

Bridging the Digital Divide: Experiences and Strategies of Elementary Grade Teachers on Technology Integration to Instruction

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Abstract. This study explored the experiences, coping mechanisms, and insights of elementary grade teachers regarding the integration of technology into classroom instruction. Conducted in the Kapalong West District, Division of Davao del Norte, the study involved ten (10) purposively selected elementary teachers. A phenomenological approach was employed to capture the participants lived experiences, using in-depth interviews and focus group discussions as the primary data collection methods. Through thematic analysis, three key themes emerged in relation to their experiences: accessing digital tools, honing personal expertise, and engaging in continuous professional development. In terms of coping mechanisms, the participants reported leveraging free online resources and open-source software, fostering collaborative learning and digital literacy, and differentiating instructional materials to meet diverse student needs. The study also identified three critical insights relevant to educational management: the importance of strategic resource allocation, the implementation of sustained professional development programs, and the cultivation of collaboration and peer learning among teachers. These findings underscore the need for systemic support and policy interventions to bridge the digital divide and promote effective technology integration.

KEY WORDS

1. Bridging the digital divide 2. Experiences 3. strategies

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1. Introduction

The digital divide remains a pressing issue in today's educational landscape, particularly as technology becomes an essential component of effective teaching and learning. The study explored how elementary grade teachers implement technology in their classrooms to enhance student learning despite challenges related to access and resource availability. It aimed to identify the strategies used by teachers to address these gaps and effectively integrate digital tools in their instructional practices. This study

is significant because it addresses the ongoing issue of unequal access to technology, particularly in developing regions, and examines how teachers creatively overcome barriers to provide equitable learning opportunities. Understanding these experiences is crucial for developing policies and support systems that promote effective technology integration in elementary education. In the United States, a significant gap in technology integration among elementary grade teachers emerged due to disparities in digital access

and technology training. Many rural and under-served communities lacked access to high-speed internet and devices, which hindered effective online teaching. According to the National Center for Education Statistics (NCES, 2021), only 60% in India faced substantial challenges with digital inclusion among elementary teachers, primarily due to infrastructure constraints. A report by the Azim Premji Foundation (2021) indicated that only 10% in South Africa, the digital divide was exacerbated by socioeconomic disparities. Most elementary teachers in under-resourced schools lacked both digital devices and the necessary training to use them effectively. The government's initiative to integrate technology into education faced hurdles due to power shortages, lack of stable internet, and the high cost of digital devices. As a result, many teachers relied on traditional methods even during periods of remote learning (Mafenya, 2021). In the Philippines, the digital divide was evident in the stark contrast between public and private school systems. While private school teachers had better access to digital resources and training, public school teachers, especially in rural areas, struggled due to inadequate infrastructure and minimal technical support. This gap limited the ability of teachers to adapt to technology-driven instructional strategies (Malipot, et. al 2022). The integration of technology in elementary classrooms in the Philippines has faced several challenges and gaps, primarily due to disparities in infrastructure, access to resources, and teacher training. Many public elementary schools, especially in rural areas, lack basic digital infrastructure such as reliable internet connectivity, computers, and other digital devices. Only 30% of public elementary schools in rural regions had stable internet access, making it dif-

ficult for teachers to implement digital teaching strategies effectively. This gap is further compounded by frequent power outages, especially in remote areas (Soriano et al., 2022). The lack of comprehensive training for elementary teachers on integrating technology into instruction is another critical issue. Many teachers reported insufficient training in using digital tools for teaching and learning. While the Department of Education (DepEd) launched training programs like Digital Rise and Learning Continuity Plans, the rapid shift to remote learning highlighted a significant skill gap among teachers, with many feeling unprepared to handle digital platforms for instruction (Delos Santos Magalong, 2021). In Davao del Norte, the integration of technology in elementary education has faced several gaps and issues related to infrastructure, training, and access to digital resources. These challenges are compounded by regional disparities and the unique contextual realities of teaching in a geographically diverse province. Although efforts have been made to address the digital divide, significant barriers persist, particularly in rural areas. Many schools, especially those in rural and remote areas, face limitations in digital infrastructure. Only 40% of elementary schools in the province have stable internet connectivity, making it difficult for teachers to integrate digital tools into their lessons effectively. This issue is further exacerbated by frequent power interruptions in some areas, which disrupt online classes and digital activities (Dela Cruz et al. (2022). Hence, considering all the existing issues on bridging the digital divide, the research opted to provide a comprehensive overview of the challenges faced by elementary teachers in integrating technology, emphasizing the need for targeted interventions.

1.1. Purpose of the Study—The study explored bridging the digital divide through the experiences and strategies of elementary grade teachers on technology integration to instruction. It aimed to explore and understand the lived experiences of elementary grade teachers in integrating technology into their instructional practices, particularly in the context of bridging the digital

divide. In the context of this study, it captured the nuanced realities of teachers' experiences with digital technology in their classrooms. The study provided a holistic view of how teachers perceive the digital divide, the barriers they face, and the strategies they employ to mitigate these challenges. The approach was particularly relevant in the Philippine setting, where the digital divide manifests in various forms, such as disparities in infrastructure, access to digital devices, and the availability of relevant professional development. The findings of the study may provide valuable insights into the effectiveness of this research and ensures that the voices of the teachers are heard and understood, offering insights that can inform policy, professional development, and resource allocation to support technology integration in diverse educational settings. This approach also highlights the need for context-specific strategies that consider the unique challenges faced by teachers in bridging the digital divide.

1.2. Research Questions—In line with the purpose of exploring the digital divide, experiences and strategies of elementary grade teachers on technology integration to instruction including the coping mechanisms with the challenges that they encountered, this study specifically sought answers to the following research questions:

- (1) What are the experiences of teachers integrating technology to instruction to bridge digital divide?
- (2) How do teachers cope with the challenges while integrating technology to instruction to bridge digital divide?
- (3) What insights can be drawn on technology integration to instruction to bridge digital divide?

1.3. Significant of the Study—Bridging the digital divide can enhance pupils' technology integration learning experiences and outcomes, and provide insights for educators and policy-makers on effective instructional approaches. This study may find significance to the following:

Learners

Through their active participation in technology integration within the classroom such as engaging with digital tools for learning, completing assignments using various technological platforms, and collaborating with peers on projects that utilize technology may help to optimize their learning and improve outcomes. They are also responsible for developing their digital literacy skills, which includes

learning how to use software, navigating online resources, and practicing safe and responsible internet use.

Teachers

Teachers' role in bridging the digital divide through their active engagement in integrating technology into their instructional practices. Their duties encompass designing and implementing lesson plans that effectively incorporate digital tools, fostering digital literacy among students, and adapting teaching methods to meet the diverse needs of learners. Additionally, teachers are responsible for continuously updating their skills through professional development opportunities and collaborating with colleagues to share best practices in technology use.

1.4. Theoretical Lens—This study dealt with the perspective of bridging the digital divide through the experiences and strategies of el-

ementary grade teachers on technology integration to instruction. It is pillared on the Diffusion of Innovations Theory by Everett Rogers (2003).

The Diffusion of Innovations Theory, developed by Rogers, explains how new ideas and technologies spread within a social system. This theory is relevant to understanding how technological integration occurs in educational settings. The Diffusion of Innovations Theory explains how, why, and at what rate new ideas and technology spread within society. The theory provides a framework for understanding the process by which innovations are communicated over time among the members of a social system. In the context of education, the Diffusion of Innovations Theory can be applied to understand how teachers and schools adopt new technologies and instructional practices. For example, when introducing a new educational technology, understanding the stages of adoption can help educators implement effective training and support strategies. Providing sufficient training and resources can help teachers move through the knowledge and persuasion stages more effectively. Leveraging early adopters within a school can encourage others to adopt the technology by demonstrating its benefits. Establishing channels for feedback can help address concerns during the implementation stage, reinforcing positive experiences with the innovation. The Diffusion of Innovations Theory offers valuable insights into the processes involved in the adoption of new ideas and technologies. By understanding the factors that influence the rate of adoption and the categories of adopters, educators can better navigate the challenges associated with integrating new innovations in their teaching practices and promote a culture of continuous improvement and innovation in education. According to Miller Hodge (2022), successful technology integration requires not only access to technology but also ongoing support and a culture of innovation among educators. Teachers who perceive technology as beneficial are more likely to adopt and integrate it into their teaching practices. Moreover, this is also anchored on TPACK Framework (Tech-

nological Pedagogical Content Knowledge) by Mishra Koehler (2006). The TPACK framework highlights the intersection of technology, pedagogy, and content knowledge, emphasizing that successful technology integration occurs when educators effectively blend these elements to enhance teaching and learning. The TPACK Framework (Technological Pedagogical Content Knowledge) is a valuable model for understanding how teachers can effectively integrate technology into their teaching while addressing the challenges of the digital divide. This empowers teachers to thoughtfully integrate technology into their teaching, addressing the digital divide not just through access to tools but by ensuring inclusive, equitable, and meaningful learning experiences. By focusing on the interplay of technology, pedagogy, and content, it provides a roadmap for creating learning environments that serve all students, regardless of their digital access levels. Constructivist Learning Theory, primarily advocated by Jean Piaget (1973) and Lev Vygotsky (1978) also supports this study. This emphasizes that learners actively construct knowledge through experiences, social interactions, and reflection. Within the context of elementary education, this theory supports the creation of student-centered learning environments. In relation to technology integration, the constructivist approach highlights the transformative potential of digital tools in promoting active, inquiry-based, and meaningful learning. In this study, Constructivist Learning Theory serves as a foundational lens. It frames how teachers leverage various technologies and collaborative online platforms to enhance student engagement and understanding. Teachers often describe how technology allows them to shift from traditional, lecture-based teaching to more dynamic and personalized instruction, where students take an active role in constructing knowledge. Collaborative digital projects also foster peer interaction and shared learning, key elements of Vygotsky's emphasis on social

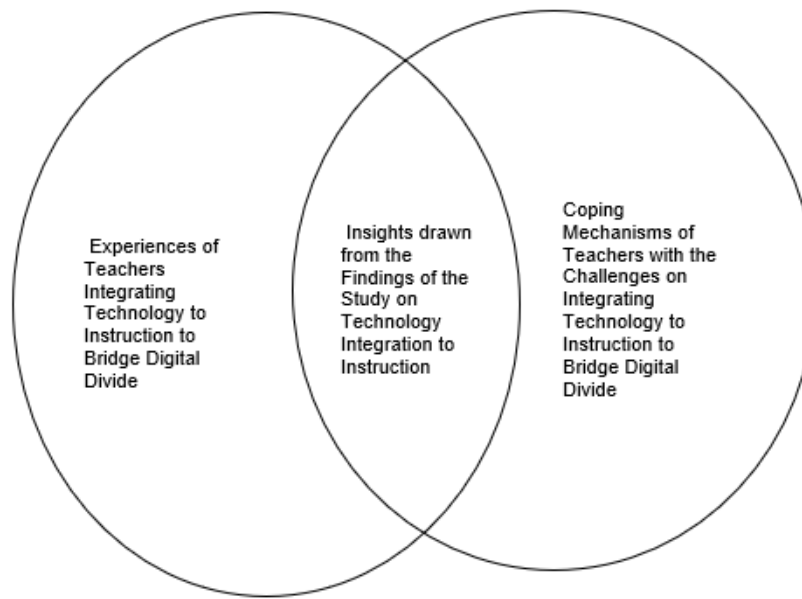


Fig. 1. The Conceptual Framework of the Study

constructivism. This theory contextualizes the teachers' instructional strategies as deliberate efforts to support active learning, scaffold student understanding, and create inclusive, engaging, and interactive classroom environments through technology.

2. Methodology

This chapter outlines the research methodology employed in the study, including the selection of participants, methods of data collection, the researcher's role, data analysis procedures, measures to ensure trustworthiness, and ethical considerations. Grounded in the previously conducted study on the experiences and strategies of elementary grade teachers in integrating technology into instruction, this chapter details how the research design was shaped by the need to understand and address the persistent digital divide in educational settings. The methods described herein were carefully chosen to capture authentic teacher experiences and practical strategies that have emerged in response to challenges in digital integration.

2.1. Philosophical Assumptions—The philosophical assumption framework of this study guided the collection, analysis, and interpretation of data within the context of technology integration in elementary education. It provided the foundational lens through which the results and conclusions were drawn. In line with qualitative research principles, the study considered where these assumptions fit within the broader research process and emphasized their critical role in shaping the inquiry. As emphasized by Khalifa and Khalifa (2024), such assumptions encompass ontological, epistemological, axiological, and methodological perspectives relevant to the educational field. Throughout the research process, I remained critically conscious of my own beliefs regarding the nature of reality, the ways in which knowledge is constructed, the influence of personal and professional values, and the qualitative

methods employed. These philosophical underpinnings were instrumental in framing the lived experiences and strategies shared by elementary grade teachers as they navigated the challenges of bridging the digital divide through instructional technology. **Ontology** refers to the philosophical stance concerning the nature of reality and what can be known about it. It encompasses the underlying assumptions both conscious and unconscious that researchers bring into the inquiry. These beliefs shape how realities are understood and interpreted within the social world. In his 2019 study, Jack Newman discusses ontological assumptions in qualitative research, particularly in social policy contexts. He critiques the dominance of positivist paradigms that focus on measurable phenomena, instead advocating for a constructivist approach that views reality as socially constructed through human interaction and shared meaning. This perspective is closely aligned with qualitative research methodologies that emphasize the value of individual experiences. In the context of this study on the experiences and strategies of elementary grade teachers in integrating technology into instruction, ontological assumptions guided the exploration of participants' lived realities. The study acknowledged that the challenges and strategies associated with bridging the digital divide are shaped by personal, institutional, and contextual factors. I centered on the voices of the participants by presenting rich descriptions, direct quotes, and emergent themes that reflected their varied experiences. Data were systematically coded and analyzed to identify both patterns and unique viewpoints. Throughout the process, I maintained a commitment to accurately representing the participants' perspectives, avoiding personal bias, and ensuring the authenticity and trustworthiness of the findings.

Epistemology refers to the philosophical foundation concerning who can

be a knower and how knowledge is formed through the relationship between the researcher and the participants. It emphasizes the importance of recognizing the researcher's standpoint and how this influences the generation of knowledge. McNeil (2020) calls for a shift away from dominant postpositivist frameworks, advocating for critical epistemologies that elevate marginalized voices and support social justice. Similarly, scholars such as Crotty, Denzin, and Lincoln, as cited in Khalifa (2023), argue that epistemology centers on how we come to know what we know, highlighting that, in qualitative research, knowledge is co-constructed through meaningful interaction between the researcher and participants. In this study, which explored the lived experiences and strategies of elementary grade teachers in integrating technology into their instruction, I embraced an epistemological stance rooted in subjectivity and proximity. Knowledge emerged from the personal stories, insights, and shared meanings conveyed by the participants. I adopted a phenomenological approach coupled with thematic analysis to deeply engage with the narratives of teachers, allowing themes to surface from their firsthand accounts. Through sustained and respectful interactions with the participants, I gathered rich, contextual data about their challenges and adaptive strategies in bridging the digital divide. These close engagements enabled a deeper understanding of their realities, aligning with the qualitative belief that authentic knowledge arises through deep, personal connection with those being studied. **Axiology** refers to the role of values and ethics in the research process. As Creswell (2019) asserts, qualitative research is inherently value-laden; researchers must recognize and be transparent about their own biases, ethical considerations, and the values that inform the research process. This openness allows readers to better understand how the researcher's background and positionality may influence data interpretation. In this completed

study, I consistently upheld the integrity and worth of the information shared by the participants. I acknowledged the personal and value-oriented nature of the data collected and ensured that each participant's insights were interpreted with care and respect. Their voices were preserved authentically, and ethical responsibility was maintained throughout the research process, particularly in representing their experiences truthfully and without distortion.

Rhetoric

Rhetoric in qualitative research pertains to the philosophical foundations and stylistic choices that influence how findings are presented. As noted by Creswell and Poth (2019),

2.2. *Qualitative Assumptions*—Research assumptions serve as the foundation for any theoretical or methodological framework. In qualitative inquiry, explicitly acknowledging these assumptions strengthens the credibility and transparency of the research. Barrick (2020) emphasizes the use of in-depth interviews in social research to elicit detailed insights, while Hinton and Ryan (2020) stress the importance of qualitative interviews in exploring personal perceptions and lived realities. They further assert that FGDs are essential in gathering rich, contextual data across disciplines, especially when the aim is to understand the complexity of participants lived experiences. Within a phenomenological framework, FGDs complement individual interviews by revealing common patterns and shared meanings among participants. To ensure credibility and confirmability, researchers must clearly articulate their assumptions, positionality, and the rationale for using FGDs, thereby strengthening the study's validity and transparency. This study used a phenomenological qualitative design, grounded in the philosophy that knowledge is best gained through the subjective experiences of individuals. As outlined by Neubauer, et.al. (2019),

qualitative research often employs a personal tone, reflective language, and rich narratives to convey depth and meaning. In this study, a phenomenological approach was employed to explore the lived experiences and strategies of elementary grade teachers integrating technology into instruction. I adopted a narrative style, using first-person voice where appropriate, to emphasize connection with the participants' lived realities. The presentation of findings included expressive language, direct participant quotes, and interpretive descriptions that allowed for a deeper understanding of the digital divide from the participants' own perspectives.

phenomenology requires deep engagement with the philosophical underpinnings of human experience. Following this, the research focused on interpreting the lived experiences of teachers who actively integrate technology in their classrooms. Guided by the works of Lester (1999, as cited in Bhandari, 2020), I approached the phenomenon from the participants' perspectives, setting aside preconceptions to allow authentic meanings to emerge. Qualitative research, as Bhandari also emphasized, is rooted in understanding language, experience, and context rather than numerical data fitting for a study centered on personal strategies, challenges, and growth. Data collection involved extensive interviews with teachers who had firsthand experience with the phenomenon. These narratives were analyzed using horizontalization, identifying significant statements and clustering them into themes. These themes were then used to construct both textual (what was experienced) and structural (how it was experienced) descriptions, forming a composite narrative that captured the essence of the phenomenon. Despite the strengths of this approach, the study also encountered challenges. Phenomenological inquiry demands a strong grasp of its philosophi-

cal principles. Bracketing personal biases was a particularly complex task, as it required ongoing reflexivity to avoid imposing my own interpretations prematurely. Moreover, determining how and when to incorporate my observations into the analysis required careful ethical and methodological judgment. Qutoshi (2020) reinforces that phenomenological inquiry offers a way to deeply understand lived experiences,

not only illuminating the phenomenon under study but also fostering personal and intellectual transformation for the researcher. In this study, phenomenology allowed for an in-depth exploration of how teachers navigate the integration of technology into instruction, revealing both practical strategies and deeper meanings behind their professional journeys.

2.3. Design and Procedure—The study utilized a qualitative research method employing a phenomenological qualitative design. According to Lester (1999, as cited in Bhandari, 2020) Phenomenological research is concerned with studying experiences from the individual's perspective, "bracketing" taken-for-granted assumptions, and usual ways of perceiving. The phenomenological approach is based on a paradigm of personal knowledge and subjectivity. It emphasized the importance of personal perspective and interpretation. Thus, it was powerful for understanding subjective experiences, gaining insights into participants' motivations and actions, and cutting through the clutter of taken-for-granted assumptions and conventional wisdom. Qutoshi (2020), concluded that data collection and analysis occur side by side to illumine the specific experience and identify the phenomena perceived by the actors in a particular situation. The outcomes of a phenomenological study broaden the mind, improve the ways of thinking to see a phenomenon, enable one to see ahead and define researchers' posture through an intentional study of lived experiences. However, the subjectivity and personal knowledge in perceiving and interpreting it from the research participant's point of view have been central in phenomenological studies. To achieve such an objective, phenomenology could be used extensively in social sciences. Phenomenological research design is a qualitative type of research for which interviews pro-

vide an in-depth method that can grant access to deep knowledge and explanations and help to grasp the subject's perspective. A questionnaire was a set of carefully designed, written down, and tested questions that were asked of individual respondents to gather information in research. These structured questionnaires, with some open-ended questions included, were prepared to cater to the subjects that are too busy and difficult to trace. It is also a useful instrument for the researcher to use for the teachers whose number is too significant to be covered by the researcher personally. The questionnaires were also appropriate for quickly collecting massive amounts of data. The open-ended questions allowed the respondents to give further opinions by qualifying or substantiating their answers. They were also intended to tap as much information as possible from the different categories of respondents (Delve. Limpaecher, 2022). The underlying reason for conducting qualitative research is to gain a richly detailed understanding of a particular topic, issue, or meaning based on first-hand experience. This is achieved by having a relatively small but focused sample base because collecting the data can be rather time-consuming; qualitative data is concerned with depth as opposed to quantity of findings. A qualitative research design is concerned with establishing answers to the whys and how's of the phenomenon in question. Qualitative research design should also account for what was said or done and how something was

spoken or carried out by a participant. Sometimes, these mannerisms can hold answers to questions in themselves, and body language and the tone of voice used by respondents are key considerations. As a researcher, I employed a qualitative methodology utilizing phenomenological design. Qualitative research is typically subjective rather than objective, leading to findings expressed in written form instead of nu-

merical data. Consequently, the information gathered from qualitative research is often not amenable to quantitative analysis using statistical methods, as there may be significant variations among the collected findings. However, by implementing a coding process, common categories can be identified during the analysis, facilitating a more structured interpretation of the data.

2.4. Research Participants—The study involved ten (10) purposively selected elementary grade teachers from five public schools in the Kapalong West District, namely: Gabuyan Central Elementary School, Semong Elementary School, Tiburcia Elementary School, Bunawan Elementary School, and Pag-asa Elementary School. These teachers had at least three years of teaching experience and consistently earned a very satisfactory performance rating for three

consecutive years. Additionally, they had first-hand experience in integrating technology into their instruction at least once every quarter. Participants for both in-depth interviews (IDI) and focus group discussions (FGD) were selected using purposive sampling, which allowed me to identify information-rich individuals whose insights aligned with the study's objective. This non-random selection ensured the authenticity and depth of the data collected, given the specific experience required for the research.

2.5. Ethical Considerations—In this completed study, ethical considerations played a vital role in safeguarding the rights, welfare, and dignity of the elementary grade teacher-participants who shared their lived experiences on technology integration. Throughout the research process, I upheld core ethical principles, including respect for persons, beneficence, and

justice. Confidentiality was strictly observed to protect the identities of participants, and the voluntary nature of participation was ensured through transparent communication and formal consent procedures. These measures were implemented to maintain the integrity of the research and ensure that it was conducted with honesty, fairness, and sensitivity.

2.6. Role of the Researcher—As the primary instrument of this qualitative inquiry, I took on multiple roles to ensure that the study was carried out ethically and competently:

Facilitator and Promoter of Unbiased Research I guided participants through interviews while consciously minimizing personal biases. Interpretations were grounded in literature and participants' actual responses rather than the researcher's assumptions. Expert in Qualitative Methods With support from a research adviser

and peers, I ensured adherence to qualitative protocols, such as environmental triangulation and thematic content analysis, to ensure rigor and consistency. Data Collector and Keeper Interview data were captured via handwritten notes and audio recordings, which were securely stored. Transcriptions were done verbatim to preserve the authenticity of responses. Data Analyst Through systematic coding, theming, and interpretation, I examined data from the participants' viewpoints. Care was taken to ensure

that their voices were accurately represented. Findings were structured according to research questions and supported by relevant literature.

Implications for educational policy and practice were also provided.

2.7. Data Collection—The following steps were followed in gathering the data: Securing Endorsement I obtained an ethics compliance certificate from the Dean of the Graduate School of Rizal Memorial Colleges in the first week of February 2025, signaling readiness to begin the study. Seeking Permission from the Schools Division Superintendent (SDS) During the second week of February 2025, a formal request was submitted to the SDS of the Division of Davao del Norte. This included Chapters 1 and 2 of the thesis, as well as the research instrument. The study proceeded only after obtaining the SDS's approval. Asking Permission from School Heads Upon securing division-level approval, school principals were contacted during the third week of February 2025. Letters explaining the purpose, procedures, and benefits of the study were sent to ensure transparency and institutional support. Obtaining Consent from the Participants. I asked permission from

the participants. During the fourth week of February 2025, they were formally oriented about the study and the process they had to undergo as participants. Conducting the Interview I conducted an in-depth interview and focus group discussions using the questionnaire in the first and second weeks of March 2025. The profile of the participants was taken, notes were jotted down, and conversations were recorded using a sound recorder for ease of transcription. Transcribing the Responses of the Interviewees I transcribed the interviewees' responses precisely by recalling their answers from the sound recorder on the third week of March 2025. Data Coding and Thematizing After the transcription, the data were categorized and coded on the fourth week of March and first week of April, 2025. Then, themes were extracted and individual data within the participants were compared and contrasted to come up with patterns and trends.

2.8. Data Analysis—In this study, thematic analysis was utilized to analyze the gathered data. I analyzed the answers of the participants from the interviews conducted using Creswell's Model, specifically the identifying of themes approach. According to Creswell (2012 as cited in Chali, et.al. 2022) themes in qualitative research are similar codes aggregated together to form a significant idea in the database. Familiarization With the data is common to all forms of qualitative analysis. I immersed myself in and became intimately familiar with their data, read and re-read it and noted any initial analytic observations. Coding Is also a common element of many approaches to qualitative analysis and involves generating pithy labels for

important features of the data of relevance to the (broad) research question guiding the analysis. Coding is not simply a data reduction method; it is also an analytic process, so codes capture both a semantic and conceptual reading of the data. Thematic analysis According to Fuchs (2023) thematic analysis is a widely used method for analyzing qualitative social science research data. This research article provides a step-by-step guide on conducting thematic analysis manually, emphasizing the importance of understanding the process for researchers seeking a deeper grasp of the nuances involved. The article highlights the key steps, including familiarizing oneself with the data, generating initial codes, searching for themes, reviewing

and refining them, defining and naming them, and producing a final report. Researchers can delve deep into the data, capture meaningful details, and uncover rich insights through iterative reading, note-taking, and coding techniques. The thematic analysis offers a valuable avenue for developing theoretical understanding, generating nuanced interpretations, and contributing to knowledge advancement in tourism research. The article also discusses the relevance and adaptability of thematic analysis in various qualitative research designs and methodologies. Searching for Themes It is a coherent and meaningful pattern in the data relevant to the research question. I ended this phase by collating all the

coded data relevant to each theme. Reviewing Themes I reflected on whether the themes tell a convincing and compelling story about the data and began to define the nature of each individual theme and the relationship between the themes. See to it the themes are connected and relevant to participants answers.

Defining and naming themes I prepared a detailed analysis of each theme, identified its ‘essence’ and constructed a concise, punchy, and informative name for each theme. Writing-up It involves weaving together the analytic narrative and data extracts to tell the reader a coherent and persuasive story about the data and contextualizing it in relation to existing literature.

2.9. Framework of Analysis—Framework analysis and applied qualitative research can be a perfect match, largely because framework analysis was developed specifically to analyze qualitative data in applied policy research. This study employed a qualitative research method. Data was analyzed following the steps outlined by Fuchs (2023) Goldsmith (2021) on qualitative data analysis:

Organizing the Data

Data were organized in a way that is easy to look at, allowing me to go through each topic to pick out concepts and themes.

Finding and Organizing Ideas and Concepts

Specific words or ideas kept coming up, and then I organized these ideas into codes or categories.

Building Over-Arching Themes in the Data

Each response category has one or more as-

sociated themes that gave a deeper meaning to the data. Different categories can collapse under one central over-arching theme.

Ensuring Reliability and Validity in the Data Analysis and in the Findings

The dependability of the findings was significantly strengthened using multiple independent sources to confirm information. The validity of the results was further enhanced by employing more than one instrument Beyond data analysis, I completed two crucial steps: first, writing and drafting the study’s output weaving together rich narratives from participants. Second, the presentation of the findings was meticulously crafted through thematic. While the framework analysis approach used in the study can appear straightforward, underscoring that such rigorous qualitative methodologies are neither simple nor demanding, as highlighted by Ritchie and Spencer (1994, cited in Goldsmith

2.10. Trustworthiness of the Study—In this qualitative inquiry exploring the experiences and strategies of elementary grade teachers in Kapalong West District, Division of Davao del Norte, the concepts of validity and reliability

common in quantitative research were not the primary focus. Instead, the study adhered to the qualitative standard of trustworthiness proposed by Lincoln and Guba (1985, as cited in Alexander, 2019), which includes credibility, transfer-

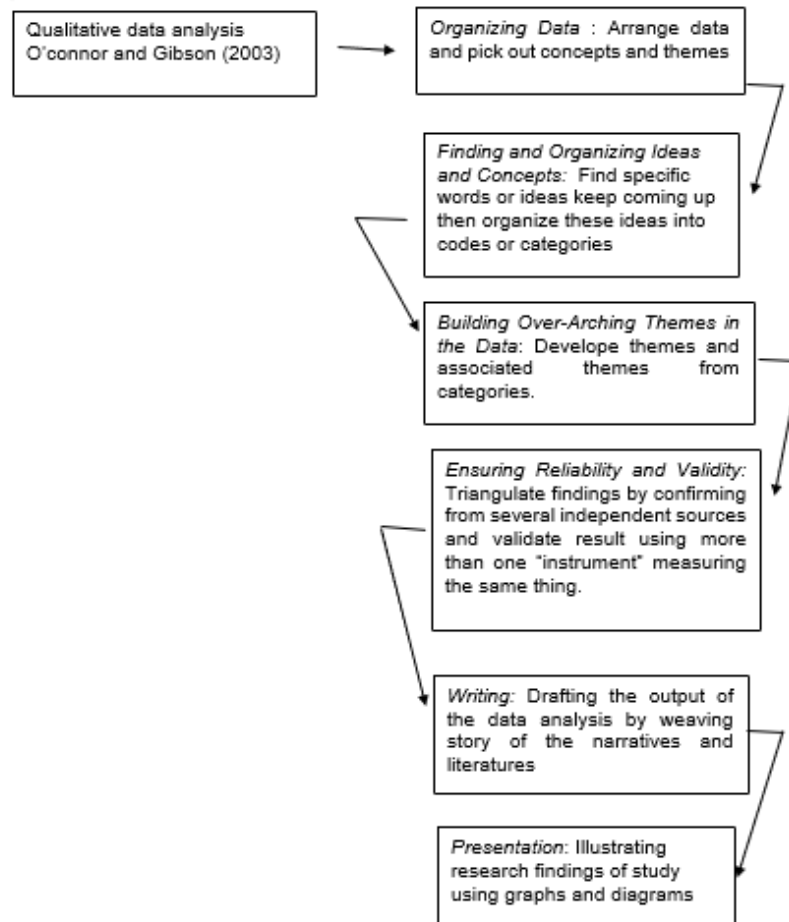


Fig. 2. Analytical Framework of the Study

ability, dependability, and confirmability. This focus ensured that the interpretations of teacher experiences were grounded in rigor, authenticity, and transparency. As noted by Hendren et al. (2023) and Ahmed (2024), strengthening trustworthiness is critical in generating research that informs responsive educational policies, particularly those anchored in equity and social justice.

Credibility

To ensure credibility, the study emphasized a faithful representation of the teachers' lived experiences with technology integration. Prolonged engagement in the field, member checking, and triangulation through interviews and focus group discussions helped establish a strong alignment between the data and its interpretation. The study sought agreement between the perspectives of the participants, elementary teachers navigating real classroom challenges and the researcher's thematic interpretations.

Transferability

Transferability was addressed by providing rich, thick descriptions of the participants' backgrounds, school contexts, and instructional environments within Kapalong West District. This included detailed accounts of how teachers integrated specific technologies, like educational videos, interactive apps, or online assessment tools, based on the resources available in their respective schools. By doing so, the study allowed other researchers, educators, or policy stakeholders to evaluate whether the insights could apply to other settings with similar educational infrastructures or teacher profiles.

Dependability

To establish dependability, the research process was documented in detail, from participant selection through data analysis. A clear audit trail was maintained, outlining decisions related to interview protocols, coding strategies,

and theme development. This procedural transparency ensures that another researcher investigating technology integration among elementary teachers whether in Davao del Norte or a comparable setting could replicate the study and arrive at similar conclusions. The use of consistent methods and detailed field notes supports the reliability of the process, even within the inherently flexible and interpretive nature of qualitative research.

Confirmability

To ensure confirmability during data collection, researchers prioritize transparency and rigor by meticulously documenting all decisions and processes. This involves maintaining an audit trail, using verbatim transcripts of participant interviews, and incorporating participants' direct quotes in the analysis. Reflexivity is practiced throughout, with researchers continually reflecting on their own potential biases and deliberately setting them aside to allow authentic participant voices to emerge. Member checking or participant validation can also be employed, where participants review and confirm the accuracy of the data or interpretations. These strategies collectively uphold the integrity of the data and reinforce that the findings genuinely reflect participants' perspectives. As emphasized by Ahmed (2024), confirmability involves ensuring that findings are not shaped by researcher predisposition but reflect the actual voices and realities of the participants. The use of peer debriefing and external audit further reinforced the neutrality of the analysis, offering a layer of independent validation for the study's conclusions. On the other hand, confirmability in qualitative research is achieved by maintaining objectivity and practicing reflexivity, ensuring that findings are grounded in participant data rather than researcher biases (Karcher et al., 2024).

3. Results and Discussion

This chapter presents the findings of the study, focusing on the research questions and the corresponding answers derived from the participants' responses. It offers an in-depth exploration of the experiences and strategies employed by elementary grade teachers in integrating technology into their instruction. The study aims to illuminate how these teachers navigate challenges and leverage digital tools to bridge the digital divide in their classrooms. Through a detailed analysis of teachers' narratives, this chapter highlights practical approaches, contextual factors, and the nuanced realities that shape technology integration in elementary education.

3.1. Experiences of Elementary Grade Teachers on Technology Integration to Instruction—Teachers' experiences with technology integration vary based on factors such as access to digital tools, institutional support, and personal expertise. Many educators recognize the benefits of technology in making lessons more interactive and student-centered. According to Smith and Gonzales (2021), elementary teachers who successfully integrate technology observe improvements in student participation, individualized learning, and formative assessments. However, challenges such as internet connectivity issues, lack of professional development, and adapting to new platforms remain prevalent.

Teachers' experiences with technology integration vary based on factors such as access to digital tools, institutional support, and personal expertise. Many educators recognize the benefits of technology in making lessons more interactive and student-centered. Elementary teachers who successfully integrate technology observe improvements in student participation, individualized learning, and formative assessments. However, challenges such as internet connectivity issues, lack of professional development, and adapting to new platforms remain prevalent.

3.1.1. Access to Digital Tools—This support system encompasses the availability and ability of students and teachers to use technology-based resources such as computers, tablets, interactive whiteboards, educational software, and reliable internet connections for learning and instruction. Limited access to these tools can create a digital divide, where some students and schools benefit from advanced technology, while others face challenges due to a lack of resources, affecting equitable learning experiences. The foregoing results of the study were consistent with the findings made by Lopez et al. (2023) highlights that teachers often feel overwhelmed by the rapid advancements in educational technology. While interactive whiteboards, educational apps, and gamified learning have enhanced teaching effectiveness, the pressure to continuously upgrade

digital literacy skills can be daunting. Some teachers also report a digital divide among students, where disparities in device access hinder equitable learning experiences. Likewise, the study's findings are also supported by another effective strategy is differentiated instruction through digital platforms, where teachers use adaptive learning tools such as Kahoot, Google Classroom, and Seesaw to tailor lessons to students' needs. Research by Fernandez and Cruz (2020) found that elementary teachers who utilize personalized learning software can better support students with diverse learning styles and abilities. As I analyzed the narration from the lived experience of teachers, comparing these two teachers' experiences with technology integration, P1 actively uses educational apps and online platforms on tablets for interactive reading and math, benefiting from increased stu-

dent engagement and real-time data despite challenges with limited gadgets and inconsistent internet. In contrast, P3 leverages projectors and interactive whiteboards to deliver dynamic, visual, and multimedia-rich lessons, particularly aiding in the comprehension of abstract concepts, while contending with the need for electricity and equipment maintenance. (Kibani, 2023). According to Lachner et.al. (2024), an effective technology integration to instruction depends on teachers' professional competencies, vision, and instructional strategies. It can be gleaned from P7's insight focuses on integrating technology through a blended learning approach, combining traditional classroom activities with online resources like educational websites for enrichment. This method offers the advantage of learning flexibility and self-paced study, but it is challenged by the digital divide, which necessitates alternative activities for students without home access to technology. Despite this, the teacher observes that students with access become more independent learners and expand their knowledge significantly

3.1.2. Honing Personal Expertise—Technology integration in elementary education requires not only access to digital tools but also the personal expertise of teachers in utilizing these tools effectively. Personal expertise refers to teachers' proficiency in using technology, their confidence in integrating digital resources into lessons, and their ability to adapt to emerging technological trends. Teachers with strong digital competencies can leverage blended learning, interactive media, and educational apps to enhance student engagement and learning outcomes (Runge et.al. (2023) The findings of the study agree with the findings according to Smith and Gonzales (2021), elementary educators with high personal expertise in technology demonstrate greater adaptability, creativity, and engagement when incorporating digital tools into instruction. These teachers can navi-

due to the vast information available online. Albakri and Wood-Harper (2025) emphasizes that while blended learning approaches can empower students and foster independence, they also gave worse situation for those without reliable access to technology Moreover, professional development and peer collaboration play a crucial role in enhancing teachers' confidence and competence in using technology. Educators who participate in technology training workshops, online courses, and collaborative learning communities report higher levels of self-efficacy and effectiveness in integrating digital tools into instruction (Taylor Mendoza, 2024). Despite the benefits, technology integration still presents technical, pedagogical, and logistical challenges. Limited access to devices and unstable internet connections hinders seamless instruction, particularly in rural and underfunded schools. To address these issues, school administrators and policymakers must prioritize infrastructure development and funding for digital resources (Garcia Santos, 2021).

gate online learning platforms, design interactive lessons, and use data-driven assessments to tailor instruction based on students' needs. Similarly, research by Lopez et al. (2023) found that teachers who undergo continuous training and self-directed learning are more likely to integrate technology successfully. They are comfortable using virtual simulations, augmented reality (AR), and artificial intelligence (AI) applications to enhance students' conceptual understanding. However, teachers with limited expertise often struggle with technical troubleshooting, lesson planning with digital tools, and maintaining student engagement in virtual environments. With the narration above, I analyzed how both teachers highlight the positive impact of their individual tech proficiency on student learning, with P2 focusing on creating rich, bespoke content and P4 on innovative, budget-

conscious adaptation. Teachers' individual tech proficiency, such as creating personalized content or adapting tools creatively, significantly enhances student learning outcomes (Rosales, 2021). Research indicates that participation in technology workshops, online certification programs, and peer mentoring helps teachers develop confidence and proficiency in digital instruction (Martinez Rivera, 2022). P5 leverages their personal expertise in basic programming or coding to teach problem-solving and critical thinking, demonstrating simple coding games and digital logic. This not only develops computational thinking skills but also prepares students for future technology, despite the initial challenge of grasping programming

concepts (Montuori et.al. 2024). In contrast, P9 applies their personal expertise in organizing information to create a simplified Learning Management System (LMS) using free online tools, providing easy access to modules and resources. This approach enhances learning organization and progress tracking, fostering student responsibility and independence in finding learning materials, though it demands significant self-discipline and time management from the teacher (NCES 2020). Research by Fernandez Cruz, (2020) engaging in teacher communities, professional learning networks (PLNs), and school-based technology initiatives fosters a culture of shared learning and innovation.

3.1.3. Continuing Professional Development —Professional development (PD) is essential for equipping elementary grade teachers with the knowledge, skills, and confidence needed to effectively integrate technology into their classrooms. PD programs help teachers stay current with educational technology trends, develop new strategies for engaging students, and implement digital tools that can enhance learning. For effective technology integration, PD must be ongoing, collaborative, and tailored to meet the specific needs of educators. Recent studies have highlighted the importance of PD in bridging the digital divide and improving the overall quality of instruction (Rosales 2021). The said findings were also supported by Tucker and Garcia (2022) argue, teachers who receive targeted, high-quality PD are more likely to incorporate innovative technologies, such as virtual simulations, interactive platforms, and educational apps, into their teaching practices. PD provides teachers with the knowledge to apply technology in meaningful ways that align with instructional goals, fostering deeper student engagement and improving academic outcomes. Moreover, PD allows teachers to reflect on their teaching practices, share strategies with peers,

and collaborate on integrating technology effectively across the curriculum. According to Edwards and Moore (2021), PD sessions that include opportunities for teachers to experiment with technology in real-world scenarios significantly enhance their confidence and competence. Teachers who have strong professional development backing are more likely to embrace technology and use it to support their students' learning needs. Generally, I analyzed the narration of both insights highlight crucial avenues for ongoing learning in educational technology, with P6 emphasizing broad, independent online learning and P8 focusing on structured, peer-supported collaboration within the school. Continued professional development in educational technology is very important for adapting to ever changing digital tools and pedagogical strategies (Irwin et al., 2024). Lee and Taylor (2021) stress that when PD is tailored to teachers' specific technological needs, it enables them to confidently use tools like learning management systems (LMS), interactive whiteboards, and cloud-based apps, enhancing the teaching-learning experience. Literature highlights the importance of professional development according to Miller et al. (2023), many

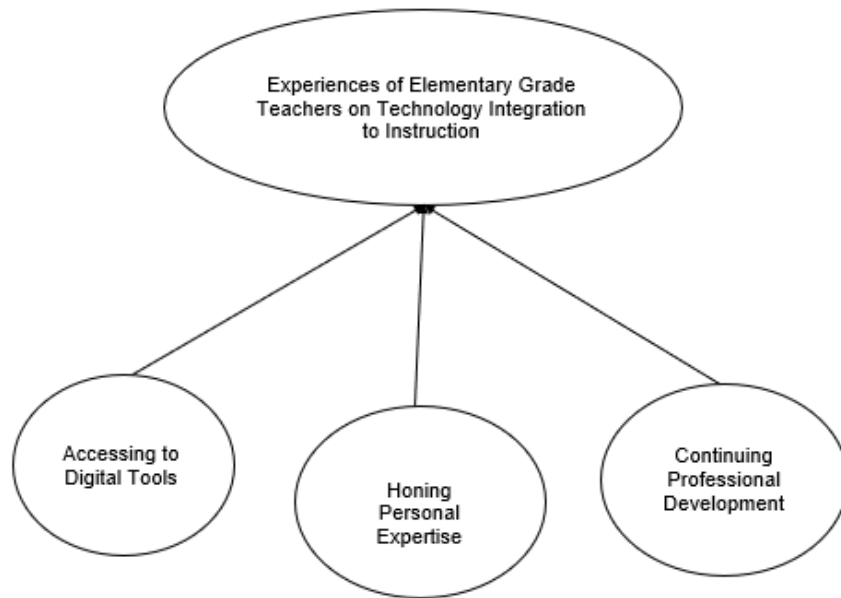


Fig. 3. Emerging Themes on the Experiences of Elementary Grade Teachers on Technology Integration to Instruction

schools lack the financial resources to offer comprehensive, high-quality PD programs, limiting teachers' opportunities for growth. Additionally, time constraints such as the demands of curriculum planning, classroom management, and assessment make it difficult for teachers to participate in PD regularly. As mentioned earlier, the participant emphasizes enhancing technology integration through seeking out mentors and

coaching opportunities from more technologically advanced teachers. This strategy provides personalized guidance and feedback, leading to faster learning and more effective technology use, despite the challenge of mentor availability due to workload (Kumar Johnson 2022). The result is students becoming more adaptable to the digital environment and achieving higher performance in technology-based tasks.

3.2. Coping Mechanisms of Teachers with the Challenges on Integrating Technology Integration to Instruction—The integration of technology in education has brought both opportunities and challenges for elementary grade teachers, particularly in addressing the digital divide. Teachers often face issues such as limited access to digital tools, inadequate training,

and varying levels of student digital literacy. To overcome these challenges, educators adopt various coping mechanisms that enable them to integrate technology effectively in instruction despite disparities in access and resources. This section explores the coping strategies employed by teachers to bridge the digital divide on technology integration in elementary education.

3.2.1. Leveraging Free Online Resources and Open Software—The strategic use of cost-free digital tools, platforms, and open-source software to enhance teaching, learning, and productivity. This approach allows educators, stu-

dents, and professionals to access high-quality educational materials, collaborate effectively, and integrate technology into their work without financial barriers. By utilizing free learning platforms, educational websites, open-access

journals, and open-source applications, users can develop skills, create engaging content, and improve efficiency while fostering digital inclusivity, especially in settings with limited resources (Fagan, 2025; Spielman et al., 2024). One of the most significant barriers teachers face in technology integration is the lack of access to digital resources, particularly in low-income schools and rural areas. To cope with this challenge, teachers implement low-tech and blended learning approaches that allow students to engage with digital content even with limited devices or internet connectivity. Johnson and Rivera (2022) highlight that teachers use a combination of printed materials and offline digital resources, such as pre-downloaded educational videos or simulations, to ensure that students can still benefit from technology-based instruction. Similarly, Garcia et al. (2023) found that many teachers maximize the use of available school technology by implementing device-sharing strategies, where students work in small groups to collaborate on digital tasks, thereby optimizing limited resources.

As I gleaned on the participants' responses, P1 tackles the lack of budget for paid software and tools by resourcefully leveraging free online resources and open-source software, continuously exploring high-quality alternatives to provide tech-enhanced lessons without cost. In contrast, P2 addresses their initial limited technological skills by proactively exploring user-friendly free online tools with abundant tutori-

als, learning at their own pace through YouTube and online teacher groups to gradually improve their tech proficiency without frustration (Spielman et al., 2024). Another common strategy is leveraging mobile technology, as many students have access to smartphones even if they lack computers. Lopez and Chen (2021) report that teachers integrate mobile-friendly educational apps and encourage students to complete assignments using their phones when access to computers is restricted. The responses above revealed the challenge of lack of quality control in free online resources by developing personal criteria for evaluating educational value, security, and age-appropriateness (APA Style, n.d.). The teacher's coping strategy involves critically consuming online content and building a "curated list" of trusted resources, ensuring the provision of a high-quality digital learning experience. Research of Nguyen et al. (2023) discuss how educators design lessons that can be completed online or using printed handouts, allowing students with limited digital access to participate equally. Another approach is flipped classroom instruction, where teachers provide pre-recorded lessons or offline digital resources for students to access at home, while classroom time is used for hands-on learning and discussions (Tucker Garcia, 2021). This strategy helps mitigate connectivity issues by allowing students to engage with digital content at their own pace, even when internet access is intermittent.

3.2.2. *Fostering a Collaborative and Digital Literacy Development*—This means enhancing students' ability to work together while simultaneously improving their competence in using digital tools effectively. This approach encourages teamwork through technology-driven activities, such as collaborative online projects, shared digital workspaces, and interactive discussions. By integrating digital literacy into col-

laborative learning, students not only develop essential technical skills but also improve their communication, problem-solving, and critical thinking abilities in a digital environment (Di Blas, 2022). The study's findings agree with Edwards and Moore (2024) highlight the importance of integrating basic digital skills into everyday lessons, ensuring that students, regardless of their background, can develop the com-

petencies needed for a technology-driven learning environment. On the other hand, the findings of the study were affirmed by the study of Miller et al. (2023) found that recognizing that technology integration is a systemic challenge, many teachers engage in policy advocacy and community partnerships to secure better resources for their schools. Educators collaborate with school administrators and policymakers to push for increased funding for educational technology. Both teachers effectively use structured approaches to foster collaborative digital literacy, but P3 focuses on structuring the activity design to encourage collaboration, while P5 focuses on structuring the assessment to ensure accountability within digital group work (Kasperski et.al, 2022). Additionally, partnerships with local businesses, non-profit organizations, and technology providers have enabled many schools to receive donations of digital devices and internet access support (Garcia et al., 2024). Teachers also work with parents and guardians to create home-school connections that support students' digital learning. Kim et al. (2023) emphasizes the role of parental involvement in technology integration, as many teachers conduct training sessions for parents on how to assist their children in using digital tools at home. By building a strong support network, educators ensure that students receive consistent guidance in developing digital skills beyond the classroom. Comparing these two teachers' strategies for integrating technology,

P8 addresses the critical challenge of students lacking digital literacy skills, such as identifying reliable sources and protecting online identity. This teacher copes by regularly integrating lessons on digital citizenship and critical evaluation of online information, modeling responsible digital behavior, and teaching "red flags" in online content. In contrast, P10 focuses on the practical challenge of arranging the physical learning environment to support collaborative digital work, dealing with insufficient space and power outlets. This teacher implements flexible seating arrangements, uses portable power strips, and creates "digital collaboration zones" to foster seamless teamwork and digital literacy development. This deals with the idea of Johnson and Rivera (2022) found that teachers frequently use offline digital resources, such as pre-downloaded instructional videos and educational software, allowing students to interact with digital content even without internet access. According to the research another coping mechanism involves device-sharing strategies, where students collaborate in small groups using shared devices to complete digital tasks. Garcia et al. (2023) highlight that teachers organize rotational technology schedules, ensuring that all students get time to engage with digital learning tools. Additionally, mobile technology has become a viable alternative, teachers encouraging students to use smartphones for research, digital assignments, and interactive learning activities (Lopez Chen, 2021).

3.2.3. Differentiating Instructional Materials—Adapting and customizing resources to suit diverse student needs, teachers can ensure that all learners, regardless of their technological access or skill levels, can engage with the content (Kong, 2022). This approach helps bridge the digital divide, offering students alternative ways to interact with the material, whether through low-tech resources, printed ma-

terials, or digital tools. Teachers can also adjust their strategies to accommodate various learning paces and preferences, ensuring that each student receives the support necessary for success in a tech-driven classroom. The foregoing results of the study were consistent with the findings of the study made by Lopez and Kim (2022), one of the main barriers to effective technology integration in the classroom is the un-

equal access to devices and the internet, which can result in some students being unable to fully participate in technology-based lessons. To address this, many teachers are differentiating instructional materials by creating both digital and non-digital resources to ensure that all students can engage with the learning content. Teachers often design lessons that provide digital versions of resources, such as interactive slides, videos, and online quizzes, for students who have reliable access to technology. For students without access to devices, print-based materials including worksheets, books, and pre-recorded audio lessons are provided to ensure equity in learning opportunities. To effectively implement differentiated materials, teachers rely on a range of strategies. One such approach is blended learning, where teachers combine online instruction with face-to-face teaching. This allows students to access digital content for independent learning, while still benefiting from personalized support during in-person sessions. The statements reflect the adaptability of teachers in overcoming challenges related to technology integration in classrooms, especially when resources are limited. P4 tackles the unsuitability of online materials for diverse learning levels by actively differentiating digital instructional materials. This involves seeking out various online resources at different difficulty levels for the same concept, then guiding students to choose the most appropriate material, thereby enhancing individualized learning. Thus, P6 addresses the lack of multi-modal instruction in online materials, often finding them too text based. This teacher copes by actively incorporating diverse digital instructional materials to cater to various learning styles, supplementing text with video explanations, audio clips, or interactive simulations (Beetham Sharpe, 2019). This strategy ensures balanced visual, auditory, and kinesthetic online activities, leading to more inclusive learning and increased engagement in technology-integrated lessons.

In addition, teachers often use adaptive learning technologies that cater to individual student needs. For example, some teachers use platforms like Khan Academy or DreamBox, which personalize the learning experience by adjusting content to the learner's level of proficiency. These tools help ensure that students receive content that is appropriately challenging, regardless of whether they are using technology at home or in the classroom (Miller Lee, 2024). Another important strategy is tiered instruction, where teachers create three or more levels of instructional content to teach progressively more complex or technology-driven based on students' learning levels and access to technology. By differentiating tasks in this manner, teachers can ensure that all students engage with the content at an appropriate level, thus maintaining the integrity of the lesson while accommodating technological gaps (Watson et al., 2023). Hence, P7's insight details a solution to the challenge of adapting traditional, offline materials into differentiated digital formats. The teacher copes by leveraging simple, free online tools like Google Slides for interactive presentations with varied question levels or Jamboard for collaborative brainstorming. This strategy emphasizes resourcefulness and using technology to enhance existing materials rather than replacing them, making differentiated instruction more accessible. This finding is congruent to the notion of a comprehensive study according to Brown and Johnson (2023), ongoing training in technology integration is essential for building teacher confidence and expertise. Many teachers participate in online courses, workshops, and professional learning communities (PLCs) to improve their technology skills and learn how to design differentiated materials effectively. These development opportunities allow teachers to stay updated on new technologies and pedagogical approaches. Moreover, schools can support teachers by providing access to mentorship or technology coaches. This support ensures that

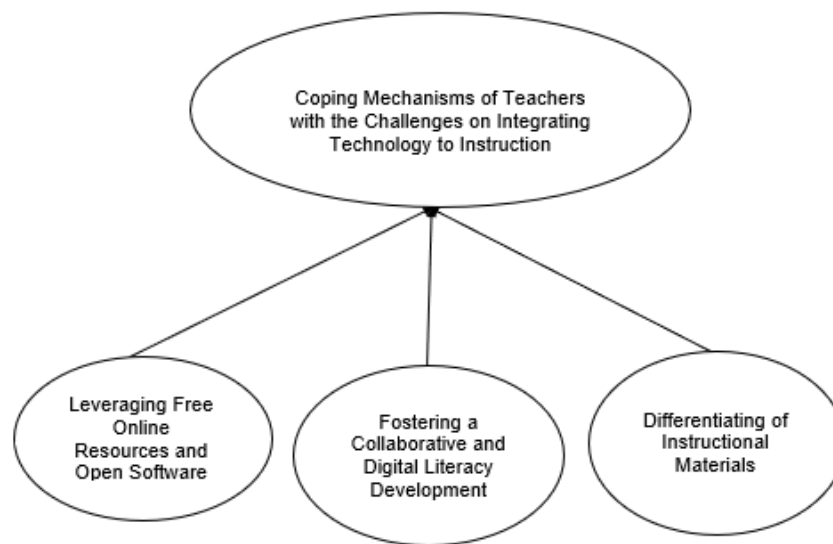


Fig. 4. Emerging Themes on the Coping Mechanisms of Teachers with the Challenges on Integrating Technology to Instruction

teachers are equipped to meet the needs of their students and bridge the digital effectively (Hernandez et al., 2024). Klapproth et al. (2020) examined teachers' stress and coping strategies during COVID-19-induced distance teaching. Although slightly older, this study remains relevant as it highlights how teachers adapted to sudden technological demands. It found that teachers used functional coping strategies when faced with external barriers and emphasized the need for better digital skills and school infrastructure. World Economic Forum (2025) emphasized the importance of structured training

and support for teachers to embrace emerging technologies like AI. The article argues that integrating technology effectively requires not just tools but also time, training, and a shift in educational priorities to include soft skills and self-awareness. Based on the themes identified from the figure, the coping mechanisms of teachers in integrating technology into instruction to bridge the digital divide were leveraging free online resources and open software, fostering collaborative and digital literacy development, and differentiating of instructional materials.

3.3. Educational Management Insights Drawn from the Findings of the Study on Technology Integration to Instruction—The participants shared their educational management in-

sights, and these were narrowed down into one to generate the themes. These themes were carefully analyzed and formulated based on what came from participants accounts and reflections. The subthemes are shown below:

3.3.1. Applying Strategic Resource Allocation—One of the major insights is the importance of strategic allocation of resources to ensure that all students have equal access to

technology. Educational managers need to prioritize investment in infrastructure and ensure that all students, regardless of socio-economic background, have access to the tools they need

for digital learning. This includes providing mobile devices, internet access, and software to students in underserved areas. As noted in the study, when technology resources are scarce, teachers often turn to low-cost alternatives like mobile phones and free online resources, but long-term solutions require sustainable funding and policy commitment to reduce the digital divide. Research has shown that effective resource allocation can bridge the digital divide in education. In regions where access to technology is limited, schools have begun investing in laptops, tablets, and high-speed internet to ensure all students can engage in technology-driven learning (Liu et al., 2021). Strategic resource allocation is not only about the availability of devices but also ensuring that students are equipped with reliable access to the internet and other necessary tools to engage in digital learning (Zhang et al., 2020). Strategic resource allocation also involves fostering a culture of collaboration among teachers. Teachers can share digital resources, lesson plans, and strategies to maximize the impact of available technology. Schools that invest in shared digital platforms or cloud-based resources allow teachers to access and use materials more efficiently, regardless of their classroom settings (Johnson et al., 2020). Collaborative tools enable teachers to work together, share best practices, and troubleshoot challenges they face in implementing technology. Both insights underscore that simply having technology isn't enough; P1 focuses on the pedagogical wisdom of technology selection, while P2 emphasizes the foundational infrastructure necessary for its successful implementation. This is consistent with findings from the U.S. Department of Education (2023), which highlight the dual importance of instructional design and infrastructure in ensuring effective and equitable technology integration in schools. Technology integration to be sustainable, schools must allocate resources in a way that ensures long-term viability. This involves

not only purchasing hardware but also maintaining and upgrading the technology as needed. It includes budgeting for regular software updates, cybersecurity measures, and technical support to keep the digital infrastructure functional over time. Schools must also account for the long-term costs of internet subscriptions and software licenses to ensure continuous access to digital learning resources (Tucker, 2020). According to Tan (2021), equitable access to digital tools such as tablets, laptops, and interactive whiteboards is critical for promoting inclusive education and bridging the digital divide. In many areas, however, schools face challenges in ensuring that every student has access to such tools, leading to disparities in educational experiences. Comparing these two teachers' realizations on the significance of strategic resource allocation in technology integration, P4 emphasizes that teacher knowledge and skills are paramount even more so than the technology itself for transforming pedagogy. This teacher advocates for substantial, continuous investment in teacher professional development to ensure technology is used to its full potential. In contrast, P9's primary realization is that technology is a powerful tool for personalizing learning, enabling individualized pace and content for diverse student needs. This is supported by Laak and Aru (2024), who highlight the effectiveness of AI-driven personalized learning solutions in enhancing educational outcomes while emphasizing the need for alignment with broader educational goals. This teacher argues that strategic resource allocation should prioritize digital tools with adaptive features and data-tracking capabilities to facilitate customized learning paths and targeted interventions for enhanced individual outcomes. Strategic allocation, which focuses on prioritizing the deployment of resources to schools with the greatest need, has proven effective in improving technology access (Zhang, 2022). Digital tools enable students to engage with content in diverse ways, enhancing their learning

experience and increasing motivation. This is also supported by a study according to Moser et al. (2023), professional development programs focused on digital literacy and technology integration are essential for teachers to feel confident and capable in the use of new tools. Schools must allocate resources towards con-

tinuous teacher training, webinars, workshops, and mentoring programs to ensure that teachers remain updated on the latest technological advancements and pedagogical strategies. These programs help teachers develop skills for using digital resources effectively and integrating them into existing curriculum frameworks.

3.3.2. Implementing Professional Development Programs—Another significant insight is the need for ongoing professional development in technology integration. The study reveals that teachers are eager to integrate technology into their instruction, but face challenges related to insufficient training and support. Educational leaders should focus on tailored professional development programs that not only teach teachers how to use digital tools but also how to align them with curriculum goals and student learning outcomes (Sterrett, W., Richardson, J. W. (2020). The study's findings agree with Chang et al. (2021) in Taiwan found that teachers who participated in structured, hands-on professional development workshops were more likely to integrate technology effectively in their classrooms. These programs often included training on specific tools such as interactive whiteboards, online learning platforms, and educational apps. Similarly, in the United States, Wang and Li (2022) reported that teachers who engaged in collaborative professional development sessions focused on digital literacy showed increased use of technology in lesson planning, content delivery, and student engagement. This indicates that ongoing training and peer collaboration are essential for successful technology integration. Moreover, comparing these two teachers' insights on the significance of professional development for technology integration, P3 realizes that generic computer literacy training is insufficient, emphasizing the need for targeted programs focused on pedagogical applications of technology (e.g., using

interactive whiteboards for storytelling or online tools for assessment) to truly make teaching more effective. While, P8 highlights the crucial importance of follow-up and coaching after workshops for actual classroom implementation, noting that without such guidance, new strategies are easily forgotten. This teacher advocates for mentorship or coaching components in professional development programs to provide real-time support and feedback, strengthening confidence and skills. Mentorship in professional development settings has been shown to contribute positively to educators' confidence and skills (Zhang, Ma, Xu, 2024). According to Smith et al. (2023) in the United Kingdom, differentiated professional development initiatives, which allow teachers to select workshops based on their prior technological experience, were more impactful than one-size-fits-all models. The research revealed that new teachers benefited from foundational courses, while more experienced educators gained value from advanced sessions on integrating augmented reality or artificial intelligence tools into their teaching. These differentiated approaches ensured that all teachers, regardless of their technology proficiency, could improve their practices. A study by Almeida et al. (2020) highlighted that collaborative workshop where teachers shared experiences and strategies led to greater adoption of technology. Teachers who collaborated in technology-focused communities of practice were better able to troubleshoot challenges, share ideas, and support one another in implementing technology in the classroom. This peer

support network was particularly valuable in overcoming the common barriers to technology integration, such as lack of time and technical difficulties. The statement underscores P10's primary realization regarding technology integration is that it serves as a tool to enhance teaching, not replace the teacher's role. This teacher criticizes professional development programs for often overemphasizing the "how-to" of technology while neglecting its pedagogical applications. In which supported with the statement of (Fernández-Batanero et al., 2021). P10 stresses that the true significance of technology lies in its ability to support deeper learning and address diverse student needs, advocating for professional development that focuses on how teachers can become more effective us-

ing technology, rather than simply just using it. According to Rahman et al. (2022) noted that while teachers received training in digital tools, they often faced challenges such as inadequate technological infrastructure, limited access to devices, and inconsistent internet connectivity. These challenges were compounded by a lack of ongoing technical support after training programs. Additionally, teachers in India reported that the pressure to cover the curriculum often left little time to experiment with technology, making it difficult to fully incorporate digital tools into everyday teaching practices (Sharma Patel, 2021). Thus, professional development programs must be complemented by institutional support and access to resources to be truly effective.

3.3.3. Fostering Collaboration and Peer Learning —The findings suggest that fostering a collaborative learning environment among teachers plays a crucial role in overcoming challenges in technology integration. Teachers often rely on peer support and collaboration to share resources, strategies, and troubleshoot problems. Educational managers should encourage communities of practice within schools, where teachers can regularly meet to discuss the integration of technology, exchange successful strategies, and provide mutual support. This can also be extended to creating cross-school networks, where teachers can connect with others facing similar challenges, particularly in rural or underserved areas. Educational managers should encourage communities of practice within schools, where teachers can regularly meet to discuss the integration of technology, exchange successful strategies, and provide mutual support (Irish, et.al.,2023).

Wang and Zhang (2022) explored how PLCs, where teachers share experiences, strategies, and challenges related to technology integration, fostered a positive environment for

professional growth. Teachers who participated in such communities were more likely to try new tools, such as educational apps and interactive whiteboards, and share these tools with their colleagues. In the United States, Harrison et al. (2021) found that when teachers collaborated on lesson plans and technology-based projects, they not only enhanced their own skills but also inspired their peers to use technology more effectively. These findings suggest that collaborative environments can break down barriers to technology integration, such as fear of failure or lack of knowledge. These responses highlight the impact of needs as P5 emphasizes its ability to facilitate broader peer-to-peer collaboration by moving beyond traditional methods to enable easier sharing of ideas, feedback, and online co-creation of projects. This strengthens student connections and communication, fostering a robust learning community. Moreover, P6 highlights technology's capacity to personalize peer support, allowing students to record and share explanations (e.g., video solutions for math problems) with struggling classmates. This provides flexible and customized

assistance tailored to individual learning pace and style, making giving and receiving help more comfortable and effective. Ramteja Sajja et al. (2023) explain that personalized learning assistants provide flexible, customized support tailored to individual learning pace and style, making receiving help more comfortable and effective. Lam et al. (2023) conducted a study in Hong Kong, highlighting that teacher who engaged in peer learning activities, such as co-teaching or peer observations, were more confident in using digital tools in their classrooms. Through peer learning, teachers were able to observe the practical application of technology and gain insights into how to address specific challenges. Nguyen et al. (2020) found that teachers in Vietnam who participated in peer learning sessions focused on technology tools for classroom management and interactive learning techniques showed improvements in their ability to incorporate these tools into their teaching strategies. Peer learning, thus, serves as a powerful means of demystifying technology and making it more accessible to educators. The study could shed light of P7's primary realization regarding technology integration is its capacity to build a broader digital learning community inside and outside the classroom. By leveraging shared online spaces for posting work, asking

questions, sharing, and giving feedback, technology significantly expands students' network of support and learning, empowering them to be more active and confident in collaborative digital endeavors (Smith Jones, 2024). The use of online platforms for collaboration has become increasingly prevalent in supporting technology integration. A study by Lopez Santos (2021) in Spain found that teachers who participated in online forums and discussion groups focused on technology use in education were more motivated to implement digital tools in their classrooms. Moreover, in Australia, Turner and Watson (2022) observed that teachers who used social media and professional networks such as Twitter and Facebook groups to connect with colleagues globally were exposed to innovative technology strategies and educational resources. These online collaborative networks provided teachers with a wider range of ideas and resources. Based on the responses from the participants, three key themes emerged that provide critical insights into how educational management can address the challenges associated with technology integration and bridge the digital divide in classrooms. These themes are applying strategic resource allocation, ongoing professional development programs, and fostering collaboration and peer learning.

4. Implications and Future Directions

This chapter serves as a critical component of the study, providing insights into the practical, policy, and research implications of the findings, offering guidance for future strategies of elementary grade teachers on technology integration to instruction. A study on experiences of elementary grade teachers on technology integration would typically discuss the implications of the study's findings and suggest potential future directions for research or practice in the teaching field.

4.1. Findings—The study revealed important themes regarding the experiences, coping mechanisms, and insights of elementary grade teachers in Kapalong West District on integrating technology into instruction to bridge the digital divide. First, in terms of their experi-

ences, three key themes emerged: accessing to digital tools, honing personal expertise, and continuing professional development. The practical implication for educational institutions is to ensure equitable access to reliable digital devices and stable internet connectivity, especially

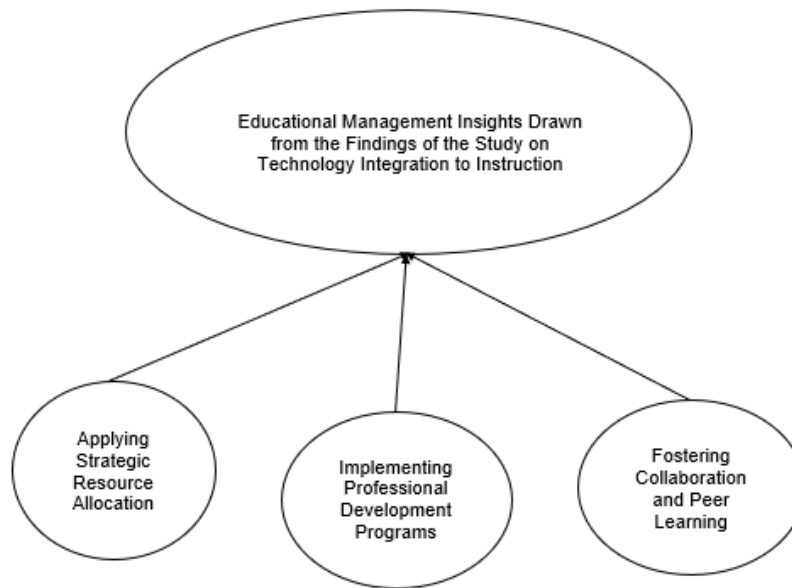


Fig. 5. Emerging Themes on the Educational Management Insights Drawn from the Findings of the Study on Technology Integration

in underserved areas. According to Rogers' Diffusion of Innovation Theory, the availability and quality of the innovation itself are fundamental to its adoption; without these basic tools, teachers cannot effectively apply their Technological Pedagogical Content Knowledge (TPACK) in the classroom. Furthermore, teachers' confidence and skills in using technology are critical, suggesting that schools should provide targeted, hands-on training that integrates technology with pedagogy and content knowledge. This approach reduces the perceived complexity of technology use and supports its diffusion by making it more observable and usable. From a constructivist perspective, well-prepared teachers are better equipped to facilitate learner-centered environments where students actively build knowledge through technology-enhanced

experiences. Finally, sustained professional development that emphasizes collaboration and reflection helps teachers continuously refine their technology integration strategies, supporting deeper learning and bridging the digital gap. Sustained professional development that emphasizes collaboration, and reflection aligns with Vygotsky's Social Constructivist Theory which highlights the importance of social interaction and scaffolding in learning. Teachers refine their technology integration strategies through collaborative reflection, enabling deeper learning and bridging the digital divide by supporting each other's growth. Through this theory sustained professional development that emphasizes collaboration and reflection helps teachers refine technology integration strategies, supporting deeper learning and bridging the digital gap.

4.2. Implications—Regarding coping mechanisms, teachers demonstrated creativity and resourcefulness through leveraging free online resources and open software, fostering collaborative digital literacy development, and differentiating instructional materials. Educa-

tional institutions can enhance these efforts by training teachers to identify and incorporate freely available digital content, thus increasing the relative advantage and compatibility of technology integration with existing school resources and needs, as described in Rogers'

theory. Encouraging collaboration through professional learning communities or peer mentoring creates powerful communication channels that facilitate the sharing of successful strategies, reduce perceived complexity, and enhance teachers' collective digital competence, aligning with both diffusion theory and the social constructivist view that knowledge grows through interaction. Moreover, supporting teachers in differentiating instructional materials ensures technology integration is compatible with diverse student needs and access levels, allowing personalized learning experiences that adhere to the principles of TPACK and constructivism by meeting learners where they are and scaffolding their growth. From an educational management perspective, applying strategic resource allocation, implementing professional development programs, and fostering collaboration among teachers are critical insights. Rather than merely acquiring technology, institutions must distribute resources thoughtfully to meet pedagogical goals, enabling effective adoption as outlined in Diffusion of Innovation Theory. Professional development programs should go beyond familiarization with tools to cultivate deep, integrated knowledge of technology, pedagogy, and content, reflecting the core of the TPACK framework. Additionally, creating structured

opportunities for peer learning and collaboration supports the diffusion of innovation by making technology integration more visible, credible, and socially reinforced among educators. This collaborative culture also resonates with constructivist ideals, emphasizing social interaction as a pathway for developing new skills and knowledge. The findings underscore that bridging the digital divide and enhancing technology integration in elementary education requires a balanced focus on infrastructure, teacher capacity-building, and collaborative support systems, each informed by well-established theoretical frameworks to ensure sustainable and meaningful change. Bridging the digital divide and enhancing technology integration in elementary education requires building teacher self-efficacy, infrastructure, and collaborative support systems, as highlighted by Bandura's Social Cognitive Theory. This theory emphasizes that learning occurs through observing, modeling, and social interaction, and that confidence (self-efficacy) in using technology is crucial for meaningful and sustained adoption suggests that enhancing technology integration involves not only providing infrastructure but also fostering teacher self-efficacy and collaborative support to promote sustained change.

4.3. Future Directions—The ongoing efforts to bridge the digital divide through technology integration in education require active participation from policymakers, school administrators, and teachers. Each group plays a pivotal role in ensuring that technology is used effectively to enhance learning opportunities, especially for disadvantaged students. Future directions for these stakeholders can be outlined as follows: Learners They should focus on ensuring equitable access to digital tools and skills, empowering them to navigate the increasingly digital world. This will result in more

engaging, personalized learning experiences, fostering critical thinking and problem-solving abilities essential for the future. Ultimately, students will become digitally literate citizens, ready to participate fully in a technologically advanced society. Teachers To effectively bridge the digital divide in technology integration, future efforts should prioritize empowering teachers through continuous, context-specific professional development that not only enhances their digital skills but also builds their confidence and adaptability in diverse classroom settings. Additionally, fostering strong collaborative net-

works—both within and across schools—will enable teachers to share best practices, troubleshoot challenges, and co-create innovative instructional strategies. Integrating culturally responsive pedagogy with technology training can further ensure that digital tools meet the varied needs of all learners, thereby promoting equity in access and learning outcomes. Parents Understanding the importance of technology integration will empower them to become active partners in their children’s digital learning journey. Parents can support school initiatives by encouraging responsible technology use at home and engaging in communication with teachers about digital learning progress. This collaboration between home and school is crucial for creating a seamless and supportive learning environment School Administrators They should create robust support systems and infrastructure for technological integration. They should prioritize allocating resources for reliable internet access, up-to-date devices, and relevant software, while also fostering a culture of innovation and continuous learning among staff. These actions are vital to ensuring all teachers can effectively implement technology and reach every student, particularly those in disadvantaged areas. Department of Education Officials They should offer empirical evidence to inform national policies and programs aimed at technology integration. The Department should

develop and implement comprehensive guidelines for digital literacy curriculum development and teacher training nationwide, ensuring consistent standards and support across all schools. This will solidify systemic efforts to bridge the digital divide, promoting equitable access to quality education for all Filipino learners. Future Researchers Should investigate the multifaceted barriers that contribute to the digital divide in educational settings, particularly focusing on how socio-economic, cultural, and infrastructural factors influence technology integration in diverse classrooms. Researchers are encouraged to explore longitudinal studies that assess the long-term impact of targeted interventions on both teacher practices and student outcomes. Emphasis should be placed on developing and validating scalable, culturally responsive models of professional development that empower educators to effectively integrate technology. Additionally, leveraging mixed-methods approaches will provide deeper insights into the nuanced experiences of teachers and students, while exploring innovative technologies such as AI and adaptive learning systems in bridging digital inequities. Collaborative partnerships between researchers, educators, policymakers, and communities will be vital to designing inclusive strategies that ensure equitable access and meaningful technology use.

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