et al., 2024; Consoli et al., 2023; Wohlfart & Wagner, 2023). Moreover, technology facilitates lesson preparation, classroom management, assessment, and feedback, although challenges such as technostress and emotional exhaustion may affect instructional performance (Chen et al., 2026). Similarly, purposeful technology utilization promotes learners' motivation, participation, and collaboration while supporting inclusive and equitable education (Topping et al., 2022; Antonietti et al., 2023; UNESCO, 2023). In the Philippines, the Digital Rise Program and the DepEd Computerization Program strengthen digital competencies and access to educational resources (Department of Education, 2022, 2024). At the local level, Caresosa (2024) established significant associations between technology-based teaching practices, teachers' competence, and work values, while Mula and Bucar (2023) identified persistent ICT utilization challenges despite effective computerization initiatives. Against this background, the study examined the relationship between technology integration, teachers' instructional productivity, and learners' engagement in selected public elementary schools in Zone 2, Guindulman District, Schools Division of Bohol, as a basis for developing an evidence-based enhancement plan to optimize technology-supported instruction.

Research Problem

Despite increasing investments in educational technology, access to digital resources does not necessarily guarantee effective instruction or meaningful learner engagement. Successful technology integration requires technological competence, pedagogical alignment, confidence, and institutional support (Msafiri et al., 2023; Alieto et al., 2024). Teachers' perceptions of usefulness and digital competence also shape their willingness to adopt educational technologies (Aslan Altan et al., 2024). Moreover, inappropriate technology use may create classroom distractions and interfere with learning activities (Deng et al., 2022). Effective integration therefore requires purposeful instructional strategies, appropriate classroom management, and technology-supported assessment practices (Børte et al., 2023). Although previous studies in Bohol have examined technology-based teaching practices, computer literacy, and computerization initiatives (Caresosa, 2024; Mula & Bucar, 2023), limited localized evidence exists regarding the relationship between technology integration, teachers' instructional productivity, and learners' engagement. This study addressed this gap among school heads, teachers, and learners of Guio-ang Elementary School, Basdio Elementary School, and Trinidad Elementary School, providing empirical evidence for instructional improvement and technology-supported educational planning.

Assumptions of the Study

The study assumed that purposeful technology integration, supported by teachers' technological competence and confidence, is associated with efficient instructional practices and meaningful learning experiences (Zeng et al., 2022; Gomez et al., 2022; Aslan Altan et al., 2024). It further assumed that appropriately designed technology-supported activities may strengthen learners' behavioral, cognitive, emotional, collaborative, and sustained engagement (Ryan, 2023; Reschly & Christenson, 2022; Martin & Borup, 2022). The study tested the null hypotheses that no significant relationship existed between technology integration and teachers' instructional productivity and between technology integration and learners' engagement at the 0.05 level of significance.

Objectives of the Study

This study aimed to assess technology integration and its relationship with teachers' instructional productivity and learners' engagement in selected public elementary schools in Zone 2, Guindulman District, Schools Division of Bohol, during School Year 2026–2027. Specifically, it sought to describe the demographic and professional profiles of school heads and teachers, determine the extent of technology integration, assess teachers' instructional productivity, and evaluate learners' engagement across their respective dimensions. Furthermore, it examined the significant relationships between technology integration and both instructional productivity and learners' engagement. Ultimately, the findings served as the basis for developing an evidence-based enhancement plan to optimize technology-supported teaching and learning.

Theoretical or Conceptual Basis

The study was anchored in complementary theories explaining technology integration, instructional productivity, and learners' engagement. The Technological Pedagogical Content Knowledge (TPACK) Framework emphasizes the alignment of technological, pedagogical, and content knowledge (Mishra et al., 2023; Sofwan et al., 2024; Zeng et al., 2022), while the Technology Acceptance Model (TAM) explains technology adoption through perceived usefulness and ease of use (Aslan Altan et al., 2024). Similarly, the Substitution, Augmentation, Modification, and Redefinition (SAMR) Model emphasizes technology's progression from instructional enhancement to transformative learning (Bicalho et al., 2023). Regarding instructional productivity, Walberg's Educational Productivity Theory highlights instructional quality and resource utilization (Bentsi-Enchill, 2024), complemented by Taylor's Efficiency Theory, which emphasizes systematic planning and efficient resource management (OECD, 2023, 2024). Meanwhile, Self-Determination Theory (SDT) explains motivation through autonomy, competence, and relatedness (Ryan, 2023; Chiu et al., 2024), while Learner Engagement Theory emphasizes multidimensional participation in learning (Reschly & Christenson, 2022; Martin & Borup, 2022). Building on these foundations, technology integration encompasses frequency of use, purposefulness, pedagogical alignment, teacher competence and confidence, management of off-task potential, and feedback and assessment integration (Yılmaz Ergül & Taşar, 2023; Veridiano & Brondo, 2023; Alieto et al., 2024). These dimensions emphasize meaningful technology utilization, classroom management, and effective assessment practices (Antonietti et al., 2023; Consoli et al., 2023; Deng et al., 2022; Børte et al., 2023; Muslu & Siegel, 2024). Correspondingly, teachers' instructional productivity encompasses task efficiency, instructional flow, learner-focused maintenance, feedback and assessment turnaround, and differentiation and personalization capability (Alp Christ et al., 2024; OECD, 2023, 2024; Ouwehand et al., 2022). These dimensions support instructional efficiency and responsiveness to diverse learning needs (Xuan et al., 2022; Eikeland & Ohna, 2022; Kahmann et al., 2022). Likewise, learners' engagement encompasses behavioral and cognitive involvement (Wang et al., 2022; Lawson et al., 2023), emotional participation (Abulela et al., 2023; Huang, 2026), interaction and collaboration, and sustained engagement (Zhao & Cao, 2023; Gherghel et al., 2023; Katsantonis, 2024; Rautanen et al., 2022). Empirical studies highlight the potential of technology-supported activities to strengthen multidimensional engagement (Drljević et al., 2022; Nikou, 2024; Maričić & Lavicza, 2024; Wong et al., 2024), while collaborative digital environments support meaningful participation and motivation (Cho et al., 2022; Meyer & Turner, 2022; Chzhen et al., 2022; Ong et al., 2023). Furthermore, Philippine educational policies reinforce digital transformation, professional development, and instructional efficiency (Department of Education, 2022, 2024). Collectively, these foundations support the examination of the relationships among the study variables and the development of an evidence-based technology integration enhancement plan.

This study aligns primarily with SDG 4 – Quality Education, which promotes inclusive and equitable quality education and lifelong learning opportunities. It supports Target 4.1 through its emphasis on effective elementary education, Target 4.a through technology-supported learning environments, and Target 4.c through the development of teachers' technological and instructional competencies (United Nations, 2025). The study also contributes to educational, technological, and institutional sustainability through purposeful digital resource utilization, continuous professional development, instructional efficiency, and sustained learner engagement. These contributions are consistent with UNESCO's (2023) emphasis on evidence-based and inclusive technology integration. Through the proposed enhancement plan, the study provides a foundation for continuous instructional improvement, responsible technology utilization, and institutional capacity-building, supporting the long-term sustainability of quality teaching and learning in public elementary schools.

2. METHODOLOGY

Research Design

The study utilized a descriptive-correlational research design to determine the extent of technology integration, the level of teachers' instructional productivity, and the level of learners' engagement. The descriptive component examined the respondents' profiles and assessments of the study variables, while the correlational component determined whether significant relationships existed between technology integration and teachers' instructional productivity and between technology integration and learners' engagement.

Research Locale or Study Setting

The study was conducted in three selected public elementary schools in Zone 2 of Guindulman District, Schools Division of Bohol, Philippines, namely Guio-ang Elementary School, Basdio Elementary School, and Trinidad Elementary School, during School Year 2026–2027. These schools provided a localized educational setting for examining technology integration, instructional practices, and learners' engagement within their respective communities.

Participants or Data Sources

The study involved 178 respondents, comprising three school heads, 35 teachers, and 140 learners. Guio-ang Elementary School contributed 66 respondents, consisting of one school head, 13 teachers, and 52 learners. Basdio Elementary School contributed 41 respondents, comprising one school head, eight teachers, and 32 learners, while Trinidad Elementary School contributed 71 respondents, consisting of one school head, 14 teachers, and 56 learners. School heads and teachers assessed technology integration and teachers' instructional productivity, while teachers and learners evaluated learners' engagement. Their participation provided perspectives relevant to the assessment of technology-supported teaching and learning.

Research Instruments or Materials

The study utilized survey questionnaires adapted from previously validated instruments and relevant literature, with modifications aligned with the research objectives. The instrument comprised four parts: respondents' demographic and professional profiles; technology integration, covering frequency of use, purposefulness, pedagogical alignment, teacher competence and confidence, management of off-task potential, and feedback and assessment integration (Yılmaz Ergül & Taşar, 2023; Veridiano & Brondo, 2023; Alieto et al., 2024); teachers' instructional productivity, encompassing task efficiency, instructional flow, learner-focused maintenance, feedback and assessment turnaround, and differentiation and personalization capability (Alp Christ et al., 2024; OECD, 2023); and learners' engagement, covering behavioral, cognitive, emotional, interaction and collaboration, and sustained engagement (Fernández-

Scagliusi & Llorente-Cejudo, 2024; Yang, 2023). A four-point Likert scale was employed to assess the three principal variables, while categorical responses were used to describe respondents' profiles.

Data Gathering Procedure

Prior to data collection, the researcher secured approval from the graduate school and permission from the Public Schools District Supervisor and participating school heads. After explaining the study's purpose, procedures, and ethical considerations, the adapted questionnaires were administered through Google Forms with the assistance of school heads. Respondents were given sufficient time to complete the questionnaires, with follow-up reminders as necessary. Subsequently, the collected responses were organized, coded, tabulated, and statistically analyzed. The findings served as the basis for developing the proposed evidence-based instructional enhancement plan.

Data Analysis

The study employed descriptive and inferential statistics. Frequency and percentage were used to describe respondents' profiles, while weighted means determined the extent of technology integration, teachers' instructional productivity, and learners' engagement. The results were interpreted using four numerical ranges: 3.26–4.00 (highly integrated/productive/engaged), 2.51–3.25 (integrated/productive/engaged), 1.76–2.50 (slightly integrated/productive/engaged), and 1.00–1.75 (not integrated/productive/engaged). Furthermore, Spearman's rank-order correlation coefficient was employed to determine the relationships between technology integration and teachers' instructional productivity and learners' engagement at the 0.05 significance level.

Ethical Consideration

The study observed ethical research principles through institutional permission, voluntary participation, informed participation, and confidentiality. Respondents were informed of the study's purpose and procedures and were assured that their responses would remain confidential and be used exclusively for academic research. The information collected was handled responsibly throughout data gathering, processing, analysis, and interpretation.

3. RESULTS AND DISCUSSION

3.1 Demographic and Professional Profile of the Respondents

3.1.1 Age

The largest proportion of teacher-respondents was aged 41–50 years (37%), followed by those aged 51–60 years (34%), 31–40 years (23%), and 21–30 years (6%). School heads had a mean age of 47.3 years (SD = 10.7), while teachers had a mean age of 44.3 years (SD = 7.47). Although respondents were predominantly mature educators, effective technology integration requires technological competence, confidence, and professional preparedness rather than age alone (Stringer et al., 2022; Sofwan et al., 2024; Zeng et al., 2022).

3.1.2 Sex

All three school heads were female (100%), while 32 teachers (91%) were female and three (9%) were male. Although the findings reflect female predominance among respondents, effective technology integration requires technological, pedagogical, and content knowledge regardless of sex (Mishra et al., 2023; Sofwan et al., 2024; Zeng et al., 2022).

3.1.3 Years of Experience

Most school heads had served for at least 21 years (67%), while the largest proportion of teachers had 11–20 years of experience (49%), followed by those with at least 21 years (31%), 6–10 years (17%), and below five years (3%). The mean length of service was 24.3 years (SD = 6.03) for school heads and 18.3 years (SD = 7.24) for teachers. Despite their substantial professional experience, continuous digital competency development remains essential for effective technology integration (Mishra et al., 2023; Sofwan et al., 2024; Aslan Altan et al., 2024).

3.1.4 Highest Educational Attainment

Among school heads, one held a doctorate, one completed a master's degree, and one earned master's degree units. Among teachers, 37% had earned master's degree units, 31% held bachelor's degrees, 26% completed master's degrees, and 6% earned doctorate units. These findings reflect participation in professional advancement; however, academic qualifications must be complemented by practical technological and pedagogical competencies (Mishra et al., 2023; König et al., 2024).

3.1.5 Training, Seminars, and Workshops Attended

Teachers predominantly attended division-level training (46%), followed by regional (31%), international (14%), and national (9%) activities. Meanwhile, school heads participated in international, national, and division-level training, with one respondent in each category. Notably, no respondents reported attending school-level training, highlighting the need for sustained school-based professional development to strengthen technological competence, confidence, and instructional practices (Mishra et al., 2023; Aslan Altan et al., 2024; Amemasor et al., 2025).

3.2 Extent of Technology Integration in Teaching and Learning

3.2.1 Frequency of Use

Frequency of technology use obtained a composite mean of 3.67, interpreted as Highly Integrated. Daily use of technological tools in classroom lessons received the highest mean of 3.79, while incorporating digital platforms at least once a week obtained the lowest mean of 3.50. The findings indicate that technology has become a regular component of classroom instruction, although the utilization of digital platforms may be further strengthened. Consistent with the TPACK framework, meaningful technology integration requires digital resources to complement instructional objectives and pedagogical practices (Mishra et al., 2023).

3.2.2 Purposefulness of Integration

Purposefulness of integration obtained a composite mean of 3.82, interpreted as Highly Integrated. Incorporating technology to actively engage learners received the highest mean of 3.90, while selecting technology that supports instructional goals obtained the lowest mean of 3.74. The findings suggest that teachers generally utilize technology with clear instructional intentions, particularly in encouraging learner participation. However, greater attention to selecting digital tools aligned with learning objectives remains necessary. Aslan Altan et al. (2024) emphasize the importance of perceived usefulness in technology acceptance, while König et al. (2024) highlight purposeful ICT integration in lesson planning as an essential teaching competency.

3.2.3 Pedagogical Alignment

Pedagogical alignment obtained a composite mean of 3.75, interpreted as Highly Integrated. Designing technology-supported lessons that facilitate deeper learning and enhance understanding of key concepts both received the highest mean of 3.89. Meanwhile, using technology to support teaching strategies effectively obtained the lowest mean of 3.58. The findings indicate that teachers generally integrate technology according to instructional content and learning objectives. Nevertheless, strengthening the alignment between digital tools and teaching strategies may enhance instructional effectiveness. Mishra et al. (2023) and Zeng et al. (2022) emphasize the importance of technological knowledge, pedagogical competence, and self-efficacy in meaningful technology integration.

3.2.4 Teacher Competence and Confidence

Teacher competence and confidence obtained a composite mean of 3.62, interpreted as Highly Integrated. Teachers' perceived skills in using digital tools and preparedness to enhance student learning through technology both received the highest mean of 3.79. Confidence in troubleshooting technological problems obtained the lowest mean of 3.38. Although teachers demonstrated confidence in technology-supported instruction, technical troubleshooting remains an area for improvement. Mishra et al. (2023) and Sofwan et al. (2024) emphasize the importance of technological competence in effective instruction. Similarly, Amemasor et al. (2025) highlight the contribution of practical training and continuous professional support to teachers' digital confidence and competencies.

3.2.5 Management of Off-Task Potential

Management of off-task potential obtained a composite mean of 3.75, interpreted as Highly Integrated. Establishing classroom rules for proper technology use received the highest mean of 3.90, while employing strategies to maintain learners' focus obtained the lowest mean of 3.52. The findings demonstrate that teachers establish appropriate guidelines for responsible technology utilization. However, maintaining learners' attention requires active instructional guidance beyond classroom rules. Reschly and Christenson (2022) and Martin and Borup (2022) emphasize the importance of behavioral engagement, teacher support, and instructional strategies in sustaining meaningful learner participation.

3.2.6 Feedback and Assessment Integration

Feedback and assessment integration obtained a composite mean of 3.64, interpreted as Highly Integrated. Using technology to assess learners efficiently received the highest mean of 3.67, while providing timely feedback through digital platforms obtained the lowest mean of 3.57. The findings indicate that teachers effectively utilize technology for assessment, although the timeliness of feedback requires further enhancement. Mayer (2024) emphasizes the importance of appropriately designed multimedia information in supporting meaningful cognitive processing. Similarly, Fernández-Scagliusi and Llorente-Cejudo (2024) highlight the relevance of technology-supported learning in strengthening learner engagement.

3.2.7 Overall Extent of Technology Integration

The overall weighted mean for technology integration was 3.70, interpreted as Highly Integrated. Purposefulness of integration ranked highest (3.82), followed by pedagogical alignment (3.75), management of off-task potential (3.75), frequency of use (3.67), feedback and assessment

integration (3.64), and teacher competence and confidence (3.62). The findings demonstrate that technology is consistently integrated into classroom instruction, with purposeful utilization emerging as its strongest dimension. However, teachers' technical competence and confidence remain priorities for enhancement. Mishra et al. (2023) and Børte et al. (2023) emphasize that effective technology integration depends on the alignment of digital resources with pedagogical practices and teachers' professional competencies.

3.3 Level of Teachers' Instructional Productivity

3.3.1 Task Efficiency

Task efficiency obtained a composite mean of 3.74, interpreted as Highly Productive. Reducing lesson preparation time through digital tools received the highest mean of 3.89, while streamlining classroom administrative tasks digitally obtained the lowest mean of 3.55. The findings indicate that digital tools support efficient lesson preparation and instructional organization. However, their utilization in administrative responsibilities may be further improved. OECD (2023, 2024) emphasizes the importance of efficient resource utilization, workload management, and technology-supported instructional practices in improving teachers' productivity.

3.3.2 Instructional Flow

Instructional flow obtained a composite mean of 3.80, interpreted as Highly Productive. Facilitating seamless transitions between activities using digital tools received the highest mean of 3.92, while engaging learners through technology to improve lesson flow obtained the lowest mean of 3.57. The findings demonstrate that technology supports organized instructional delivery and smooth classroom transitions. However, sustaining learner participation throughout lessons requires appropriate pedagogical strategies. Børte et al. (2023) emphasize that productive technology integration requires alignment between digital resources and instructional practices.

3.3.3 Learner-Focused Maintenance

Learner-focused maintenance obtained a composite mean of 3.67, interpreted as Highly Productive. Using technology to maintain learners' attention received the highest mean of 3.86, while helping learners remain on task through interactive digital tools obtained the lowest mean of 3.47. The findings suggest that teachers effectively utilize technology to capture learners' attention, although interactive task-monitoring strategies require further enhancement. Martin and Borup (2022) emphasize the importance of teacher presence, instructional guidance, and supportive learning environments in sustaining learners' attention and participation.

3.3.4 Feedback and Assessment Turnaround

Feedback and assessment turnaround obtained a composite mean of 3.75, interpreted as Highly Productive. Using digital tools for faster grading and feedback received the highest mean of 3.92, while providing technology-supported feedback that enables learners to improve promptly obtained the lowest mean of 3.57. The findings indicate that digital resources facilitate efficient assessment processes, although greater emphasis on timely and actionable feedback remains necessary. Børte et al. (2023) and Muslu and Siegel (2024) highlight the importance of integrating digital assessment with meaningful feedback to guide instructional decisions and support learners' improvement.

3.3.5 Differentiation and Personalization Capability

Differentiation and personalization capability obtained a composite mean of 3.65, interpreted as Highly Productive. Accommodating different learning needs through digital tools and using adaptive platforms for individualized learning both received the highest mean of 3.71. Personalizing lessons according to learners' performance levels obtained the lowest mean of 3.51. The findings suggest that teachers utilize technology to accommodate learner diversity, although performance-based instructional adjustments require further enhancement. Ouwehand et al. (2022) emphasize the importance of teaching quality and responsiveness to classroom conditions. Similarly, Eikeland and Ohna (2022) highlight differentiated instruction as an approach to addressing learners' individual educational needs.

3.3.6 Overall Level of Teachers' Instructional Productivity

Teachers' instructional productivity obtained an overall weighted mean of 3.72, interpreted as Highly Productive. Instructional flow ranked highest (3.80), followed by feedback and assessment turnaround (3.75), task efficiency (3.74), learner-focused maintenance (3.67), and differentiation and personalization capability (3.65). The findings demonstrate strong instructional productivity, particularly in maintaining organized lesson delivery and efficient assessment processes. However, personalized instruction remains a priority for improvement. Bentsi-Enchill (2024) and Alp Christ et al. (2024) emphasize the importance of instructional quality, effective learning environments, and responsiveness to learners in supporting educational outcomes.

3.4 Level of Learners' Engagement

3.4.1 Behavioral Engagement

Behavioral engagement obtained a composite mean of 3.60, interpreted as Highly Engaged. Active participation in technology-enhanced lessons received the highest mean of 3.64, while completing tasks and assignments during digital learning activities obtained the lowest mean of 3.57. The findings indicate that learners actively participate in technology-supported instruction, although consistent task completion may be further encouraged. Wong et al. (2024) emphasize the importance of behavioral engagement in technology-oriented learning activities. Furthermore, Wang et al. (2023) demonstrate the potential of mobile technologies to support behavioral, cognitive, and affective learning outcomes in primary and secondary education.

3.4.2 Cognitive Engagement

Cognitive engagement obtained a composite mean of 3.50, interpreted as Highly Engaged. Thinking critically while using technology received the highest mean of 3.53, while engaging in deep learning and reflection through digital platforms obtained the lowest mean of 3.46. The findings suggest that technology-supported instruction provides opportunities for critical thinking, although deeper reflection and analysis require further enhancement. Yang (2023) highlights the importance of learner engagement within technology-supported learning environments, while Mayer (2024) emphasizes meaningful cognitive processing through appropriately designed multimedia instruction. These perspectives reinforce the need for digital activities that encourage analysis, reflection, and knowledge application.

3.4.3 Emotional Engagement

Emotional engagement obtained a composite mean of 3.58, interpreted as Highly Engaged. Interest and enjoyment in technology-enhanced learning received the highest mean of 3.64, while motivation to participate actively and confidence in completing technology-supported tasks both obtained the lowest mean of 3.55. The findings indicate that learners generally demonstrate positive emotional responses to technology-supported instruction. Nevertheless, strengthening their motivation and confidence remains important. Meyer and Turner (2022) emphasize the relationship between emotional engagement and meaningful classroom participation, while Wang et al. (2023) highlight the potential of mobile technology to support affective learning outcomes.

3.4.4 Interaction and Collaboration

Interaction and collaboration obtained a composite mean of 3.52, interpreted as Highly Engaged. Enhancing teamwork and social learning through digital platforms received the highest mean of 3.58, while participation in online discussions and group activities obtained the lowest mean of 3.47. The findings demonstrate that technology-supported activities facilitate teamwork and social interaction, although structured opportunities for collaborative discussions may be strengthened. Cho et al. (2022) highlight the relevance of virtual learning environments in supporting elementary learners' collaborative experiences, motivation, and group self-efficacy.

3.4.5 Sustained Engagement

Sustained engagement obtained a composite mean of 3.56, interpreted as Highly Engaged. Maintaining focus for extended periods and demonstrating consistent engagement across multiple digital activities both received the highest mean of 3.58. Continuous participation throughout classroom instruction obtained the lowest mean of 3.54. The findings indicate that learners generally maintain attention and involvement during technology-supported activities. However, sustaining participation throughout the entire lesson requires varied and appropriately structured instructional tasks. Lawson et al. (2023) emphasize the importance of designing learning activities that encourage meaningful cognitive engagement, while Martin and Borup (2022) highlight the role of instructional support in sustaining learner participation.

3.4.6 Overall Level of Learners' Engagement

Learners' engagement obtained an overall weighted mean of 3.55, interpreted as Highly Engaged. Behavioral engagement ranked highest (3.60), followed by emotional engagement (3.58), sustained engagement (3.56), interaction and collaboration (3.52), and cognitive engagement (3.50). The findings demonstrate that learners actively participate in technology-supported classroom instruction, although cognitive engagement remains a priority for enhancement. Wang et al. (2022) recognize behavioral, cognitive, emotional, and social engagement as essential dimensions of technology-supported learning. Furthermore, Dorris et al. (2024) provide evidence of the educational benefits of appropriately integrated mobile devices in primary school classrooms, reinforcing the importance of purposeful technology-supported activities rather than technology use alone.

3.5 Significant Relationship Between the Study Variables

3.5.1 Relationship Between Technology Integration and Teachers' Instructional Productivity

The Spearman rank-order correlation analysis revealed a moderately strong positive relationship between technology integration and teachers' instructional productivity ($\rho = 0.635$, $p < .001$). Since the p-value was below the 0.05 significance level, the null hypothesis was rejected, indicating a statistically significant relationship between the two variables. The findings suggest that higher levels of technology integration are associated with greater instructional productivity, particularly in accomplishing teaching responsibilities, organizing classroom instruction, facilitating assessment, and responding to learners' needs. Kolovou et al. (2024) emphasize the relevance of teaching quality and accurate teacher judgments to educational outcomes, while König et al. (2024) highlight ICT integration in lesson planning as an important component of teachers' professional competence. These perspectives support the importance of purposeful technology integration in strengthening instructional practices.

3.5.2 Relationship Between Technology Integration and Learners' Engagement

The Spearman rank-order correlation analysis revealed a moderate positive relationship between technology integration and learners' engagement ($\rho = 0.490$, $p = .003$). Since the p-value was below the 0.05 significance level, the null hypothesis was rejected, establishing a statistically significant relationship between the two variables. The findings indicate that greater technology integration is associated with higher levels of learners' participation, cognitive involvement, emotional engagement, collaboration, and sustained attention. Wang et al. (2022) emphasize the multidimensional nature of engagement in digital learning environments, while Wang et al. (2023) highlight the educational benefits of mobile technology across cognitive, affective, and behavioral learning outcomes. These findings reinforce the importance of designing meaningful technology-supported instruction that encourages active participation and deeper learning.

3.6 Basis for the Evidence-Based Enhancement Plan

The findings identified teacher competence and confidence (3.62), differentiation and personalization capability (3.65), and cognitive engagement (3.50) as the lowest-rated dimensions within their respective variables. Although all dimensions received favorable assessments, these areas represent the primary priorities for the proposed enhancement plan. The results emphasize the need for targeted professional development, technical troubleshooting support, personalized instructional strategies, and digital learning activities that encourage higher-order thinking. Amemasor et al. (2025) emphasize sustained and context-specific professional development in strengthening technology integration, while Mayer (2024) highlights the importance of instructional design that promotes meaningful cognitive processing. These perspectives support the development of an evidence-based enhancement plan responsive to the needs of teachers and learners.

4. CONCLUSIONS AND RECOMMENDATIONS

The study concludes that technology integration is positively and significantly associated with teachers' instructional productivity and learners' engagement in the selected public elementary schools in Zone 2, Guindulman District, Schools Division of Bohol. Technology integration was highly evident, particularly in its purposeful utilization, while teachers demonstrated strong

instructional productivity in maintaining organized lesson delivery and efficient assessment processes. Learners likewise exhibited high engagement, particularly in behavioral and emotional participation. Despite these favorable findings, teacher competence and confidence, differentiation and personalization capability, and cognitive engagement emerged as priority areas for improvement. The significant relationships established among the variables emphasize the importance of purposeful and pedagogically aligned technology integration in supporting instructional practices and meaningful learner participation. Collectively, the findings provide an empirical foundation for developing an evidence-based enhancement plan that addresses teachers' technological competencies, instructional responsiveness, and learners' deeper engagement.

The implementation of the proposed evidence-based Technology Integration Enhancement Program is recommended to optimize teachers' instructional productivity and learners' engagement. School heads should facilitate targeted professional development activities focusing on digital competencies, technical troubleshooting, and effective utilization of educational platforms. Teachers should strengthen technology-supported differentiation and personalization strategies to address learners' varying abilities, needs, interests, and performance levels. Greater emphasis should also be placed on designing interactive digital activities that promote critical thinking, problem-solving, information processing, and reflective learning. School heads and teachers should collaboratively develop instructional materials, share effective practices, and monitor the classroom application of technology-supported strategies. The Public Schools District Supervisor and Schools Division Office of Bohol should review and support the proposed enhancement program. Regular monitoring and evaluation are recommended to assess its implementation and identify opportunities for continuous instructional improvement.

The study was limited to 178 respondents comprising school heads, teachers, and learners from three selected public elementary schools in Zone 2, Guindulman District, during School Year 2026–2027, which may limit the generalizability of the findings. The reliance on questionnaire-based assessments reflects respondents' perceptions rather than direct observations of instructional practices and learner engagement. Furthermore, the descriptive-correlational design establishes statistical associations but does not determine causality. Future research may consider broader geographical coverage, larger respondent groups, classroom observations, and longitudinal or experimental approaches to strengthen the evidence concerning technology integration, instructional productivity, and learners' engagement.

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