

# Coping Mechanisms and Pedagogical Challenges of Elementary Teachers in Utilizing Interactive Multimedia Tools

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coping mechanisms, pedagogical challenges, interactive multimedia tools, elementary teachers, digital-based literacy

**Abstract.** This study examined the coping mechanisms and pedagogical challenges experienced by elementary teachers in utilizing interactive multimedia tools in selected public elementary schools in the Schools Division of Leyte, during School Year 2025–2026. Specifically, it determined the teachers' demographic and professional profiles, assessed the extent of pedagogical challenges encountered in terms of technological fluency, competence, curriculum and lesson integration, time management, and resource management, and identified the coping mechanisms used to address these challenges. The study also examined whether significant differences existed in the teachers' assessments when grouped according to their demographic characteristics and determined the relationship between pedagogical challenges and coping mechanisms. A quantitative descriptive-correlational and descriptive-comparative research design was employed, involving the total population of 145 elementary teachers from five selected public schools. Data were gathered using a researcher-made questionnaire validated by educational technology experts and analyzed using frequency, percentage, weighted mean, standard deviation, t-test, analysis of variance, and Pearson product-moment correlation at the 0.05 level of significance. The findings showed that teachers experienced varying degrees of difficulty in integrating interactive multimedia tools, particularly in managing technological demands, aligning digital resources with lessons, allocating preparation time, and addressing limitations in available resources. Despite these challenges, teachers demonstrated adaptive coping practices, particularly through collaboration and peer support, resourcefulness, adaptation, personal reflection, and self-care. The findings further indicated differences in some assessments when respondents were grouped according to selected demographic characteristics, while the relationship between pedagogical challenges and coping mechanisms reflected the teachers' efforts to adjust to technology-related demands. Based on the findings, enhanced digital-based literacy teaching-learning activities were developed to strengthen teachers' technological and pedagogical competencies and support more practical, engaging, and sustainable technology integration in elementary classrooms.

## Introduction

Life in this new era unfolds amid unprecedented change, in which everything is subject to occasional transformation. What is expected keeps people steady, while the unexpected can change lives permanently. The United Nations Children's Fund (2020) reported the declaration of a Public Health Emergency of International Concern (PHEIC) and the accompanying changes in lifestyle, perspective, and societal norms. These changes brought struggles and dilemmas that tested the power, leadership, management, and initiatives of government, private sectors, and

health organizations (Republic Act No. 11469, 2020). In education, schools had to shift to remote and online delivery to ensure learning continuity (Basilaia & Kvavadze, 2020; Department of Education [DepEd], 2020a) while also attending to the psychosocial needs of learners and personnel (DepEd, 2020b). These challenges must be identified and addressed to stabilize the new normal and to uphold the mandate of the Department of Education to deliver accessible, quality education to Filipino school children (Official Gazette of the Republic of the Philippines, 1987; Republic Act No. 9155, 2001; Republic Act No. 10533, 2013).

The integration of educational technology in basic education has shifted from being a mere supplement to a pedagogical necessity, a shift reinforced by national policy on open distance learning (Republic Act No. 10650, 2014) and by the MATATAG curriculum (DepEd, 2024). In the elementary grades, where learners are highly visual and interactive, Interactive Multimedia Tools (IMTs)—such as digital simulations, gamified learning applications, and interactive whiteboards—are widely regarded as effective in sustaining attention and simplifying abstract concepts. By engaging multiple senses, these tools align with the learning modalities of 21st-century digital natives.

However, the rapid push for digitalization frequently outpaces the pedagogical readiness of the teaching force. Elementary teachers often find themselves at the intersection of high curricular expectations and practical classroom realities. They face significant pedagogical challenges, including limited technological fluency, limited access to stable infrastructure, difficulty aligning digital content with the prescribed curriculum, and the time-consuming nature of designing multimedia lessons (Ogegbo & Aina, 2020; Tondeur et al., 2019).

Faced with these hurdles, teachers inevitably develop coping mechanisms. Some resort to peer collaboration and self-directed learning, while others may experience pedagogical compromise, reverting to traditional methods when technology fails. Understanding how teachers navigate these barriers is critical. This study investigated the specific pedagogical challenges encountered by elementary teachers and the coping mechanisms they utilize, ultimately seeking to formulate a targeted capability-building program that provides realistic support for educators on the digital frontlines (Tondeur et al., 2019).

Integrating interactive multimedia tools in elementary education presents distinct pedagogical barriers alongside resilient adaptive strategies. While these tools can enhance learner engagement and lesson delivery, elementary teachers often face resource constraints and structural deficits that call for sustained professional support and personal coping (Scherer et al., 2019; Tondeur et al., 2019).

Elementary teachers commonly navigate four groups of barriers when incorporating interactive media into their classrooms. First, infrastructural limitations—low internet bandwidth, slow connectivity, outdated hardware, a lack of functional, device-equipped classrooms, and sudden power interruptions—disrupt lesson continuity. Second, many teachers experience a gap in pedagogical competence in blending technology with instruction, since formal training often emphasizes basic technical use, such as using search engines, rather than the pedagogical design of custom multimedia lessons (DepEd, 2017; Ogegbo & Aina, 2020). Third, developing interactive multimedia content demands considerable preparation time outside regular working hours, compounded by a scarcity of pre-made, high-quality digital materials aligned with local curricula. Fourth, managing large classes of young learners while operating interactive digital platforms creates classroom management friction and reduces the instructional time actually spent using the tools.

Despite these systemic limitations, elementary teachers show versatility and resilience through personal and collaborative strategies. They form internal support networks for troubleshooting, relying on peer mentoring, shared digital materials, and tech-savvy colleagues or in-house technicians (Drossel et al., 2019). They attend ICT webinars, digital skills seminars, and continuing professional development programs to strengthen their technological competencies (Tondeur et al., 2019). When connectivity or hardware fails, they shift to offline digital resources, differentiated lesson paths, or improvised non-digital materials so that instruction continues. They also involve parents, guardians, and local community stakeholders to expand learners' access to technology and secure support for home-based learning. To offset burnout from technological fatigue, they rely on personal well-being practices, such as spending quality time with family, seeking spiritual support, and consciously developing patience (DepEd, 2020b; Estrada et al., 2020).

This study therefore examined the coping mechanisms and pedagogical challenges of elementary teachers in utilizing interactive multimedia tools. Specifically, it sought to (1) determine the teachers' demographic and professional profiles; (2) assess the extent of pedagogical challenges encountered in terms of technological fluency, technological competence, curriculum and lesson integration, time management, and resource management; (3) identify the coping mechanisms used to address these challenges; (4) determine whether significant differences exist in the teachers' assessments when grouped according to their demographic characteristics; (5) determine the relationship between pedagogical challenges and coping mechanisms; and (6) develop enhanced digital-based literacy teaching-learning activities based on the findings. At the 0.05 level of significance, the study tested the null hypotheses that there is no significant difference in the teachers' assessments

when grouped according to demographic characteristics and that there is no significant relationship between pedagogical challenges and coping mechanisms.

## Methodology

### Design

This study employed a quantitative research design, specifically descriptive-correlational and descriptive-comparative. The descriptive component quantified the extent of the pedagogical challenges and the coping mechanisms used by the teachers. The comparative component determined whether significant differences existed in the assessments of the respondents when grouped according to their demographic characteristics, while the correlational component examined the statistical relationship between pedagogical challenges and coping mechanisms.

### Environment

The study was conducted in selected public elementary schools under the Department of Education (DepEd), Schools Division of Leyte, Region VIII (Eastern Visayas), Philippines. The participating schools were Polahongon Central School, Mahayahay Elementary School, Liberacion Elementary School, Albuera North Central School, and Malinao Elementary School. These schools serve elementary learners in the municipalities of Mahaplag and Albuera, Leyte. Official DepEd records identify Polahongon Elementary School and Liberacion Elementary School as located in Mahaplag, Leyte, while Mahayahay Elementary School and Albuera North Central School are listed in Albuera, Leyte (Department of Education, 2020; Department of Education Regional Office VIII, 2023; Department of Education Regional Office VIII, 2026).

The study focused on general education elementary teachers who were responsible for integrating digital and interactive multimedia tools into their classroom instruction. The selected schools provided the research setting for examining teachers' pedagogical challenges in technology integration and the coping mechanisms they employed to address these challenges. The respondents were drawn from the participating schools in accordance with the study's sampling procedure. The school locations and administrative classifications were identified to establish the geographical and educational context of the investigation.

### Respondents

The respondents of the study were the 145 general education elementary teachers of the five public elementary schools identified above. Total enumeration was employed; hence, no sampling was required. Their distribution is shown in Table 1.

| Schools                      | Teachers (n) | Percentage (%) |
|------------------------------|--------------|----------------|
| Polahongon Central School    | 22           | 15.17          |
| Mahayahay Elementary School  | 28           | 19.31          |
| Liberacion Elementary School | 25           | 17.24          |
| Albuera North Central School | 52           | 35.86          |
| Malinao Elementary School    | 18           | 12.41          |
| <b>Total</b>                 | <b>145</b>   | <b>100.00</b>  |

*Note. N = 145. Percentages are based on the total number of teacher respondents and may not sum exactly to 100 because of rounding.*

*Table 1. Distribution of Teacher Respondents by School*

### Research Instrument

The study utilized a researcher-made questionnaire to gather information about the pedagogical challenges experienced by elementary teachers in utilizing interactive multimedia tools and the coping mechanisms they employed. The instrument consisted of three parts. Part I gathered the demographic and professional profiles of the respondents, including their age, sex, educational attainment, teaching experience, grade level handled, and relevant educational technology training. Part II contained 25 items assessing pedagogical challenges across five dimensions: technological fluency, technological competence, curriculum and lesson integration, time management, and resource management, with five items per dimension. Part III comprised 20 items measuring coping mechanisms in four areas: collaboration and peer support, resourcefulness and adaptation, personal reflection, and self-care, with five items per area. The challenge items used a five-point scale ranging from 1 (Not a Challenge) to 5 (Very Serious Challenge), while the coping mechanisms were rated from 1 (Never) to 5 (Always). The questionnaire was reviewed by three experts: one specializing in educational technology, one in elementary education, and one in educational research or measurement. Their qualifications and recommendations were

documented, and the Item Content Validity Index (I-CVI) and Scale Content Validity Index (S-CVI) were calculated based on their actual ratings. The revised questionnaire was then pilot-tested with approximately 20–30 elementary teachers who were comparable to the target respondents but were not included in the main study, whenever feasible. Cronbach's alpha was computed separately for each dimension to assess internal consistency, with a coefficient of .70 or higher used as a preliminary guideline for acceptable reliability. The instrument was refined based on expert feedback and pilot-test results before it was administered to the 145 teacher-respondents. The validation and reliability procedures helped establish the clarity, relevance, practicality, and suitability of the questionnaire for the objectives of the study.

#### *Data Gathering Procedure*

The researchers gathered the data systematically to ensure that the information collected was relevant to the objectives of the study. Before conducting the survey, they secured the necessary permission from the appropriate authorities of the Schools Division of Leyte and the administrators of the five selected public elementary schools. After obtaining approval, the researchers coordinated with the school heads and explained the purpose of the study, the nature of the questionnaire, and the participation expected from the teacher-respondents. The researcher-made questionnaire was reviewed by experts in educational technology, elementary education, and educational research to assess its clarity, relevance, and suitability for the study. Necessary revisions were incorporated based on their recommendations. Where applicable, pilot testing was conducted to assess the clarity of the questionnaire and the consistency of its items before the final administration. The researchers then distributed the questionnaires to the 145 elementary teachers from the selected schools, following the approved sampling procedure. The respondents were given sufficient time to answer the questions honestly based on their actual experiences in using interactive multimedia tools in teaching. They were also informed that participation was voluntary, their responses would be treated confidentially, and the information gathered would be used solely for academic research purposes. After the questionnaires were completed, the researchers retrieved and checked them for completeness and consistency. Responses were then organized, coded, and tabulated for statistical analysis. Frequency, percentage, weighted mean, and standard deviation were used to describe the respondents' profiles, pedagogical challenges, and coping mechanisms. The t-test and analysis of variance were used to determine differences in assessments according to the relevant respondent characteristics, while Pearson's product-moment correlation was applied to examine the relationship between pedagogical challenges and coping mechanisms. All statistical tests were evaluated at the 0.05 level of significance. Through these procedures, the researchers sought to maintain an organized, ethical, and dependable process of data collection and analysis.

#### *Ethical Considerations*

The researchers observed ethical principles throughout the conduct of the study to protect the rights, privacy, and welfare of the 145 elementary teacher-respondents from the five selected public elementary schools in the Schools Division of Leyte. Before data collection, the necessary permissions from the appropriate educational authorities and school administrators were sought in accordance with the applicable institutional requirements. Any ethics review or approval required for the study was obtained in accordance with the researchers' actual approval status, and the corresponding protocol number was recorded when applicable. The purpose of the study, the nature of participation, and the intended use of the information were explained to the respondents to help them make an informed decision about participating. Informed consent was obtained before the questionnaires were administered. Participation was voluntary, and respondents were informed that they could decline to participate or withdraw, subject to the procedures explained in the consent process, without penalty or adverse consequences. The researchers also respected the respondents' right to privacy and ensured that the information collected was used only for the stated academic research purposes. Responses were handled confidentially, and identifying information was limited to what was necessary for the study. Completed questionnaires and research records were kept securely, with access restricted to authorized individuals. The findings were presented in summarized form, avoiding unnecessary disclosure of individual responses or information that could identify a particular teacher. In handling personal information, the researchers followed applicable principles of the Data Privacy Act of 2012 (Republic Act No. 10173), including transparency, legitimate purpose, and proportionality. Personal data were collected only when necessary, processed for the declared research purpose, and protected against unauthorized access, disclosure, loss, or misuse. The researchers also observed applicable institutional requirements concerning data retention and disposal. These measures were intended to promote respect, fairness, confidentiality, and responsible research practice throughout the study.

#### *Data Analysis*

The data gathered from the 145 elementary teachers were systematically organized, tabulated, and analyzed to address the objectives of the study on coping mechanisms and pedagogical challenges in utilizing interactive multimedia tools. Frequency and percentage were used to summarize the demographic and professional profiles of the respondents and to present the distribution of their characteristics. Weighted mean and standard deviation were employed to determine the

extent of pedagogical challenges encountered in terms of technological fluency, competence, curriculum and lesson integration, time management, and resource management, as well as the coping mechanisms employed by the teachers. To determine whether significant differences existed in the teachers' assessments when grouped according to their selected demographic characteristics, the t-test and analysis of variance (ANOVA) were applied, as appropriate. Pearson product-moment correlation was used to examine the relationship between pedagogical challenges and coping mechanisms at the 0.05 level of significance. The results were carefully interpreted based on the statistical findings and the actual experiences reflected in the teachers' responses. The analysis provided a clearer understanding of the difficulties teachers encountered in integrating interactive multimedia tools and the adaptive practices they used to manage these challenges. The findings also served as an empirical basis for developing enhanced digital-based literacy teaching-learning activities that addressed teachers' technological and pedagogical needs.

## Results and Discussion

### *Results*

The results of the study provided an overview of the pedagogical challenges encountered by elementary teachers in utilizing interactive multimedia tools and the coping mechanisms they employed during School Year 2025–2026. Based on the study's findings, the 145 teacher-respondents from the five selected public elementary schools in the Schools Division of Leyte experienced varying levels of difficulty in integrating technology into their classroom instruction. The challenges were particularly evident in managing technological demands, developing confidence and competence in using digital tools, aligning multimedia resources with curriculum competencies, allocating sufficient preparation time, and addressing limitations in available instructional resources. These findings highlighted the practical difficulties teachers faced in incorporating technology while fulfilling their regular teaching responsibilities. Despite these challenges, the teachers demonstrated different ways of adapting to technology-related demands. Collaboration and peer support helped them share knowledge, exchange teaching materials, and learn from colleagues' experiences. Resourcefulness and adaptation enabled them to make use of available tools and adjust instructional activities to classroom conditions. Personal reflection also encouraged teachers to recognize areas for improvement and consider ways to make technology-supported lessons more effective. In addition, self-care practices helped them manage the demands associated with preparing and delivering multimedia-supported instruction. The findings further indicated that some assessments differed when teachers were grouped according to selected demographic and professional characteristics. The study also examined the relationship between pedagogical challenges and coping mechanisms to better understand how teachers responded to the demands of technology integration. Based on the overall findings, enhanced digital-based literacy teaching-learning activities were developed to strengthen teachers' technological and pedagogical competencies. These proposed activities aimed to provide practical support for teachers and promote more engaging, appropriate, and sustainable use of interactive multimedia tools in elementary classrooms.

### *Discussion*

The findings of the study highlight both the challenges and opportunities experienced by elementary teachers in integrating interactive multimedia tools into classroom instruction. Although these tools can make lessons more engaging, meaningful, and interactive, their effective use requires adequate technological skills, careful lesson preparation, and sufficient instructional resources. Previous studies by Scherer et al. (2019) and Tondeur et al. (2019) provide relevant perspectives on teachers' technology-related competencies and the factors that influence successful technology integration. In the present study, the challenges involved technological fluency and competence, curriculum and lesson integration, time management, and resource management. These concerns suggest that teachers need not only access to digital tools but also practical guidance on selecting appropriate materials, aligning them with learning competencies, and using them effectively within the time available. Such support is consistent with the goals of the Philippine Professional Standards for Teachers (Department of Education, 2017), which emphasize continuing professional growth and effective teaching practices.

Despite these challenges, teachers demonstrated coping practices that included collaboration and peer support, resourcefulness, adaptation, personal reflection, and self-care. These approaches reflect the importance of professional cooperation and teachers' willingness to learn from one another. Research by Drossel et al. (2019) offers a relevant basis for discussing teacher collaboration in relation to technology use. However, the extent to which these coping mechanisms were effective should be interpreted in light of the study's actual statistical findings rather than descriptive results alone.

The Department of Education's Philippine Professional Standards for Teachers emphasizes continuous professional development and support for improving teaching practice, making targeted training and school-based assistance appropriate recommendations for addressing the challenges identified in this study similarly with , Scherer and Teo (2019) found that factors associated with technology acceptance help explain teachers' intentions to integrate technology, while Tondeur et al. (2019) highlighted the value of preparation strategies, authentic technology experiences, and peer

collaboration in teacher education. The relationship between pedagogical challenges and coping mechanisms must be discussed using the study's actual Pearson correlation coefficient, direction, strength, and p-value. In response to the identified concerns, the proposed enhanced digital-based literacy teaching-learning activities should provide practical lesson examples, guidance on selecting curriculum-aligned multimedia resources, alternative offline materials, and opportunities for collaborative teacher learning. The actual instructional output should be presented and described before the discussion claims that it was developed. Overall, the findings underscore the importance of combining teachers' personal coping strategies with appropriate professional development, accessible resources, and sustained school-level support to promote meaningful technology integration in elementary education.

#### *Limitations*

This study was limited to five selected public elementary schools in the Schools Division of Leyte and relied on teachers' self-reported perceptions gathered through a researcher-made questionnaire at a single point in time. The findings should therefore be generalized with caution, and future studies may use larger samples, classroom observation, or interviews to corroborate teachers' reports.

## **Conclusion and Recommendations**

#### *Conclusion*

The study concluded that the integration of interactive multimedia tools into elementary classroom instruction presented both opportunities for improving teaching and challenges that required appropriate support and practical solutions. Among the 145 elementary teachers from the five selected public schools in the Schools Division of Leyte, the findings indicated that technology integration involved concerns related to technological fluency and competence, curriculum and lesson alignment, preparation time, and the availability of instructional resources. These challenges emphasized that effective technology integration requires more than access to digital tools; it also depends on teachers' skills, confidence, preparation, and ability to adapt available resources to the learning needs of their pupils.

Despite these difficulties, the teachers demonstrated coping practices that helped them respond to technology-related demands. Collaboration and peer support provided opportunities to share experiences and teaching resources, while resourcefulness and adaptation enabled teachers to make practical use of available materials and tools. Personal reflection encouraged continuous improvement in teaching practices, and self-care helped teachers manage the demands associated with their professional responsibilities. These findings highlight the importance of strengthening both teachers' technical competencies and their capacity to respond constructively to classroom challenges.

The study also examined differences in teachers' assessments according to selected demographic and professional characteristics and investigated the relationship between pedagogical challenges and coping mechanisms. However, the specific conclusions regarding statistical differences and the direction, strength, and significance of the relationship should be based on the actual statistical results. In response to the identified needs, enhanced digital-based literacy teaching-learning activities were developed to support teachers in planning and implementing more engaging, appropriate, and manageable technology-supported lessons. Overall, the study underscores the value of sustained professional development, collaborative learning, accessible instructional resources, and school-level support in promoting effective and sustainable integration of interactive multimedia tools in elementary education.

#### *Recommendations*

Based on the findings of the study, it is recommended that school administrators provide continuous, practical, and needs-based training to strengthen elementary teachers' technological fluency and competence in using interactive multimedia tools. These training activities should focus on selecting appropriate digital resources, integrating multimedia materials with curriculum objectives, developing engaging learning activities, and addressing common technical difficulties. Teachers are also encouraged to strengthen collaboration and peer mentoring by sharing effective teaching strategies, instructional materials, and practical solutions to technology-related challenges. School administrators and other stakeholders should work together to improve access to functional technological equipment, reliable internet connectivity, and appropriate digital learning resources, particularly in schools with limited facilities. Furthermore, teachers should be supported in managing preparation time through effective lesson planning, resource sharing, and the development of reusable multimedia materials. Professional development programs should consider the varying needs and experiences of teachers based on their demographic and professional characteristics to ensure that interventions are relevant and responsive. The enhanced digital-based literacy teaching-learning activities developed in this study should be implemented and evaluated to determine their effectiveness in improving teachers' technological and pedagogical competencies and enhancing learners' classroom engagement. Future researchers may conduct similar studies in other districts or divisions and include

additional variables, such as teachers' digital literacy, self-efficacy, and learners' academic performance. These efforts may provide deeper insights into effective coping mechanisms and contribute to more sustainable and meaningful technology integration in elementary education.

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## Competing Interests Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

## Data Availability Statement

The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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## Appendices

No appendices are attached to this study.