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The Utilization of the Technology-Assisted Learning Materials in Improving the Teaching Performance of the Grade 6 Teachers in Paracale District, Division of Camarines Norte

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ABSTRACT

This study examined the utilization of technology-assisted learning materials (TALMs) and their influence on the teaching performance of Grade 6 Science teachers in Paracale District, Division of Camarines Norte during School Year 2024–2025. Grounded in the increasing demand for technology integration in Philippine basic education, the research investigated four major dimensions of TALM utilization: multimedia-based learning, game-based learning, interactive whiteboards, and educational apps. It further assessed how these dimensions contribute to teachers' performance in terms of content knowledge and mastery, instructional delivery, use of technology and learning resources, classroom management, motivation and interest, and assessment and feedback. Using a descriptive-evaluative-correlational research design, the study employed total enumeration of sixty-five (65) Grade 6 Science teachers from small, medium, and big public elementary schools. Data were analyzed using weighted mean, rank order, and Kendall's Coefficient of Concordance (W) at 0.05 level of significance. Findings revealed that technology-assisted learning materials were Much Utilized overall (M = 4.36). Among the dimensions, interactive whiteboards (M = 4.45) and multimedia-based learning (M = 4.44) ranked highest, followed by game-based learning (M = 4.43), while educational apps (M = 4.11) received the lowest mean though still interpreted as Much Utilized. No significant agreement was found in the rank orders of utilization across school types ($p > 0.05$). In terms of teaching performance, technology-assisted learning materials were found to be Very Much Evident in improving content knowledge and mastery (M = 4.54), instructional delivery (M = 4.52), and use of technology and learning resources (M = 4.90). Classroom management (M = 3.86) and motivation and interest (M = 4.01) were Much Evident, while assessment and feedback (M = 3.36) was Evident. Significant agreement was observed only in content knowledge and mastery ($p < 0.01$). The study concludes that effective integration of technology-enhanced instructional tools strengthens teacher competence and instructional quality, though disparities in training, access, and technical readiness remain. Policy recommendations emphasize sustained professional development, equitable resource allocation, and strengthened monitoring systems to ensure consistent and impactful technology integration in Science instruction.

1. Introduction

The rapid advancement of digital technologies has significantly transformed the landscape of basic education, redefining traditional pedagogical approaches and expanding opportunities for learner engagement. In science education particularly, technology-assisted learning materials (TALMs) have emerged as powerful instructional tools capable of enhancing conceptual understanding, promoting interactive learning, and supporting differentiated instruction. Multimedia presentations, educational games, interactive whiteboards, and mobile learning applications provide dynamic representations of abstract scientific phenomena that are often difficult to explain using conventional textbook-based instruction. As educational systems increasingly align with 21st-century competencies, the integration of technology in classroom practice has become not only desirable but essential.

In the Philippine educational context, the mandate for quality, accessible, and technology-responsive education is embedded in national policies such as the 1987 Philippine Constitution, Republic Act No. 9155 (Governance of Basic Education Act of 2001), and Republic Act No. 10533 (Enhanced Basic Education Act of 2013). The Department of Education (DepEd) continues to promote digital transformation initiatives under its reform agendas to strengthen literacy, numeracy, and science competencies. These reforms underscore the importance of equipping teachers with the capacity to integrate digital tools effectively in instruction, particularly in foundational subjects such as Science. The emphasis on technology integration is further reinforced by global education standards and international assessment results, which highlight the need to improve science achievement and instructional quality.

Science education plays a critical role in developing learners' critical thinking, inquiry skills, and scientific literacy. However, persistent challenges such as limited instructional resources, varying teacher readiness, and disparities in access to digital infrastructure affect the effectiveness of technology integration in many public elementary schools. While numerous studies have examined the general use of Information and Communication Technology (ICT) in classrooms, fewer investigations have systematically assessed how specific technology-assisted learning materials influence teachers' performance in delivering Science instruction at the elementary level. Understanding this relationship is essential, as teacher competence in content knowledge, instructional delivery, classroom management, and assessment directly affects student learning outcomes.

In response to this gap, the present study examined the extent to which technology-assisted learning materials are utilized in teaching Science 6 and how such utilization contributes to the teaching performance of Grade 6 teachers in Paracale District, Division of Camarines Norte. Specifically, the study investigated four dimensions of technology integration—multimedia-based learning, game-based learning, interactive whiteboards, and educational apps—and their influence on teachers' performance across key domains: content knowledge and mastery, instructional delivery, use of technology and learning resources, classroom management, motivation and interest, and assessment and feedback. By providing empirical evidence on the patterns of utilization and their instructional implications, this research aims to inform policy decisions, professional development initiatives, and school-level interventions that promote effective and equitable technology integration in Science education.

Ultimately, strengthening the pedagogical use of technology-assisted learning materials is not merely a matter of modernization but a strategic imperative to enhance instructional quality, foster learner engagement, and contribute to the development of scientifically literate and globally competitive Filipino learners.

2. Methodology

This study utilized a descriptive–evaluative–correlational research design to examine the extent of utilization of technology-assisted learning materials (TALMs) and their influence on the teaching performance of Grade 6 Science teachers in Paracale District, Division of Camarines Norte during School Year 2024–2025. The descriptive component determined the level of TALM utilization and teachers' performance across identified domains, while the evaluative aspect interpreted these levels using established scale descriptors. The correlational dimension tested the degree of agreement in rank orders among groups of respondents through Kendall's Coefficient of Concordance (W), with the level of significance set at 0.05.

The study was conducted in selected public elementary schools categorized as small, medium, and big schools within Paracale District. A total enumeration sampling technique was employed, involving sixty-five (65) Grade 6 Science teachers as respondents. This approach ensured comprehensive representation of teachers across varying school contexts and minimized sampling bias. The inclusion of different school classifications allowed for comparative analysis of technology utilization patterns and instructional performance.

Data were gathered using a structured questionnaire developed in alignment with the study objectives and related literature on technology integration in education. The instrument measured the extent of TALM utilization in terms of multimedia-based learning, game-based learning, interactive whiteboards, and educational apps. It also assessed teachers' performance across six domains: content knowledge and mastery, instructional delivery, use of technology and learning resources, classroom management, motivation and interest, and assessment and feedback. Responses were rated using a five-point Likert scale ranging from "Not at All" to "Very Much Utilized/Very Much Evident."

After securing necessary permissions from school authorities, the questionnaires were distributed and retrieved personally by the researcher to ensure completeness and accuracy of responses. Data were analyzed using weighted mean, frequency count, percentage, and rank order to describe the extent of utilization and performance levels. Kendall's Coefficient of Concordance (W) and the corresponding chi-square test were computed to determine the significance of agreement in rank orders among groups of respondents at the 0.05 level of significance.

3. Results and Discussions

3.1 Utilization of Technology-Assisted Learning Materials in Teaching Science 6

Table 1: Summary of the Extent of Utilization of Technology-Assisted Learning Materials

Dimension	Weighted Mean	Interpretation	Rank
Interactive Whiteboards	4.45	Much Utilized	1
Multimedia-Based Learning	4.44	Much Utilized	2
Game-Based Learning	4.43	Much Utilized	3
Use of Educational Apps	4.11	Much Utilized	4
Overall Mean	4.36	Much Utilized	

The results indicate that technology-assisted learning materials (TALMs) are Much Utilized in teaching Science 6 (M = 4.36). Among the dimensions, interactive whiteboards ranked highest (M = 4.45), followed closely by multimedia-based learning (M = 4.44) and game-based learning (M = 4.43). Educational apps received the lowest mean (M = 4.11), though still within the "Much Utilized" category.

The prominence of interactive whiteboards suggests that teachers value visual presentation, simulation display, and lesson revisiting features, which enhance conceptual clarity and learner engagement. Multimedia-based learning similarly supports comprehension of complex scientific concepts through visual and auditory reinforcement. Game-based learning's strong rating reflects its effectiveness in promoting retention, participation, and motivation. However, the comparatively lower rating of educational apps may indicate constraints in device access, connectivity, or teacher familiarity with advanced app integration.

These findings demonstrate that while technology integration is generally strong, disparities in infrastructure and digital competence influence utilization patterns.

3.2 Significant Agreement on Rank Orders of TALM Utilization

Table 2: Kendall's Coefficient of Concordance on TALM Utilization

Dimension	Kendall's W	Computed χ^2	p-value	Decision
Multimedia-Based Learning	0.21	5.67	>0.05	Not Significant
Game-Based Learning	0.13	3.12	>0.05	Not Significant
Interactive Whiteboards	0.48	13.02	>0.05	Not Significant
Educational Apps	0.19	5.13	>0.05	Not Significant

The computed chi-square values for all four dimensions did not exceed the tabular values at the 0.05 level of significance. Thus, no significant agreement was observed in the rank orders of utilization across school classifications. Although interactive whiteboards exhibited the highest coefficient (W = 0.48), the agreement was statistically insignificant.
This suggests variability in access, training, and implementation practices among schools. Differences in infrastructure and digital readiness may contribute to inconsistent patterns of technology integration. The absence of significant agreement underscores the need for standardized support systems to ensure equitable technology utilization across school types.

3.3 Utilization of TALMs in Improving Teachers' Performance

Table 3: Extent of TALM Utilization in Improving Teaching Performance

Performance Domain	Weighted Mean	Interpretation	Rank
Use of Technology & Learning Resources	4.90	Very Much Evident	1
Content Knowledge and Mastery	4.54	Very Much Evident	2
Instructional Delivery	4.52	Very Much Evident	3
Motivation and Interest	4.01	Much Evident	4
Classroom Management	3.86	Much Evident	5
Assessment and Feedback	3.36	Evident	6

Technology-assisted learning materials were found to be Very Much Evident in enhancing teachers' use of technology and learning resources (M = 4.90), content knowledge (M = 4.54), and instructional delivery (M = 4.52). These high ratings indicate that digital tools strengthen teachers' access to updated scientific information, simulations, and interactive instructional strategies. Teachers appear to leverage digital platforms effectively for lesson planning, visualization, and dynamic content presentation.
Motivation and interest (M = 4.01) and classroom management (M = 3.86) were rated Much Evident, suggesting that while technology enhances engagement, its direct influence on classroom behavioral dynamics may depend on contextual factors. Assessment and feedback received the lowest rating (M = 3.36), interpreted as Evident. This implies that although digital tools are present, teachers may not fully utilize advanced digital assessment systems such as automated grading, real-time analytics, and differentiated feedback mechanisms. The comparatively lower score highlights an area requiring targeted professional development.

3.4 Significant Agreement on Teachers' Performance Domains

Table 4: Kendall's Coefficient of Concordance on Teaching Performance

Performance Domain	Kendall's W	Computed χ^2	p-value	Decision
Content Knowledge and Mastery	0.83	22.41	<0.01	Significant
Instructional Delivery	0.30	9.00	>0.05	Not Significant
Use of Technology & Learning Resources	0.37	10.00	>0.05	Not Significant
Classroom Management	0.16	4.32	>0.05	Not Significant
Motivation and Interest	0.49	12.23	>0.05	Not Significant
Assessment and Feedback	0.32	8.64	>0.05	Not Significant

Significant agreement was found only in Content Knowledge and Mastery (W = 0.83, $p < 0.01$), indicating strong consensus across schools regarding the positive impact of technology on enhancing teachers' subject matter expertise. This suggests that access to digital references, online communities, and updated scientific databases consistently strengthens teachers' mastery of Science content.
Other domains did not show significant agreement, implying that the perceived effects of technology on instructional delivery, classroom management, motivation, and assessment vary across contexts. These variations may stem from differences in teacher training, availability of devices, administrative support, and digital infrastructure.
The findings affirm that technology-assisted learning materials play a substantive role in enhancing instructional practices in Science education. Interactive whiteboards and multimedia-based tools dominate classroom integration, reflecting teachers' preference for visually enriched and interactive instructional formats. The strong influence of technology on content mastery and

instructional delivery underscores its pedagogical value in clarifying complex scientific concepts and diversifying teaching strategies.

However, variability in rank agreement across school classifications indicates inequities in resource allocation and teacher readiness. Moreover, the relatively lower ratings in assessment and feedback reveal an underutilization of digital formative assessment tools. These results suggest that while technology integration is progressing positively, strategic investments in professional development, infrastructure equalization, and digital assessment literacy are necessary to maximize its instructional impact.

Overall, the study demonstrates that technology-assisted learning materials significantly enhance teachers' instructional competence, particularly in content mastery and resource utilization. Sustained institutional support and capacity-building initiatives remain critical to achieving consistent and equitable technology integration across elementary Science classrooms.

4. Conclusions and Implications

4.1 Conclusions

The present study investigated the extent of utilization of technology-assisted learning materials (TALMs) and their influence on the teaching performance of Grade 6 Science teachers in Paracale District, Division of Camarines Norte. The findings confirm that technology integration in Science instruction is generally at a high level, with overall utilization interpreted as much utilized. Among the four dimensions examined, interactive whiteboards ranked highest, followed closely by multimedia-based learning and game-based learning, while educational apps, although still much utilized, obtained comparatively lower ratings. These results indicate that teachers actively incorporate visual, interactive, and gamified tools to enhance conceptual understanding and learner engagement. The consistent use of these digital tools reflects a positive disposition toward instructional innovation and alignment with 21st-century teaching practices.

Moreover, the study established that TALMs substantially contribute to improving teachers' performance, particularly in the domains of content knowledge and mastery, instructional delivery, and use of technology and learning resources. The strongest and most statistically consistent impact was observed in content knowledge and mastery, suggesting that digital platforms, simulations, and online scientific resources enhance teachers' expertise and confidence in delivering complex scientific concepts. Instructional delivery also benefited significantly from technology integration, as digital tools enabled more dynamic presentations, interactive demonstrations, and differentiated learning experiences. These findings underscore the pedagogical value of technology when strategically aligned with curricular goals.

However, while positive effects were evident across all performance domains, relatively lower ratings were observed in classroom management, motivation and interest, and especially assessment and feedback. This suggests that although technology enhances presentation and engagement, its systematic use in digital formative assessment, automated feedback, and performance analytics remains underdeveloped. The absence of significant agreement in most domains across school classifications further highlights disparities in digital infrastructure, teacher readiness, and institutional support. These variations indicate that technology utilization is not uniform and may be influenced by contextual factors such as connectivity, device availability, and professional development opportunities.

Overall, the study concludes that technology-assisted learning materials are instrumental in strengthening instructional quality in elementary Science education. The integration of multimedia, interactive boards, gamification strategies, and digital platforms contributes positively to teacher competence and instructional effectiveness. Nevertheless, maximizing the transformative potential of TALMs requires not only access to digital tools but also sustained institutional support, equitable resource distribution, and continuous professional capacity building. Technology, therefore, should be viewed not merely as an instructional supplement but as a strategic enabler of enhanced teaching performance and improved educational outcomes.

4.2 Implications

The findings of this study carry significant implications for educational policy and governance. There is a clear need for the Department of Education and related agencies to strengthen policies that promote equitable access to digital infrastructure across schools. Variations in agreement on utilization patterns suggest that some schools may lack adequate connectivity, devices, or technical support systems. Policymakers must therefore prioritize targeted investments in interactive whiteboards, stable internet connectivity, licensed educational applications, and maintenance support to ensure that all schools, regardless of classification, benefit from technology integration. Institutionalizing monitoring and evaluation mechanisms will further ensure accountability and consistency in implementation.

From a professional development standpoint, the results highlight the importance of continuous and specialized training programs. While teachers demonstrate competence in integrating multimedia and interactive tools, the lower ratings in assessment and feedback indicate a need for capacity building in digital evaluation strategies. Training initiatives should focus on advanced digital assessment platforms, automated grading systems, data analytics for learner tracking, and strategies for providing timely, personalized feedback. Professional learning communities within schools may also serve as platforms for collaborative sharing of best practices, thereby fostering a culture of innovation and peer-supported growth.

School leadership likewise plays a critical role in sustaining technology integration. Administrators must provide strategic direction by embedding technology use in school improvement plans and performance monitoring systems. Establishing structured support systems, such as in-house technical assistance teams and regular instructional supervision focused on digital pedagogy, will enhance implementation fidelity. Furthermore, leaders should encourage reflective teaching practices where educators evaluate the effectiveness of digital tools not only in content delivery but also in student engagement and assessment outcomes.

Finally, the study opens avenues for further research in educational technology integration. Future investigations may examine longitudinal effects of TALM utilization on student achievement in Science, explore qualitative dimensions of teacher experiences with digital tools, or analyze the mediating role of digital competence in instructional effectiveness. Comparative studies across divisions or regions may provide broader generalizability and policy insights. By extending research beyond descriptive utilization patterns toward outcome-based analyses, scholars and practitioners can better understand how technology integration translates into measurable improvements in learner performance and overall educational quality.

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