Teacher Attributes and Technology Integration in Instructional Management: Benefits and Barriers

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ABSTRACT

This study examined the integration of technology in instructional management among teachers in the Lagonoy South District, focusing on teacher attributes, school contextual factors, extent of technology use, perceived benefits, and encountered barriers.

A descriptive-correlational design was used, with data gathered from teachers in mainland and coastal schools. Descriptive and correlational statistics were employed in data analysis. Findings showed that most respondents were young to middle-aged, predominantly female, and held bachelor's degrees, with some pursuing graduate studies. Participation in technology-related training was moderate. Most teachers were assigned in large mainland schools with high student populations and had access to basic ICT resources such as laptops, computers, printers, projectors, and smart televisions, while access to advanced technologies remained limited. Results further indicated that technology was commonly used in routine tasks such as lesson planning, instructional material preparation, communication, and data management. However, its use in interactive and higher-order instructional processes was limited. Teachers perceived technology as beneficial in improving instructional efficiency, learner engagement, and teaching support, although challenges such as limited internet connectivity, insufficient digital resources, and time constraints persisted. Inferential analysis revealed no significant relationship between teacher attributes and school contextual factors and the extent of technology integration, and no significant differences in technology use across school locations. However, age and training exposure influenced the level of integration. The study concludes that technology integration among teachers is largely functional rather than transformative. It recommends continuous hands-on training, improved ICT infrastructure, stronger institutional support, and mentoring programs to enhance meaningful integration of technology in instructional management.

Keywords: technology integration, instructional management, teacher attributes, ICT, school contextual factors

THE PROBLEM AND ITS SETTING

Background of the Study

The rapid advancement of technology has significantly changed education systems worldwide, transforming how teaching and learning are delivered in both developed and developing countries. The integration of Information and Communication Technology (ICT) has become a fundamental component of modern education, enabling improved access to learning resources, enhancing instructional delivery, and fostering inclusive learning environments. Globally, digital integration is widely recognized as essential in preparing learners for the demands of the 21st century, where technological competence is critical for academic and professional success (UNESCO, 2023). While countries such as Singapore have implemented comprehensive reforms that strengthen teacher readiness and instructional innovation (Natarajan, 2018), persistent disparities continue to limit access to and effective utilization of digital resources, particularly in developing countries (Espinosa et al., 2025).

In the Philippines, the Department of Education (DepEd) has implemented various programs and policies that support the integration of digital resources in basic education. Among these is the DepEd Computerization

Program (DCP), established through DepEd Order No. 78, s. 2010, which aims to provide public schools with appropriate technological equipment to enhance teaching and learning process.

This initiative is further complemented by DepEd Order No. 8, s. 2020, which provides policy guidelines for the implementation of distance and blended learning modalities to ensure continuity of instruction. Despite these initiatives, empirical evidence suggests that the availability of resources alone does not guarantee meaningful classroom integration. Studies indicate that the utilization of ICT in instruction remains limited due to various institutional and contextual factors, including inadequate infrastructure, insufficient teacher training, limited strategic integration of ICT into curriculum, and leadership-related challenges (Andrade, 2026; Tomaro & Mutiarin, 2018).

Central to this issue are teacher attributes, which serve as key determinants in the adoption and effective use of digital resources in instructional management. Instructional management encompasses planning, organizing, implementing, and evaluating learning activities, all of which require informed pedagogical decision-making. Teacher attributes such as age, sex, educational attainment, and participation in technology-related training are associated with variations in digital competence, self-efficacy, and adaptability to innovation. These internal factors influence teacher's readiness and capability to integrate technology effectively in the classroom.

The influence of these attributes becomes evident in actual teaching practices. In lesson preparation, teachers determine the appropriateness of digital tools in achieving learning objectives. During instruction, technology facilitates the delivery of content through multimedia and interactive platforms. In assessment, digital applications support timely feedback and data-informed evaluation of student performance. Moreover, in terms of learner engagement, technology enables collaborative and participatory learning environments. The effectiveness of these practices depends largely on teacher's competence and confidence in using digital tools, which reflect the extent of technology utilization in instructional management.

While ICT integration offers significant opportunities, it also presents challenges. On one hand, it enhances access to instructional materials, teaching strategies, and increased student engagement. On the other hand, teachers encounter constraints such as limited infrastructure, insufficient training, pedagogical difficulties, and lack of institutional support. These conditions influence not only implementation of technology but also teacher's perception of effectiveness. In this study, these dimensions are examined through the perceived benefits and encountered barriers associated with technology integration.

Beyond individual attributes, contextual factors within schools also shape how digital resources are utilized in instructional management, influencing teachers' access, confidence, and effectiveness in integrating technology into teaching and learning process. Variations in school location, size, population, and availability of technological resources create differing conditions for instructional delivery. These differences are particularly evident in the Lagonoy South District of Camarines Sur, where mainland and coastal schools operate under distinct circumstances. Coastal schools often experience limited internet connectivity, whereas mainland schools may have relatively more favorable conditions. These contextual variations provide a basis for comparing schools in terms of extent of utilization, perceived benefits, and encountered barriers in ICT integration.

Despite the growing body of literature on educational technology, there remains a paucity of studies examining how teacher attributes relate to the extent of utilization, perceived benefits, and encountered barriers, while simultaneously considering contextual differences such as school location. Addressing this gap is essential to understanding how both individual and institutional factors influence instructional practices in diverse educational settings.

Therefore, this study examines the relationship between teacher attributes and technology integration in instructional management, focusing on the extent of utilization, perceived benefits and encountered barriers. It also determines the differences in these variables between mainland and coastal schools in the Lagonoy South District of Camarines Sur. The findings of this study are expected to inform the development of context-responsive strategies and policies that promote more effective and equitable integration of technology in basic education.

Statement of the Problem

This research aimed to examine the attributes of teachers who integrated technology in instructional management, focusing on the extent of utilization, perceived benefits, and encountered barriers. Specifically, it sought to answer the following questions:

1. What is the profile of the respondents and their respective school environments in terms of:
A. Teacher Attributes
1.1 Age;
1.2 Sex;
1.3 Highest educational attainment;
1.4 Number of technology-related trainings attended;

B. School Contextual Factors
1.5 School location;
1.6 School size;
1.7 School population; and
1.8 Availability of technology?
2. What are the tangible and intangible technologies used by the teachers in instructional management?
3. To what extent do teachers apply technology in instructional management?
4. What are the perceived benefits of integrating technology into instructional management as experienced by the teachers in terms of:
a. Infrastructure and resources;
b. Teacher Competency;
c. Pedagogical Improvements; and
d. Institutional Support?
5. What are the encountered barriers of integrating technology into instructional management as experienced by the teachers in terms of:
a. Infrastructure and resources;
b. Teacher Competency;
c. Pedagogical and Management Challenges; and
d. Institutional Support?
6. Is there a significant difference in the use of tangible and intangible technologies for instructional management between mainland and coastal teachers in the Lagonoy South District?
7. Is there a significant difference in the extent of technology application in instructional management between mainland and coastal teachers?

8. What is the relationship of teacher attributes in integrating technology in instructional management in terms of:

a. Extent of technology use;

b. Perceived benefits; and

c. Encountered barriers?

Assumptions of the Study

This research crafted several assumptions to guide the investigation on the teacher attributes and integration of technology in instructional management in mainland and coastal schools in Lagonoy South District Lagonoy, Camarines Sur.

1. Teachers vary in age, sex, highest educational attainment, number of technology-related trainings attended, and contextual factors such as school location, and school size, school population, and availability of technology. All of which may influence how they integrate technology into instructional management.

2. Teachers utilize various tangible and intangible technologies in instructional management depending on their availability, accessibility and familiarity to facilitate effective teaching and learning.

3. Teachers apply technology in instructional management to an extent that effectively supports the organization, delivery, and evaluation of teaching and learning activities.

4. Teachers perceive various benefits from integrating technology into instructional management in terms of infrastructure and resources, teacher competency, pedagogical improvements, and institutional support. These benefits are presumed to contribute to more efficient instructional processes, enhanced teaching performance, and improved learning outcomes.

5. Teachers encounter barriers in integrating technology into instructional management in terms of infrastructure and resources, teacher competency, pedagogical management challenges, and institutional support. These barriers are presumed to influence the extent to which technology is effectively utilized in managing instruction.

Hypotheses of the Study

The following null hypotheses were tested at a 0.05 level of significance:

H_{01}: There is no significant difference in the use of tangible and intangible technologies for instructional management between mainland and coastal teachers in Lagonoy South District.
H_{02}: There is no significant difference in the extent of technology integration in instructional management between mainland and coastal teachers.

H_{03}: There is no significant relationship between teacher attributes and school contextual factors, and the extent of technology integration in instructional management.

H_{04}: There is no significant relationship between teacher attributes school contextual factors, and the perceived benefits of integrating technology into instructional management.
H_{05}: There is no significant relationship between teacher attributes school contextual factors, and the barriers encountered in integrating technology into instructional management.

Significance of the Study

The findings of this study will be beneficial to the following:

Teachers. The results of this study will help teachers identify the different factors associated with technology integration in their instructional practices. They also provide awareness that may encourage teachers to adopt more effective teaching strategies and pursue relevant professional development to enhance skills in utilizing technologies.

School Heads and Administrators. The results may assist school leaders in understanding teacher's unique condition in different geographic areas, such as the mainland and coastal schools. Administrators can promote equitable access to technological resources and institutional support, and use the findings as basis for designing targeted professional development programs that address the specific needs of their teachers.

Department of Education (DepEd) Officials and Policy Makers. The findings may serve as a reference for crafting and refining education policies that promote effective integration of technology in instructional management. They can also can also assist decision- makers in creating programs related to technology integration, especially in remote schools.

Teacher Education Institutions. The study provides valuable information for the Colleges and Universities which are responsible for preparing future educators, helping them align curricula with the realities of technology integration in instructional management. Incorporating trainings and programs related to technology use can help

ensure that pre-service teachers will be equipped with the needed and relevant competencies in successfully integrating technology in instructional management.

Future Researchers. This study may provide them valuable information through the related literature and studies including the findings derived from this research, which can guide further studies in the field.

Learners. Although students are not the direct focus of this study, they are indirect beneficiaries. When teachers effectively integrate technology in instructional management, students are likely to experience improved learning processes, increased engagement, and enhanced academic outcomes.

Scope and Delimitation of the Study

The current study aimed to examine the relationship between teacher attributes and technology integration in instructional management among teachers in the mainland and coastal schools of the Lagonoy South District. Specifically, it investigated the attributes of teachers such age, sex, educational attainment, number of technology-related trainings attended, and school contextual factors such as school location, school size, school population, and availability of technology. The study also identified the tangible and intangible technology used by the teachers and determined the extent to which they apply technology in instructional management. Additionally, it explored the perceived benefits and encountered barriers of technology integration in instructional management in terms of infrastructure and resources, teacher competency, pedagogical, and management aspects, and institutional support. Comparative analyses were conducted to determine whether significant differences existed in the use and extent of technology integration between mainland and coastal teachers. Also, the study examined the relationship between teacher attributes and technology integration in instructional management in terms of extent of technology use, perceived benefits, and encountered barriers.

Thus, this study was limited to teachers in public secondary schools and excludes individuals from private institutions or other educational stakeholders such as students, parents, and ICT support personnel. It did not evaluate the impact of technology integration on student learning outcomes or assess the technical performance of the tools used. Data collection relied exclusively on self-reported survey questionnaires, which captured teachers' own assessments of their experiences of integrating technology in instructional management.

Despite these considerations, several limitations should be acknowledged. Reliance on self-reported data might introduce personal bias or inaccuracies, as participants may overestimate, underestimate, or misinterpret their responses. The study was conducted only among public secondary schools teachers in the mainland and coastal areas of Lagonoy South District, which limited the generalizability of the findings to other limiting district and private schools. While the study focused on selected teacher attributes and their integration of technology in instructional management including variables such as age, sex, highest educational attainment, and technology-related trainings, it did not examine other factors that might influence technology integration such as teacher's actual digital literacy skills and length of teaching experience. In addition, data were collected at a single point in time, so the study could not examine how technology integration might change over time.

Locale of the Study

This study was conducted in all public secondary schools in the mainland and coastal areas of Lagonoy South District, Lagonoy, Camarines Sur. All participating institutions were public secondary schools under the Department of Education, offering junior and senior high school programs. The mainland schools included Dahat Vocational National High School and San Ramon Pilot National High School, while the coastal schools consisted of Cabotonan National High School, San Sebastian National High School, and Panagan National High School.

The participating schools varied in the number of enrolled students and teaching personnel, with mainland schools generally having a larger student and teacher population compared to coastal schools. This variation allowed the study to examine how differences in school size and population related to the extent, perceived benefits and encountered barriers of technology integration in instructional management.

Based on the researcher's initial observation, all schools in the district had access to ICT- related initiatives, including computer laboratories, digital or multimedia classrooms, and technology-supported teaching tools provided through DepEd programs and school-based funding such as the Maintenance and Other Operating Expenses (MOOE). However, the availability and utilization of these resources differed between mainland and coastal schools due to factors such as infrastructure, internet connectivity, and geographic accessibility.

These institutional characteristics were relevant to the study, as they directly influenced teachers' opportunities to integrate technology in instructional management, particularly in the planning, delivery, and assessment of instruction.

REVIEW OF RELATED LITERATURE AND STUDIES

This chapter presents the related literature and studies relevant to teacher attributes and technology integration in instructional management. It also includes the synthesis of the state-art-the-art, research gap, theoretical framework, conceptual framework, and definition of terms.

Teacher Attributes and their influence on Technology Use

Teacher attributes, such as age, gender, educational level, experience, and professional training have been widely recognized as influential factors in technology integration in instructional management. However, literature presents both converging and diverging findings regarding their extent of influence.

Several studies suggest that younger teachers tend to demonstrate higher ICT readiness and adaptability. Lucas (2022) and Manaba et al, (2025) both indicated that early exposure to digital environments enhances confidence and ease in technology use. This implies that generational exposure to technology may initially shape ICT readiness. However, contrasting findings were presented by Tondeur et al. (2015) who argued that demographic variables such as age and educational attainment are less influential compared to digital competence and pedagogical beliefs. This suggests that while age may influence initial familiarity, sustained technology integration depends more on professional capability and instructional orientation.

In terms of professional development, Amemasor et al. (2025) and Siyam et al. (2025) consistently found out that structured and well-supported ICT training improved teachers' confidence and classroom integration practices. However, Espinosa et al. (2025) emphasized that the effectiveness of such training depended heavily on its relevance, practicality, and sustainability. This indicated that training alone is insufficient unless it is aligned with actual classroom needs.

Pedagogical beliefs further influence ICT integration. Bice and Tang (2022) found out that teachers with student-centered approaches tend to integrate technology in more interactive and collaborative ways, while those with traditional approaches limit ICT use to presentation and administrative functions. This highlights that instructional philosophy significantly influence how technology is utilized in teaching practice.

School context also plays a critical role. Studies by Ahiaku et al. (2025), Li (2024), and Francom (2016) revealed that access to resources and administrative support strongly influence ICT implementation. However, variations in school size and governance, suggest that contextual conditions shape technology integration differently across educational settings, indicating that ICT use is not even within similar systems.

Extent of Technology Application

The extent of technology use in instructional management is influenced by both teacher readiness and institutional support. Roa (2021) emphasized that effective ICT integration requires not only sufficient technological skills but also access to resources and supportive learning environment. This implies that meaningful technology use is shaped by both individual capability and the conditions present within the school setting.

In the same way, Tamoria (2016) found that teachers' Technological Pedagogical Content Knowledge (TPACK) has a significant influence on how often and how effectively ICT tools are used in instruction. Misha and Koehler (2006) further explained that effective integration of technology in teaching requires the alignment of technological, pedagogical, and content technology, a combination that is not always fully developed in real classroom practice.

Although ICT resources have become more accessible, several studies suggest that technology use in schools is still largely at a functional or efficiency level rather than being transformative. Cuba (2001) noted that teachers often use technology to support and reinforce existing teaching practices instead of redesigning instruction. In many cases, ICT is mainly used for administrative work and basic instructional support.

Further, Ertmer (1999) identified external factors such as limited, heavy workload, and insufficient institutional support, as well as internal factors such as teachers' beliefs and confidence in using technology. These challenges often influence the extent to which ICT is meaningfully integrated into teaching. As a result, teachers tend to favor digital tools that are simple to use and closely connected to their daily responsibilities.

Meanwhile, Selwyn (2011) pointed out that teachers' use of technology is often guided more by practical and organizational demands than by efforts toward instructional innovation. Additionally, the Substitution, Augmentation, Modification, and Redefinition Model (SAMR) developed by Puentedura, (2006), suggests that most classroom technology use remains at the levels of substitution and augmentation rather than reaching transformative stages.

Lastly, Pantoñal (2022) observed that teachers who consistently integrate technology into lesson planning, assessment, and classroom management generally demonstrate better instructional performance. However, the extent of ICT use still varies depending on factors such as experience, confidence, and access to resources, suggesting that technology integration is shaped by the interaction of both personal and environmental factors.

Benefits of Technology Integration

Literature consistently highlights the positive effects of technology integration, although studies emphasize different dimensions of its impact.

Akram (2022) and Javier (2022) found that ICT enhances student creativity, motivation, and higher-order thinking skills such as analysis and problem-solving. Similarly, Hero et al. (2021) and Paquinol et al. (2024) emphasized that technology promotes inclusive, interactive, and collaborative learning environments, suggesting that ICT supports both cognitive and social learning development.

However, while some studies focus on cognitive outcomes, others emphasize instructional and professional benefits. Smith and Lee (2023) found out that digital platforms enhance instructional flexibility and support teacher professional development. Espinosa et al. (2025) further noted that ICT promotes innovation in lesson design, and classroom management, contributing to improved teaching effectiveness. In terms of access, Smith and Lee (2023) and Hero et al. (2021) highlighted that technology enables differentiated instruction and helps bridge educational inequalities by providing access to learning resources regardless of location. This indicates that ICT plays both instructional and equity-enhancing roles in education.

Finally, Paquinol et al. (2024) and Espinosa et al. (2025) emphasized that ICT fosters collaboration, communication, and global participation, contributing to the development of 21st- century skills such as digital literacy, creativity, and teamwork.

Barriers to Effective Technology Integration

Despite its benefits, ICT integration is hindered by multiple interconnected barriers.

Infrastructure remains one of the most critical challenges. Hero et al. (2021) and Paquinol et al. (2024) found out that limited internet connectivity, lack of devices, and inadequate facilities significantly restrict ICT use,

particularly in rural schools. Espinosa et al. (2025) further noted that outdated equipment and insufficient funding exacerbate these limitations.

Teacher-related barriers also persist. According to Paquinol et al. (2024), insufficient ICT training limits teachers' ability to effectively integrate technology into instruction. Similarly, Espinosa et al. (2025) observed that many professional development programs are overly technical or lack sustained implementation, resulting in low ICT proficiency. Resistance to change, particularly among older teachers, further limits adoption.

Workload and time constraints also affect ICT integration. Espinosa et al. (2025) noted that heavy administrative and instructional responsibilities reduce teachers' opportunities to design ICT-based lessons and participate in training programs.

Institutional and policy-related barriers further complicate implementation. Hero et al. (2021) and Espinosa et al. (2025) identified weak leadership support, bureaucratic delays, and inconsistent policy implementation as major hindrances to ICT adoption in schools.

In addition to these, student related challenges such as limited access to devices and low digital literacy also affect effectiveness of ICT-based instruction (Paquinol et al., 2024). Collectively, these findings suggest that ICT integration is shaped by structural, institutional, and human-related constraints.

Synthesis of the State-of-the-Art

The reviewed literature indicates that technology integration in instructional management is a multifaceted process influenced by teacher attributes, pedagogical beliefs, institutional support, and resource availability. While studies consistently highlight the benefits of ICT in improving student engagement, instructional quality, and collaboration, they also emphasize persistent barriers such as infrastructure limitations, insufficient training, and institutional constraints.

Findings regarding teacher attributes remain inconsistent. Some studies emphasize demographic variables such as age, while others highlight digital competence and pedagogical beliefs as more critical determinants. This inconsistency suggests that teacher characteristics alone cannot fully explain ICT integration without considering contextual and professional factors.

Similarly, the extent of ICT application varies depending on access to resources, training, and institutional support, indicating that technology integration is shaped by both individual and environmental conditions.

Effective technology integration emerges from the interaction between teacher attributes and school context, highlighting the importance of localized studies in understanding educational technology practices.

Gap Bridged by the Study

Although extensive literature exists on ICT integration in education, most studies focus on general applications or student learning outcomes rather than on examining teacher-specific factors in depth. Limited research has explored how teacher attributes such as age, sex, educational attainment, and ICT training collectively influence technology integration in instructional management.

Existing studies present mixed findings regarding the role of teacher characteristics, with some emphasizing demographic variables while others highlight professional competence and pedagogical beliefs. This inconsistency suggests the need for further empirical investigation to clarify their combined influence.

In addition, most studies are conducted in urban or resource-rich contexts, limiting their applicability to geographically diverse settings. In the Lagonoy South District of Camarines Sur, differences between mainland and coastal schools may significantly affect access to technology and instructional practices. However, localized evidence remains limited.

This study addresses these gaps by examining the relationship between teacher attributes and technology integration in instructional management, focusing on the extent of use, perceived benefits, and encountered barriers, while considering differences between mainland and coastal schools. The findings are expected to provide context-specific insights that may inform policy development, resource allocation, and targeted professional development programs.

Theoretical Framework

This study is anchored on several established educational and technology integration theories, namely the Technological Pedagogical Content Knowledge (TPACK) framework, the Technology Acceptance Model (TAM), and the Diffusion of Innovations (DOI) Theory, which collectively provide a comprehensive lens in understanding technology integration in instructional management.

The TPACK framework (Misha & Koehler, 2006) emphasizes the interrelationship among technological knowledge, pedagogical knowledge, and content knowledge in effective teaching. In the context of this study, teacher attributes such as educational attainment and training exposure are associated with the development of technological and pedagogical competencies necessary for effective technology integration. Teachers who possess strong TPACK are more likely to effectively utilize technology in lesson delivery, assessment, and classroom management.

The Technology Acceptance Model (TAM) (Davies, 1989), on the other hand, posits that an individual's acceptance and use of technology are primarily influenced by perceived usefulness and perceived ease of use. In relation to this study, teacher attributes such as age, sex, and training experience may influence their perceptions and acceptance of technology, which subsequently affects the extent of its integration in instructional practices.

Furthermore, the Diffusion of Innovations Theory by Rogers, 2003 explains how innovations are adopted within a social system over time. This theory is particularly relevant to the study as it highlights the role of both individual and environmental factors such as school location, school size, and availability of technology, and institutional support in the adoption and sustained use of educational technologies. These school contextual factors either facilitate or hinder the diffusion process within schools.

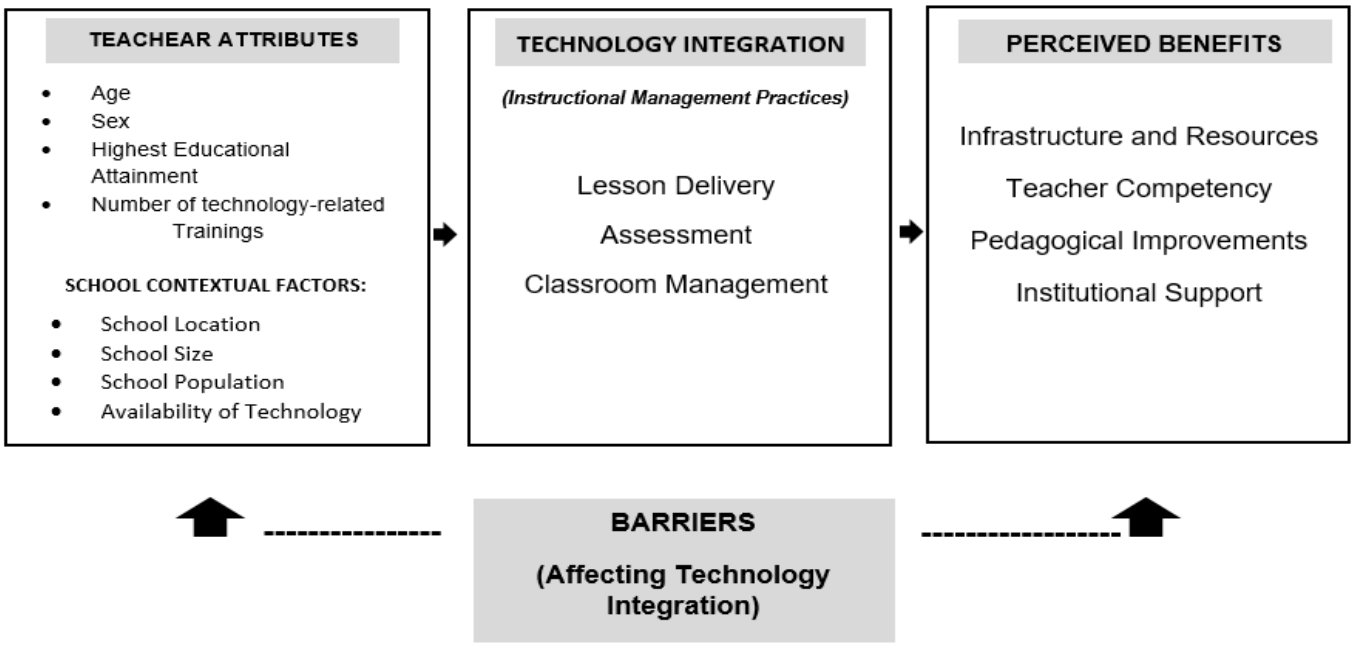
Integrating these theories, the study posits that teacher attributes and school contextual factors jointly influence the extent of technology integration in instructional management, while barriers may slow down or inhibit the adoption process. Consequently, effective integration of technology is expected to yield perceived benefits such as improved instructional delivery, enhanced teacher competency, better classroom management, and strengthened institutional support.

Generally, the conceptual framework of the study is grounded on the premise that technology integration in education is a multifaceted process influenced by individual competencies, institutional conditions, and perceived value of technology, consistent with TPACK, TAM, and DOI perspectives.

Conceptual Framework

This study is premised on the assumption that **teacher attributes and school contextual factors significantly influence the extent of technology integration in instructional management,** which subsequently leads to various perceived benefits. However, this relationship is not linear and is moderated by barriers that may impede the effective integration of technology in educational settings.

Figure 1



Conceptual Framework

The conceptual framework consists of three primary constructs: teacher attributes and school contextual factors as independent variables, technology

integration in instructional management as the mediating variable, and **perceived benefits as the dependent variable**, with **barriers functioning as an intervening variable.**

The **independent variables** include teacher attributes such as age, sex, highest educational attainment, and number of technology-related trainings attended. These attributes are considered critical in shaping teachers' competencies, attitudes, and readiness to adopt and utilize technology in instructional processes. In addition, **school contextual factors** including school location, school size, school population, and availability of technology are incorporated to account for the environmental and institutional conditions that may facilitate or constrain technology use.

These independent variables are hypothesized to influence the **mediating variable**, which is the **extent of technology integration in instructional management.** In this study, technology integration is examined across three domains: **lesson delivery**, **assessment**, and **classroom management.** These domains collectively represent how teachers employ digital tools to enhance instructional planning, implementation, and classroom organization.

The **dependent variable** in the framework is the **perceived benefits of technology integration**, which include improvements in infrastructure and resources, enhancement of teacher competency, pedagogical advancements, and increased institutional support. These benefits reflect the positive outcomes associated with effective and sustained technology use in teaching and learning processes.

Moreover, the framework acknowledges the role of **barriers** as an intervening variable that may hinder the successful integration of technology. These barriers may include, but are not limited to, inadequate technological resources, limited access to reliable internet connectivity, insufficient training opportunities, and lack of administrative or institutional support. These factors are posited to directly influence the level of technology integration, thereby affecting the extent to which the anticipated benefits are realized.

In summary, the conceptual framework posits that teacher attributes and school contextual factors serve as foundational determinants of technology integration, while perceived benefits represent the outcomes of such integration. The presence of barriers, however, may alter or weaken these relationships. This framework provides a structured basis for examining how these variables interact within the context of instructional management, particularly in diverse school settings.

Definition of Terms

In order to have a clearer grasp and better understanding of the terms used in this study, the following terms were defined conceptually and operationally:

Attributes. These are the qualities or characteristics that are regarded as inherent or associated with a person or thing (Meriam-Webster). Operationally, this pertains to the measurable characteristics of teachers such as age, sex, educational attainment, and technology related training, considered in relation to technology integration in instructional management.

Age. This term refers to the length of time that a person has lived, a measure of chronological years, (Meriam-Webster). In this study, it is use to the age brackets of the participants based on the chronological age of the teacher respondents.

Availability of Technology. This refers to the presence and accessibility of technological tools and systems in educational settings (Vu, 2014). In this study availability of technology refers to the availability of ICT tools, digital devices, and internet connectivity in the school.

Encountered Barriers. This term refers to challenges or difficulties faced in performing tasks. In this study, this term refers to the problems experienced by teachers in integrating technology into instructional management.

Extent of Technology Use. Refers to the degree or frequency of technology utilization. In this study, it is indicated by how often and to what extent teachers use technology in instructional management.

Highest Educational Attainment. This refers to the highest level of formal education completed by an individual (U.S. Census Bureau, 2025). In this study, this refer to the highest academic degree earned by the teacher respondents.

Infrastructure and Resources. This refers to the physical and organizational facilities that support the activities and tasks. In this study, it means availability and adequacy of ICT facilities, equipment, and internet connectivity in schools.

Intangible Technology. This term refers to the non-physical digital tools or systems such as software, applications, or platforms. Operationally, it mean the digital tools and systems that supported teachers' instructional management.

Institutional Support. This term refers to the assistance, guidance, or resources provided by an organization**.** In this study**,** it refers to the support provided by the school or administration to facilitate technology integration.

Instructional Management. This term refers to the planning, organization, execution, and evaluation of teaching and learning processes. In this study, it refers to the tasks performed by teachers to ensure effective teaching and learning.

Number of Technology-Related Trainings Attended. This refers to the professional development activities related to technology (National Center for Education Statistics NCES, 2003). Operationally, this is used to mean the total number of ICT-related seminars, workshops, or trainings attended by teacher respondents.

Pedagogical Improvements. This term refers to the enhancements in teaching and learning processes. Operationally, it refers to the perceived improvements resulting from technology integration.

Pedagogical Management and Challenges. This term refers to the processes of organizing, planning, and implementing teaching and learning activities including the challenges encountered, Elizabeth et al., (2024). Operationally, this refers to the difficulties and obstacles experienced by teachers in integrating technology in instructional management.

Perceived Benefits. It refers to the advantages or positive outcomes recognized by an individual (www.wisdomlib.org, 2024). Operationally, it refers to the benefits teachers experience from integrating technology in instructional management.

Relationship. It refers the way in which two or more variables or entities are connected or associated, Creswell & Creswell, (2018). Operationally, it refers through the statistical association between selected variables.

School Location. It refers to the geographic placement of a school (Insider, L. 2025). In this study, it is classified as mainland or coastal area.

School Population. This term refers to the total number of students enrolled in a school (Insider, L. 2025). In this study, this mean the total number of officially enrolled student in the school during the academic year.

School Size. This term refers to the classification of a school based on the number of personnel, learners, or facilities. Operationally, it refers to the the total number of teachers in the school.

Sex. This term refers to the biological classification of an individual as male or female. In this study, it is based on the respondents' reported sex.

Significant Difference. This refers to statistically meaningful variation between groups (Creswell & Creswell (2018). In this study, it is determined through statistical tests comparing group differences.

Tangible Technology. The term tangible means something that is perceptible by touch or physical real, (tangible, 2026). Operationally, tangible technology refers to the physical tools and devices that teachers to support instructional management.

Teacher Attributes. This term refers to the personal and professional characteristics of a teacher (NU Editorial Contributors & National University, 2025). In this study, it includes the selected demographic and professional variables such as age, sex, educational attainment, teaching experience, and training.

Teacher Competency. This refers to the knowledge, skills, and abilities of teachers in teaching situations (Nessipbayeva, (2012). In this study, it is reflected in teachers' capability to effectively use technology for instructional management.

Technology Integration. This refers to the incorporation of technology into teaching to improve learning (Anderson, 2024). In this study, it refers to the application of technological tools in instructional management.

RESEARCH DESIGN AND METHODOLOGY

This chapter describes the mechanisms and approaches that were used in the conduct of the study. Specifically, it presents the research design, respondents of the study, research instruments, research procedure and statistical tools.

Research Design

This study employed the descriptive-correlational design to examine the relationship between teacher attributes and technology integration in instructional management in all public secondary schools of Lagonoy South

District, Camarines Sur. The descriptive component determined the teacher attributes, technologies used, extent of technology application and the perceived benefits and encountered barriers in integrating technology in instructional management. The correlational component examined the relationship between teacher attributes and the extent, benefits and barriers of technology integration, as well as the differences between mainland and coastal teachers.

This design was appropriate because it allowed the researcher to gather quantitative data that described existing conditions and determined possible relationship among variables without manipulating them. The data were collected through a structured questionnaire, which was designed to obtain information relevant to the statement of the problem. This approach provided a clear understanding of how teacher attributes influenced the integration of technology in instructional management, as well as the benefits and barriers perceived by the teachers in different school locations.

Although triangulation (such as interviews or observations in addition to surveys) could have strengthened the study, the researcher employed a purely quantitative descriptive-correlational design due to its suitability for measuring relationships among variables and the need for standardized data collection across respondents. The use of a validated and reliable structured questionnaire, along with appropriate statistical tools, ensured the credibility and inconsistency of the findings.

Respondents of the Study

The respondents of this study were the teachers from public secondary schools in Lagonoy South District, Camarines Sur. This included three schools in coastal areas and two schools in mainland areas. According to the official school records, there were total of 169 teachers, with 118 from mainland schools and 51 from coastal schools.

However, only teachers who met the inclusion criteria were considered as respondents of the study. Specifically, they were those who had been teaching for at least three years to ensure that they possessed sufficient experience in integrating technology in instructional management. In addition, teachers who participated in the pilot testing of the research instrument were excluded from the actual data gathering to avoid bias and to maintain the reliability of the findings. As a result, a total of 116 teachers served as the final respondents of the study.

Although the study initially considered the entire population of teachers, the application of inclusion and exclusion criteria ensured that only qualified respondents participated in the final data collection. This approach strengthened the validity of the data by ensuring that responses came from teachers with adequate teaching experience and exposure to technology integration in instruction.

Research Instrument

This study used a structured questionnaire to collect data on teacher attributes, technology use, and extent of technology application, perceived benefits, and encountered barriers in integrating technology in instructional management. The sections of the survey questionnaire on the perceived benefits and barriers were curated from findings of previous studies and rewritten in the researcher's own words to match the study's goals and ensure validity.

The instrument was divided into five parts, Part I gathered teacher attributes and school contextual factors such as age, gender, educational attainment, number of technology-related trainings attended, school location, school size, school population and availability of technology. Part II, identified the tangible and intangible technologies that teachers utilized in performing instructional management tasks such as planning, record keeping, communication and reporting. Part III assessed the extent of application of technology in instructional management. This section determined the degree to which the teachers apply technology in instructional management. The respondents rated each item using a five-point frequency scale that ranges from always to never. Part IV measured the teachers' perceived benefits in integrating technology in instructional management in terms of infrastructure and resources, teacher competency, pedagogical improvements, and institutional support. A four-point-Likert-type scale with descriptors from 1 (Strongly Disagree) to 4 (Strongly Agree) was

used. Part V identified the encountered barriers teachers experienced in integrating technology categorized into infrastructure and resources, teacher competency, pedagogical and management challenges and institutional support. Items were rated on a four- point- Likert- type scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree).

To establish content validity, the instrument was validated by two teacher-experts with experience in technology-related instruction. The experts carefully examined each item in terms of clarity, relevance, and alignment with the objectives of the study. Their evaluation identified several items that required improvement, particularly in wording, structure, and clarity of indicators. All recommendations were systematically incorporated in the revisions of the questionnaire, including the rephrasing of ambiguous statements, improvement of item sequencing, and refinement of the presentation of variables. The incorporation of expert feedback ensured that the final instrument adequately represented the constructs being measured and enhanced its overall quality and sustainability for data collection.

To assess the reliability or internal consistency of the instrument, the result of the pilot test was statistical analyzed using Cronbach Alpha. A reliability coefficient of 0.70 or higher was considered acceptable, indicating that the questionnaire consistently measured the intended variables. Since the instrument was divided into five parts reliability testing was conducted for the sections containing scale-based statements. Part I (Teacher Attributes) and Part II (Technologies used for instructional Management) were excluded because they consist of demographic and factual information. The reliability results were excellent for Part III (Extent of Technology Use) (a=0.910), Part IV (Benefits of Integrating Technology in Instructional Management) (a=0.945), and Part V (Barriers to Technology Integration in Instructional management) (a=0.914) confirming that the questionnaire is a reliable instrument for gathering data for the study.

Research Procedure

The research process was carried out in three phases.

Pre-empirical Phase

Development of Survey Questionnaire. The researcher created a survey questionnaire to assess teacher attributes, technology use for instructional management, extent of application, perceived benefits and encountered barriers in the integration of technology.

Validation of Survey Questionnaire. The survey questionnaire was evaluated by two-experts with experience in technology-related instruction. The experts examined the instrument in terms of clarity, relevance, and alignment with the objectives of the study. Their evaluation identified items that required improvement in wording, structure, and clarity of indicators. All recommendations were systematically incorporated, including the rephrasing of ambiguous items, and the improvement of items appropriate for data collection.

Pilot Testing of Survey Questionnaire. The validated instrument was pilot tested among 10 teachers who were not part of the final respondents to identify issues related to clarity, completion time, and logical flow. Necessary adjustment were made to improve the instrument's effectiveness.

Finalization of Research Instruments. The results of the validation and pilot testing stages were used to finalize the questionnaire. The final instrument was then prepared for distribution to the research respondents.

Empirical Phase

Preparation of Letter of Permission to Conduct a Study. The researcher sought approval from the Public School District Supervisor and to the school heads of participating schools to the conduct of the study.

Administration of the Survey. The survey questionnaires were personally administered by the researcher to ensure uniformity in data collection and to address any clarifications from the respondents.

Post Empirical Phase

Coding and Encoding of Data. The researcher employed coding techniques to assign numerical values to the responses prior to statistical tools.

Mitigation Strategies. To minimize potential bias and ensure the accuracy of data, the respondents were assured of anonymity and confidentiality to encourage honest responses. Clear instructions were provided to avoid misinterpretation of questionnaire items. The researcher personally administered the survey to ensure consistency in the data collection procedure. All completed questionnaires were carefully checked during the coding and encoding process to reduce errors and maintain data integrity.

Statistical Tool

The data gathered from the respondents were organized, tabulated, and analyzed using appropriate descriptive and inferential statistical tools aligned with the research questions.

Descriptive Statistics for Teacher Attributes

Teacher attributes such as age, sex, highest educational attainment, number of technology-related trainings attended, and school contextual factors such as school location, school size, school population, and availability of technology were analyzed using frequency counts and percentage distributions. These descriptive measures provided a clear profile of the respondents.

Weighted Mean for Technology Used for Instructional Management

Tangible and intangible technologies used by teachers, as well as the frequency of their use in instructional management, were analyzed using the weighted mean. This measure accounted for both frequency and intensity of technology use. Higher weighted mean values indicated more frequent use of technology.

The weighted mean was computed using the formula:

$$\text{Weighted Mean (WM)} = \sum (f \times w)/ N$$

Where:

f= frequency

w= weight

N= total number of respondents

Table 1 Technology Use Rating Scale

Rating	Description
5	Daily
4	Weekly
3	Monthly
2	Rarely
1	Never

Table 2 Interpretation of Weighted Mean for Technology Use

Weighted Mean	Verbal Interpretation
4.50-5.00	Daily
3.50-4.49	Weekly
2.50-3.49	Monthly

1.50-2.49	Rarely
1.00-1.49	Never

Weighted Mean for Extent of Technology Application

The extent of technology application in instructional management was measured through a five-point Likert scale (5-Always to 1- Never). The weighted mean values were computed for each indicator. Higher mean scores indicated greater extent of application.

Table 3 Interpretation of Weighted Mean for Extent of Technology Application

Weighted Mean	Verbal Interpretation
4.50-5.00	Always
3.50-4.49	Often
2.50-3.49	Sometimes
1.50-2.49	Rarely
1.00-1.49	Never

Weighted Mean for Perceived Benefits and Encountered Barriers

The perceived benefits and encountered barriers in technology integration were measured using a four-point Likert-type scale: Strongly Agree (4), Agree (3), Disagree (2), and Strongly Disagree (1). Higher mean scores indicated stronger perceived benefits or more serious encountered barriers. A neutral option was intentionally excluded to encourage decisive responses and reduce central tendency bias.

Table 4 Interpretation of Weighted Mean for Perceived Benefits and Encountered Barriers

Mean score	Level of Agreement
3.26-4.00	Very High Agreement
2.51- 3.25	High Agreement
1.76-2.50	Low Agreement
1.00-1.75	Very Low Agreement

Inferential Statistics

Inferential statistic was applied to determine significant differences and relationships among the variables of the study. An independent t-test (for unequal sizes) was used to determine whether significant differences existed between th mainland and coastal teachers in terms technology use and extent of technology application in instructional management.

The Pearson Product-Moment Correlation Coefficient (Pearson's r) was employed to examine the relationships between teachers' attributes and technology integration in terms of technology use, perceived benefits and encountered barriers. This analysis measured the strength and direction of relationships among variables such as age, sex, highest educational attainment, number of technology-related trainings attainment attended, school location, school size, school population, and availability of technology. All statistical computations were performed using SPSS software (version 20), which is widely used for quantitative data analysis in educational research.

These inferential statistical tools provided a comprehensive quantitative analysis of the relationships and differences among teacher attributes and technology integration variables in instructional management.

RESULTS

This chapter presents the results of the data gathered. The results were analyzed using appropriate statistical tools such as frequency, percentage weighted mean, t-test, and Pearson r.

Attributes of Teachers who Integrate Technology in Instructional Management

Table 5 Attributes of Teachers who Integrate Technology in Instructional Management

Indicators	Range	Frequency (f)	Percentage (%)
Age			
	25-34 years old	38	32.75%
	34-44 years old	37	31.89%
	44-54 years old	34	29.31%
	55 years old and above	7	6.03%
Sex			
	Male	45	38.79%
	Female	71	61.21%
Highest Educational Attainment			
	Bachelor's Degree	58	50.00%
	Master's Degree		
	Completed	16	13.79%
	With Units	40	34.48%
	Doctorate Degree		
	With Units	2	1.73%
Technology Related Trainings			
	None	20	17.24%
	1-2	54	46.55%
	3-4	30	25.86%
	5 or more	12	10.34%
School Location			
	Mainland	83	71.55%
	Coastal	33	28.45%
School Size			
	Small School (9 teachers and below)	7	6.03%
	Medium School (10 to 25 teachers)	26	22.42%
	Large School (26-100 teachers)	83	71.55%
	Mega School (101 teachers and above)		
School Population			
	100-300	7	6.03%
	301-500	26	22.41%
	More than 500	83	71.55%
Availability of Technology			
Computers			
	Desktop	90	77.59%
	Laptop	111	95.69%
Tablet			
	IPads	5	4.31%
	Android Pad	13	11.21%
Peripherals			
	Printers	113	97.41%
	Projectors	100	86.21%

	Sound System/Speakers	90	77.59%
	Lapel/ microphone	46	39.66%
	Flash Drive	80	68.97%
	External Storage	50	43.10%
TV			
	Smart TV	102	87.93%
	Non- Smart	34	29.31%
	Monitor	26	22.41%
Software			
	Learning Management System	65	56.03%

Note: N= 116. Percentages total 100% for all categorical variables. Multiple responses were allowed only for items under availability of technology.

Table 5 presents the demographic, professional, and institutional profile of teachers who integrate technology in instructional in terms of age, sex, highest educational attainment, number of technology-related trainings attended, school location, school size, school population, and availability of technology.

Most respondents belong to the 25–34 and 34-44 age brackets, each accounting for 32.75 and 31.89%, respectively. This is followed closely by those aged 44–54 years old at 29.31%. Only a small proportion are 55 years old and above representing 6.03%. This shows that the respondents are predominantly within the working-age population, particularly those in their mid-career stage.

The female respondents (61.21%) outnumber male respondents (38.79%), indicating a higher participation of females in technology integration.

Regarding educational attainment, half of the respondents (50.00%) hold a bachelor's degree. Those with master's degree units account for 34.48%, while 13.79% have completed a master's degree. Only 1.73% have doctorate units, and none have completed a doctoral degree. This suggests that most respondents are undergraduate degree holders with many pursuing graduate studies.

For technology-related trainings, 46.55% of the respondents attended one to two trainings, followed by 25.86% who attended three to four trainings. Meanwhile, 10.34% attended five or more trainings, and 17.24% reported no training. This reflects moderate exposure to ICT-related professional development.

For school location, the majority of respondents are from mainland schools (71.55%), while 28.45% are from coastal areas. This distribution may be due to the greater number of teachers assigned in mainland school settings.

As to school size, 71.55% are from large schools, 22.42% from medium schools, and 6.03% from small schools. No respondents are from mega schools. This implies that technology integration is more evident in larger schools.

Similarly, school population shows that 71.55% of schools have more than 500 students, 22.41% have 301–500 students, and 6.03% have 100–300 students. This indicates that most respondents belong to schools with large student populations.

For the technology availability, laptops are the most widely available devices (95.69%), followed by desktop computers (77.59%). This indicates strong access to basic computing tools. However, tablet devices remain limited, with only 11.21% of schools having Android tablets and 4.31% having iPads.

For peripherals, printers are the most available (97.41%), followed by projectors (86.21%) and sound systems or speakers (77.59%). Other tools such as flash drives (68.97%), external storage (43.10%), and lapel microphones (39.66%) are less available, indicating variation in ICT support tools.

In terms of display devices, Smart TVs are widely available (87.93%), while non-smart TVs (29.31%) and monitors (22.41%) are less common.

Finally, 56.03% of respondents reported using a Learning Management System (LMS), indicating that more than half of the schools have adopted digital platforms for instruction.

Tangible and Intangible Technologies Used for Instructional Management

Table 6 Technologies Used for Instructional Management

Types of Technology	Weighted Mean	How Often The Technology is Used	Rank
A. Tangible Technologies			
Desktop Computers/Laptop	4.84	Daily	1
Projectors/ Smart TVs/ TV	4.50	Daily	2
Internet Connection/ Wi-Fi	4.37	Weekly	3
Mobile Phones (for instructional Purposes)	3.84	Weekly	4
Flash drives/External Storage	3.59	Weekly	5
Tablets/iPads	1.59	Rarely	6
Grand Mean	**3.80**	**Weekly**	
B. Intangible Technologies			
Messenger	4.78	Daily	1
Microsoft PowerPoint	4.54	Daily	2
Microsoft Word	4.40	Weekly	3
Microsoft Excel	4.23	Weekly	4
Learning Resource Portal	2.85	Monthly	5
Canva	2.83	Monthly	6.5
Padlet	2.83	Monthly	6.5
Google Docs	2.78	Monthly	8
DepEd Commons	2.59	Monthly	9
Google Forms	2.54	Monthly	10
Google Sheets	2.51	Monthly	11
Microsoft Teams	2.28	Rarely	12
Google Classroom	1.97	Rarely	13
Google Meet	1.95	Rarely	14
Zoom	1.91	Rarely	15
Kahoot	1.52	Rarely	16
Viber	1.41	Never	17.5
Telegram	1.41	Never	17.5
Grand Mean	**2.89**	**Monthly**	

Table 6 presents the technologies used by teachers for instructional management, categorized into tangible and intangible technologies, along with their weighted mean, frequency of use, and rank.

Among tangible technologies, desktop computers and laptops were the most frequently used, with a weighted mean of 4.84 and interpreted as used daily. This was followed by projectors, Smart TVs, and televisions (WM = 4.50), also used daily. Mobile phones for instructional purposes (WM = 3.84) and flash drives or external storage devices (WM = 3.59) were used weekly. Meanwhile, tablets and iPads obtained the lowest weighted mean of 1.59 and were rarely used. Overall, tangible technologies obtained a grand mean of 3.80, interpreted as used weekly.

For intangible technologies, Messenger (WM = 4.78) and Microsoft PowerPoint (WM = 4.54) were used daily. Microsoft Word (WM = 4.40) and Microsoft Excel (WM = 4.23) were used weekly. Other tools such as Google Docs (WM = 2.78), Google Forms (WM = 2.52), Google Sheets (WM = 2.51), Canva (WM = 2.83), Padlet (WM = 2.83), Learning Resource Portal (WM = 2.85), and DepEd Commons (WM = 2.59) were used monthly. Meanwhile, Google Classroom (WM = 1.97), Microsoft Teams (WM = 2.28), Zoom (WM = 1.91), Google Meet (WM = 1.95), and Kahoot (WM = 1.52) were rarely used. Messaging applications such as Viber and Telegram (WM = 1.41) were never used. Intangible technologies obtained a grand mean of 2.89, interpreted as used monthly.

Extent of Application of Technology in Instructional Management

Table 7 Extent of Application of Technology in Instructional Management

Indicators	Weighted Mean	Verbal Interpretation
Employ data management tools (e.g., e-class record systems) for recording and analyzing the performance of students.	4.66	Always
Digital tools (e.g. tablets, computers) are used in making lesson plans and instructional materials.	4.61	Always
Technology was used to communicate with students and to parents regarding instructions or follow ups.	4.33	Often
Integrate multimedia (educational videos, interactive games, audios) in delivering lessons.	4.32	Often
Collaborate with colleagues using technology for instructional planning.	4.16	Often
Conduct online or blended learning sessions during class suspensions (e.g., weather disturbances, Heat Index).	3.70	Often
Utilize learning management systems (LMS) to organize instructional materials.	3.41	Sometimes
Evaluate the outputs of students through digitals means (e.g., e-portfolios, online quizzes).	3.28	Sometimes
Online platforms (e.g., google classroom, MS Teams) used to manage the tasks of students.	2.90	Sometimes
Provide feedback to students using technology (Comments on google docs).	2.83	Sometimes
Overall Weighted Mean	**3.82**	**Often**

Table 7 presents the extent of application of technology in instructional management based on the weighted mean and verbal interpretation of each indicator.

The findings show that teachers always employ data management tools such as e-class record systems for recording and analyzing student performance, with a weighted mean of 4.66, which obtained the highest rating among the indicators. Likewise, digital tools such as tablets and computers are also always used in preparing lesson plans and instructional materials, with a weighted mean of 4.61, indicating that these tools are consistently utilized in core instructional tasks.

Technology is often used for communication with students and parents regarding instructions and follow-ups (WM = 4.33). It is also often applied in integrating multimedia resources such as educational videos, interactive games, and audio materials in lesson delivery (WM = 4.32), suggesting regular integration of varied instructional media. Collaboration with colleagues using technology for instructional planning is likewise often practiced (WM = 4.16). In addition, online or blended learning sessions during class suspensions, such as during weather disturbances or heat index conditions, are often conducted (WM = 3.70), showing that technology is also used as an alternative mode of instruction when necessary. On the other hand, learning management systems (LMS) for organizing instructional materials are sometimes used, with a weighted mean of 3.41. Evaluating student outputs through digital means such as e-portfolios and online quizzes is also sometimes practiced (WM = 3.28),

indicating occasional use in assessment processes. Similarly, the use of online platforms such as Google Classroom and MS Teams for managing student tasks is sometimes observed (WM = 2.90). Providing feedback to students using technology, such as comments in Google Docs, is also sometimes done (WM = 2.83), suggesting limited but existing use of digital feedback mechanisms.

The extent of application of technology in instructional management obtained a grand mean of 3.82, interpreted as often, indicating that technology is generally utilized in instructional and administrative functions with moderate consistency.

Benefits of Integrating Technology in Instructional Management

Table 8 Benefits of Integrating Technology in Instructional Management

Indicators	Weighted Mean	Level of Agreement
A. Infrastructure and Resources		
The availability of multimedia resources makes teaching more engaging.	3.88	Very High Agreement
Availability of ICT facilities supports lesson delivery.	3.80	Very High Agreement
Reliable access to digital devices and internet improves efficiency in preparing lessons.	3.80	Very High Agreement
Technology increases access to diverse educational content, resources, and Framework Approaches, Methods and Strategies (FAMS).	3.74	Very High Agreement
Weighted Mean for Infrastructure and Resources	**3.81**	**Very High Agreement**
B. Teacher Competency		
Utilizing technology increases confidence in teaching lessons.	3.80	Very High Agreement
Using technology makes record-keeping more efficient.	3.81	Very High Agreement
Using technology makes grading more easily.	3.85	Very High Agreement
Weighted Mean for Teacher Competency	**3.82**	**Very High Agreement**
C. Pedagogical Improvements		
Technology helps in aligning with the 21st-century skills needed by students.	3.85	Very High Agreement
Integrating technology enhances student engagement in lessons.	3.81	Very High Agreement
Integrating technology enhances students' participation in lessons.	3.81	Very High Agreement
Technology improves the understanding of concepts of students.	3.71	Very High Agreement
Technology helps differentiate instruction to meet student' individual needs.	3.67	Very High Agreement
Technology fosters the development of problem-solving skills of students.	3.56	Very High Agreement
Technology fosters the development of critical thinking of students.	3.59	Very High Agreement
Technology assists in self-paced learning of students.	3.70	Very High Agreement
Weighted Mean for Pedagogical Improvements	3.71	Very High Agreement
D. Institutional Support		
The institution encourages teachers to integrate technology in teaching.	3.82	Very High Agreement
The institution recognizes teachers' efforts in integrating technology in their lessons.	3.70	Very High Agreement

Technical Support from the school is available when I encounter difficulties in using technology.	3.53	Very High Agreement
The school administration provides adequate training to maximize the use of technology.	3.22	High Agreement
Weighted Mean for Institutional Support	**3.57**	**Very High Agreement**
Overall Weighted Mean	**3.72**	**Very High Agreement**

Table 8 presents the perceived benefits of integrating technology in instructional management in terms of infrastructure and resources, teacher competency, pedagogical improvements, and institutional support. The overall weighted mean of 3.72, interpreted as Very High Agreement, indicates that respondents demonstrate a consistently strong recognition of the role of technology in instructional processes.

Among the indicators, Teacher Competency obtained the highest weighted mean of 3.82, closely followed by Infrastructure and Resources with 3.81, both interpreted as Very High Agreement. This indicates that respondents highly recognize the role of technology in improving teaching efficiency, particularly in lesson preparation, record keeping, grading, and instructional delivery.

For Pedagogical Improvements, a weighted mean of 3.71 shows a very high level of agreement. The highest ratings were observed in student engagement and participation (WM= 3.81), while lower ratings were noted in critical thinking (WM=3.59) and problem-solving (WM=3.56). This suggests variation in how technology supports different aspects of learning.

Meanwhile, Institutional Support obtained the lowest weighted mean of 3.57, although still interpreted as Very High Agreement. The lowest item mean was observed in training (WM=3.22, High Agreement), indicating comparatively lower ratings for professional development support.

The results show that the respondents generally perceive the benefits of technology integration in instructional management positively, with all indicators interpreted from High to Very High Agreement.

Barriers of Integrating Technology in Instructional Management

Table 9 Barriers of Integrating Technology in Instructional Management

Indicators	Weighted Mean	Level of Agreement
Infrastructure and Resources		
Lack of sufficient access to computers.	2.08	Low Agreement
Lack of sufficient access to tablets.	2.36	Low Agreement
Lack of sufficient access to other digital devices for teaching.	2.36	Low Agreement
School has unreliable internet connectivity.	2.66	High Agreement
School has slow internet connectivity.	2.88	High Agreement
Lack of up-to-date software and digital learning resources relevant to subject area.	2.74	High Agreement
Access to necessary technology is limited for many of my students due to socio-economic reasons.	3.09	High Agreement
Access to necessary technology is limited for many of my students due to geographic reasons.	3.24	High Agreement
Weighted Mean for Infrastructure and Resources	2.68	High Agreement
Teacher Competency		
Have not received adequate professional development or training on how to effectively integrate technology into my teaching.	2.54	High Agreement

Lack of confidence in my ability to use different digital tools and platforms for instructional purposes.	2.27	Low Agreement
The training programs that I attended are often one-time events without sustained follow-up.	2.49	Low Agreement
Hard to troubleshoot technical issues that may arise during the integration of technology in my lessons.	2.49	Low Agreement
Lack of sufficient time to plan and adapt instructional materials to effectively integrate new technologies.	2.55	High Agreement
Digital skills e.g., multimedia development, advanced internet tools) are limited for transformative teaching practices.	2.47	Low Agreement
Weighted Mean for Teacher Competency	2.47	Low Agreement
Pedagogical and Management Challenges		
Worry about the appropriate amount of screen time of my students when integrating technology in my lessons.	2.59	High Agreement
The curriculum is too rigid, making it difficult to experiment with new technology-driven teaching methods.	2.47	Low Agreement
Integrating technology negatively impacts classroom management or student accountability.	2.22	Low Agreement
It is challenging to monitor the learning of my students and provide them timely feedback in a technology integrated environment.	2.49	Low Agreement
Weighted Mean for Pedagogical and Management Challenges	2.44	Low Agreement
Institutional Support		
There is a lack of ongoing technical and administrative support for technology acquisition in my school.	2.47	Low Agreement
School's leadership does not provide sufficient encouragement for technology integration.	2.28	Low Agreement
School's leadership does not provide sufficient resources for technology integration.	2.28	Low Agreement
School/ district lacks clear policies for ICT integration in education.	2.28	Low Agreement
School/ district lacks clear strategic plan for ICT integration in education.	2.26	Low Agreement
Weighted Mean for Institutional Support	2.31	Low Agreement
Overall Weighted Mean	**2.47**	**Low Agreement**

Table 9 presents the barriers encountered by teachers in integrating technology in instructional management, categorized into infrastructure and resources, teacher competency, pedagogical and management challenges, and institutional support. The overall weighted mean of 2.47, interpreted as Low Agreement, indicates that respondents generally do not strongly perceive the listed factors as major barriers in the integration of technology in instructional management.

Among the indicators, infrastructure and Resources obtained the highest weighted mean of 2.68, interpreted as High Agreement. This suggests that the respondents generally perceive issues related to internet connectivity and limited access among students as the most evident challenges. Specifically, high agreement was observed on unreliable internet connectivity, slow internet connection, lack of up-to-date software and digital learning resources, and limited access to technology due to socio-economic and geographic reasons. In contrast, low agreement was noted on the lack of sufficient access to computers, tablets, and other digital devices.

The weighted mean of Teacher Competency is 2.47, interpreted as Low Agreement. High agreement was noted on lack of professional development or training and lack of sufficient time for instructional preparation.

However, low agreement was observed on lack of confidence in using digital tools, difficulty in troubleshooting technical issues, and limited digital skills for transformative teaching. This indicates that while some concerns on training and workload exist, competency-related issues are not strongly perceived as major barriers.

For Pedagogical and Management Challenges, the weighted mean is 2.44, interpreted as Low Agreement. High agreement was observed only on concern regarding student screen time, while other indicators such as curriculum rigidity, classroom management issues, and difficulty in monitoring and feedback obtained low agreement. This suggests that instructional and classroom-related challenged are generally not viewed as significant barriers.

Meanwhile, Institutional Support obtained the lowest weighted mean of 2.31, interpreted as Low Agreement. All indicators, including lack of leadership support, insufficient resources, absence of ICT policies, and lack of strategic ICT plans, were rated low. This indicates that institutional factors are generally not perceived as major constraints in technology integration.

The results show a general weighted mean of 2.47, interpreted as Low Agreement, indicating that the respondents generally perceive the barriers in technology integration as minimal, with only selected aspects particularly infrastructure-related concerns, which was rated as more evident.

Significant Difference in the Use of Tangible and Intangible Technologies between Mainland and Coastal Teachers

Table 10 Significant Difference in the Use of Tangible and Intangible Technologies between Mainland and Coastal Teachers

Types of Technology	t-test value	p value	Significant at a =0.05	Interpretation
Tangible	1.900	.060	No	No statistically significant difference
Intangible	-.082	.935	No	No statistically significant difference

Table 10 presents the results of the t-test analysis on the difference in the use of tangible and intangible technologies between mainland and coastal teachers. For tangible technologies, the computed t-test value was 1.900 with a p-value of 0.060, which is higher than the 0.05 level of significance. This indicates that there is no statistically significant difference in the use of tangible technologies between mainland and coastal teachers. Similarly, for intangible technologies, the t-test value was -0.082 with a p-value of 0.935, which also exceeds the 0.05 level of significance. This further indicates that there is no statistically significant difference in the use of intangible technologies between the two groups of teachers.

Significant Difference in the Extent of Technology Application in Instructional Management between Mainland and Coastal Teachers

Table 11 Significant Difference in the Extent of Technology Application in Instructional Management between Mainland and Coastal Teachers

	t-test value	**p value**	**Significant at a =0.05**	**Interpretation**
Extent of Technology Application	.474	.637	No	No statistically significant difference

Table 11 presents the results of the t-test analysis on the difference in the extent of technology application in instructional management between mainland and coastal teachers. The computed t-test value was 0.474 with a p-value of 0.637, which is higher than the 0.05 level of significance. This indicates that there is no statistically significant difference in the extent of technology application in instructional management between mainland and coastal teachers.

Relationship of Teacher Attributes in Integrating Technology

in Instructional Management

Table 12.1 Relationship of Teacher Attributes to Extent of Technology Use

Teacher Attributes	r	Level	p	Interpretation
Age	-0.173*	Weak Negative Relationship	0.031	Significant
Sex	.102	Very weak positive relationship	.275	Not Significant
Highest Educational Attainment	-.078	Very weak negative relationship	.406	Not Significant
Number of Trainings	280**	Weak positive relationship	.002	Highly Significant
School Location	.044	Very weak positive relationship	.637	Not Significant
School Size	-.027	Negligible/very weak negative relationship	.771	Not Significant
School Population	.052	Very weak positive relationship	.580	Not Significant
Availability of Technology	-.133	Weak negative relationship	.155	Not Significant

Note: r= Pearson correlation coefficient; sig (p) =significant value

p<.05 (significant)

**p<.01(Highly Significant)

Table 12.1 presents the relationship between teacher attributes and the extent of technology use in instructional management. The results show that age has a weak negative relationship with the extent of technology use

(r = -0.173, p = 0.031), which is statistically significant. This indicates that as age increases, the extent of technology use tends to slightly decrease.

Similarly, the number of technology-related trainings attended shows a weak positive relationship (r = 0.280, p = 0.002), which is highly significant, suggesting that teachers who have attended more trainings tend to exhibit higher levels of technology use.

Table 12.2 Relationship of Teacher Attributes to Perceived Benefits

Teacher Attributes	r	Level	p	Interpretation
Age	-0.127	Weak Negative Relationship	0.087	Not Significant
Sex	.189*	Weak positive relationship	.042	Significant
Highest Educational Attainment	-.042	Very weak negative relationship	.657	Not Significant
Number of Trainings	.111	Very weak positive relationship	.238	Not Significant
School Location	.205*	Weak positive relationship	.027	Significant
School Size	-.133	Weak negative relationship	.155	Not Significant
School Population	.218*	Weak positive relationship	.019	Significant
Availability of Technology	.154	Weak positive relationship	.098	Not Significant

Note: r= Pearson correlation coefficient; sig (p) =significant value

p<.05 (significant)

**p<.01(Highly Significant)

Table 12.2 presents the relationship between teacher attributes and the perceived benefits of technology integration in instructional management. The results show that sex has a weak positive relationship (r = 0.189, p = 0.042), which is statistically significant, indicating that perceived benefits vary slightly between male and female teachers. Similarly, school location (r = 0.205,

p = 0.027) and school population (r = 0.218, p = 0.019) both exhibit weak positive relationships that are statistically significant, suggesting that teachers in certain school locations and those handling larger school populations tend to report higher perceived benefits from technology integration.

On the other hand, age shows a weak negative relationship (r = -0.127, p = 0.087), which is not statistically significant. Likewise, highest educational attainment (r = -0.042, p = 0.657), number of trainings attended (r = 0.111, p = 0.238), school size (r = -0.133, p = 0.155), and availability of technology (r = 0.154, p = 0.098) do not show statistically significant relationships with the perceived benefits.

The findings indicate that only sex, school location, and school population are significantly related to the perceive benefits of technology integration, while the remaining teacher attributes do not exhibit significant relationships.

Table 12.3 Relationship of Teacher Attributes to Encountered Barriers

Teacher Attributes	r	Level	p	Interpretation
a. Age	0.153	Very Weak positive Relationship	0.051	Not Significant
b. Sex	-.038	Very weak negative relationship	.686	Not Significant
c. Highest Educational Attainment	.023	Very weak positive relationship	.804	Not Significant
d. Number of Trainings	-.178	Weak negative relationship	.056	Not Significant
e. School Location	-.028	Very weak negative relationship	.763	Not Significant
f. School Size	.117	Very weak positive relationship	.211	Not Significant
g. School Population	-.009	Negligible Relationship	.926	Not Significant
h. Availability of Technology	.101	Very weak positive relationship	.282	Not Significant

Note: r= Pearson correlation coefficient; sig (p) =significant value

p<.05 (significant)

**p<.01(Highly Significant)

Table 12.3 presents the relationship between teacher attributes and the barriers encountered in integrating technology in instructional management. The results indicate that none of the teacher attributes show a statistically significant relationship with encountered barriers.

Specifically, age has a very weak positive relationship (r = 0.153,

p = 0.051), which is not statistically significant. Similarly, sex (r = -0.038, p = 0.686), highest educational attainment (r = 0.023, p = 0.804), number of trainings attended (r = -0.178, p = 0.056), school location (r = -0.028, p = 0.763), school size (r = 0.117, p = 0.211), school population (r = -0.009, p = 0.926), and availability of technology (r = 0.101, p = 0.282) all demonstrate no statistically significant relationships.

These findings indicate that the barriers encountered in technology integration are generally consistent across teachers, regardless of their demographic characteristics and school-related attributes.

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DISCUSSIONS

This chapter presents the analysis and interpretation of the data gathered from teachers in mainland and coastal schools of the Lagonoy South District. The discussion is organized according to the specific research problems presented in Chapter I. Additionally, it focuses on interpreting the findings, highlighting patterns, relationships, and implications of teacher attributes, technology integration, benefits and encountered barriers in integrating technology into instructional management.

Attributes of Teachers who Integrate Technology in Instructional Management

The findings on the attributes of teachers who integrate technology in instructional management reveal that ICT integration is influenced by a combination of personal, professional, and institutional factors. These attributes collectively shape how teachers engage with technology in instructional practices.

The predominance of teachers within the 25-44 age range suggests that ICT integration is largely driven by a workforce that is at a stage of professional maturity where both experience and adaptability coexist. This supports the view that younger and middle-aged teachers tend to be more responsive to technological innovation due to greater exposure and familiarity with digital environments. Lucas (2022) emphasized that age is associated with varying levels of ICT readiness, where younger teachers are generally more open and confident in using technology. However, the findings also suggest that age alone is not sufficient to guarantee effective integration, as access to training and institutional support remain essential enabling factors.

The dominance of female teachers reflects the gender structure of the teaching workforce in basic education. This aligns with UNESCO which reports that teaching remains a female-dominated profession globally. However, this distribution does not imply gender-based differences in ICT capability but rather highlights structural labor patterns in the education sector. This suggests that ICT integration policies should be inclusive and responsive to workforce composition rather than gender assumptions.

Most respondents possess at least a bachelor's degree, with many pursuing graduate studies, which indicates a generally qualified teaching workforce. However, the findings also suggest that academic qualifications do not directly translate to ICT competence. Consistent with Tondeur et al. (2015), effective technology integration is more strongly influenced by teachers' pedagogical beliefs, digital skills, and self-efficacy rather than formal educational attainment alone. This implies that ICT development programs should prioritize competence-building over credential-based assumptions of readiness.

The moderate level of technology-related training among respondents indicates that exposure to ICT professional development remains limited and uneven. While most teachers have attended at least one or two trainings, the lack of sustained and progressive training may restrict deeper integration of technology into instruction. This finding is **corroborated** by Amemasor et al. (2025), Siyam et al. (2025), and Manaba et al. (2025), who emphasized that continuous and structured ICT training is essential in developing teachers' confidence and instructional innovation. The results suggest that one-time training programs are insufficient for long-term ICT integration effectiveness.

School-related factors further highlight structural disparities influencing technology integration. The concentration of respondents in mainland schools suggests that ICT integration is shaped by geographic and institutional advantages, particularly in terms of infrastructure and resource availability. Ahiaku et al. (2025) and Li (2024) noted that school location significantly affects access to ICT resources, which in turn influences integration practices. This implies that disparities between mainland and coastal schools may contribute to variations in ICT utilization.

Similarly, the predominance of respondents from large schools suggests that institutional size plays a role in technology integration. Large schools often have greater administrative capacity, better funding allocation, and more established support systems for ICT use. However, this also indicates a contextual limitation, as smaller schools may experience different challenges that are not fully captured in the study. Although limited literature

exists on school size and ICT integration, the findings suggest that institutional scale influences the availability and use of technology in instruction.

The dominance of schools with large student populations further reinforces the context of resource concentration. Schools with higher enrollment often receive greater attention in resource allocation and infrastructure development. Francom (2019) noted that school context, including size and population, influences access to technology and instructional flexibility. However, this also implies that ICT integration practices observed in this study may reflect high-enrollment school environments rather than smaller and less populated schools.

Finally, the availability of technology reveals a mixed picture of ICT readiness. The widespread presence of laptops, printers, and smart TVs indicates that schools are equipped with essential tools for instructional delivery and administrative tasks. However, the limited availability of tablets and Learning Management Systems suggests that schools are still transitioning toward more advanced and flexible digital learning environments. This indicates that ICT integration remains at a foundational stage rather than a fully developed digital transformation level.

The findings suggest that technology integration in instructional management is shaped by the interaction of teacher attributes, professional development opportunities, and institutional conditions. While teachers demonstrate basic readiness and access to essential tools, disparities in training, resources, and school context continue to influence the depth and quality of ICT integration. These findings highlight the importance of considering both human and institutional factors in understanding technology integration practices in education.

Tangible and Intangible Technologies Used for Instructional Management

The findings on the technologies used for instructional management reveal a hierarchical and selective pattern of technology integration, where teachers predominantly utilize basic and familiar tools while more advanced digital platforms remain underutilized. This suggests that ICT integration in instructional management is still largely instrumental rather than transformative, meaning that technology is primarily used to support existing teaching practices rather than to fundamentally change instructional approaches.

The dominance of desktop computers, laptops, projectors, and smart TVs indicates a strong reliance on traditional, presentation-based instructional methods enhanced by digital tools. These technologies are primarily used for lesson preparation and content delivery, reinforcing teacher-centered instruction. This pattern aligns with Vu (2022) and the European Journal of Education (2022), which noted that teachers tend to use basic ICT tools because they are closely aligned with conventional pedagogical practices and require minimal adjustment in teaching methods. As a result, technology is often used to improve efficiency rather than to promote innovative or student-centered learning.

The weekly use of internet connectivity, mobile phones, and external storage devices suggests that these tools function mainly as supplementary resources for communication, file sharing, and access to instructional materials. However, their use remains largely supportive rather than pedagogical in nature. The very low utilization of tablets and iPads further indicates limited institutional prioritization and insufficient integration into teaching practices, which may reflect both resource constraints and lack of training in mobile-based instruction.

For intangible technologies, the high usage of Messenger and Microsoft PowerPoint reflects a strong dependence on communication and presentation-based applications. Messenger has become an informal yet dominant platform for instructional coordination, suggesting that social communication tools are being repurposed for educational use. This reflects a blending of formal instructional systems and informal communication channels within schools. Meanwhile, Microsoft Word and Excel are used primarily for documentation, reporting, and administrative tasks, indicating that technology integration remains largely administrative rather than instructional in focus.

More critically, the limited use of Google Workspace tools, Learning Management Systems, and collaborative platforms such as Google Classroom, Canva, Padlet, and the Learning Resource Portal suggests a weak

integration of cloud-based and collaborative learning environments. Despite their availability, these platforms are not fully embedded in instructional practice, indicating gaps in training, institutional support, and teacher readiness. Ayite and Nyagorme (2020) emphasized that access to technology alone does not ensure meaningful integration, as actual usage is influenced by competence, confidence, and institutional reinforcement.

Furthermore, the rare use of synchronous and interactive platforms such as Zoom, Google Meet, Microsoft Teams, and Kahoot indicates limited engagement with real-time, interactive, and learner-centered digital instruction. This suggests that blended and online learning approaches are not yet fully institutionalized, and teachers tend to favor tools that require lower technical complexity and provide more immediate usability.

The complete non-use of alternative messaging platforms such as Viber and Telegram further highlights a concentration of communication practices around a dominant application, particularly Messenger. This indicates a platform concentration effect, where technology use is shaped by familiarity, peer influence, and network behavior rather than instructional diversity or pedagogical intent.

The findings suggest that ICT integration in instructional management is still at a basic and transitional stage, categorized by functional and convenience-based usage rather than transformative pedagogical application. While schools are generally equipped with essential hardware, the depth of software utilization remains limited, reflecting gaps in training, institutional support, and instructional innovation culture. Existing literature supports this observation, emphasizing that technology integration in education is often uneven and largely dependent on familiarity and accessibility rather than instructional design transformation (Vu, 2022; European Journal of Education, 2022). Similarly, Ayite and Nyagorme (2020) noted that while digital tools are widely available, their use is often restricted to communication and content delivery rather than interactive or collaborative learning. More advanced platforms are frequently underutilized due to insufficient training, lack of institutional reinforcement, and low teacher confidence, resulting in surface-level ICT integration. Ultimately, the findings highlight that effective technology integration is not solely determined by access to tools but is strongly influenced by teacher competence, continuous professional development, and an institutional culture that supports innovative teaching practices

Extent of Application of Technology in Instructional Management

The findings reveal that teachers in the Lagonoy South District demonstrate a generally consistent use of technology in instructional management, indicating that ICT is already embedded in both instructional and administrative functions. However, its application is more concentrated on routine and efficiency-driven tasks rather than on transformative instructional practices.

Teachers most consistently use technology for data management and lesson preparation. This suggests that ICT is primarily utilized to support essential teaching responsibilities such as recording student performance and preparing instructional materials. This pattern reflects Cuban's (2001) observation that despite the presence of technology in schools, teachers often use it to reinforce established practices rather than redesign instruction. In the context of the result of the study, ICT functions mainly as a tool for efficiency and workload management.

Technology is also regularly used for communication, multimedia integration, collaboration, and alternative delivery of instruction during class disruptions. This indicates that ICT is gradually being integrated into instructional processes and is not limited to administrative functions alone. However, its use in these areas remains largely supportive rather than transformative, which is consistent with Selwyn's (2011) argument that teachers' technology practices are often shaped by practical school demands rather than innovation-driven pedagogical change.

In contrast, less frequent use is observed in more advanced applications such as learning management systems, digital assessment tools, online platforms for managing student tasks, and technology-based feedback mechanisms. This suggests that teachers may still face challenges in fully adopting ICT tools that require higher technical skills, pedagogical adjustment, and sustained institutional support. Ertmer (1999) explains that both external barriers, such as limited time and institutional constraints, and internal barriers, such as beliefs and confidence, influence the depth of technology integration in classrooms.

From a Pedagogical perspective, Misha and Koehler (2006) emphasize that meaningful technology integration requires the development of Technological Pedagogical Content Knowledge (TPACK). The limited use of more complex digital tools suggests that this integrated knowledge is still developing among teachers, which affects the depth of ICT implementation in instructional practices.

The pattern of results suggests that technology use in instructional management is more aligned with efficiency and support functions rather than instructional transformation. This aligns with the SAMR Model (Puentedura, 2006) where most classroom technology use remains at the levels of substitution and augmentation rather higher-order modification or redefinition.

Furthermore, the findings can also be interpreted through Rogers' Diffusion of Innovations Theory (2003), which explains that the adoption of technology that occurs gradually within a social technology is already accepted but its use is still influenced by contextual factors such as training, resources, and institutional support.

Benefits of Integrating Technology in Instructional Management

The findings indicate that technology integration in instructional management is widely recognized as beneficial, particularly in enhancing instructional efficiency, organization, and classroom management processes. This suggests that ICT has become an embedded component of instructional practice rather than a supplementary tool, reflecting the increasing normalization of digital practices in teaching and learning within the district.

The consistently high ratings for Teacher Competency and Infrastructure and Resources suggest that perceived benefits of technology integration are contingent upon the interaction between human capital and material support. This implies that ICT is most effective when teachers possess adequate digital competence and are provided with sufficient technological infrastructure. The interdependence of these factors indicates that neither teacher capability nor resource availability alone is sufficient to ensure meaningful ICT integration; rather, their alignment is necessary to optimize instructional outcomes. This reinforces the understanding of ICT integration as a socio-technical process in which institutional and individual factors jointly shape implementation outcomes.

In pedagogical terms, the findings reveal that technology is primarily utilized to enhance student engagement, participation, and comprehension of instructional content. However, comparatively lower ratings for critical thinking and problem solving indicate that ICT application remains largely concentrated on facilitative and content-delivery functions rather than on higher-order cognitive development. This suggests that while technology supports instructional efficiency, its potential for fostering constructivist and inquiry-based learning remains underdeveloped. Such a pattern reflects a form of partial integration, where ICT is embedded in teaching routines without substantially transforming pedagogical approaches.

The relatively lower rating for Institutional Support, particularly in relation to training, further underscores this limitation. Although institutional encouragement is evident, the findings suggest that professional development programs may not yet be sufficiently sustained or comprehensive to support advanced ICT integration. This is critical, as fragmented or episodic training tends to promote procedural usage rather than pedagogical innovation. Consequently, the absence of continuous capacity-building mechanisms may constrain teachers' ability to transition from basic technology use toward more transformative instructional practices.

These findings are consistent with Akram (2022), Javier (2022), Hero et al. (2021), and Espinosa et al. (2025), who emphasize that technology integration enhances instructional efficiency and teacher effectiveness when supported by adequate infrastructure and professional competence. Similarly, Paquinol et al. (2024) highlight that ICT use in education is often concentrated on instructional support functions rather than on deepening cognitive transformation, particularly in context where pedagogical training is limited.

The findings may be also interpreted through the Technology Acceptance Model (TAM), which posits that technology adoption is influenced by perceived usefulness and perceived ease of use. The uniformly high level of agreement across indicators indicates that teachers perceived ICT as both useful and manageable within their instructional contexts. However, while TAM explains acceptance, the present findings indicate that acceptance

does not automatically translate into pedagogical transformation. Rather, ICT adoption appears to be primarily efficiency-driven, reinforcing existing instructional practices rather than restructuring them.

Generally, the findings suggest that ICT integration in the district is at a stage of established utilization but at emerging pedagogical transformation. While technology is effectively supporting instructional efficiency and classroom management, its role in transforming teaching and learning practices remains limited. Strengthening institutional support systems, particularly through sustained and targeted professional development, is therefore essential to facilitate deeper pedagogical integration and to maximize the transformative potential of ICT in education.

Barriers of Integrating Technology in Instructional Management

The findings indicate that the barriers encountered by teachers in integrating technology in instructional management are generally minimal, suggesting that technology use has become a normalized component of instructional practice. This implies that teachers are already familiar with digital tools and have developed that capacity to integrate them into teaching without significant disruption to classroom processes. As a result, technology is no longer perceived as an external innovation but as part of everyday instructional routines.

Despite this, the results also show that certain challenges, particularly in relation to infrastructure and resources conditions. While schools have made progress in providing basic technological tools, the more pressing issues are now related to the quality and reliability of access, especially, the internet connectivity. This indicates that the challenge of technology integration has shifted from availability of devices to the consistency and effectiveness of digital access in actual classroom practice.

It is also evident that external factors beyond the school environment significantly influence technology integration. Limited access to digital tools among students due to socio-economic and geographic conditions reflects a persistent digital divide. This suggests that even when teachers are prepared and schools are equipped, students' ability to fully participate in technology-enhanced learning is still constrained by broader structural inequalities. These barriers cannot be resolved through classroom-level strategies alone, but require wider interventions that address infrastructure development and equitable access to digital resources.

In terms of teacher competency, the findings suggest that barriers are generally not strongly experienced. This may be explained by teachers' continuous exposure to technology, which has allowed them to develop functional digital skills through practice. However, the presence of concerns related to inadequate professional technology, opportunities for deeper skill development remain limited. As a result, technology use tends to remain operational rather that fully transformative in nature.

Similarly, pedagogical and classroom management challenges are not strongly encountered. Teachers appear to have adapted their instructional approaches in ways that allow them to integrate technology without disrupting classroom control. However, this also suggests that technology is often used within familiar teaching approaches, rather than being fully leveraged for more innovative, student-centered, or inquiry-based learning strategies. In this sense, integration tends to support existing practices rather than transform them.

Institutional support is also not viewed as major barrier, indicating that schools provide a generally supportive environment for technology use. Leadership encouragement and existing policies appear sufficient to sustain current practices. However, the limited emphasis on continuous training and long-term technical support suggests that institutional support may be adequate for maintaining implementation but not necessary for advancing innovation in instructional practices.

When viewed in relation to existing studies, these findings show some variation from previous literature that commonly identifies infrastructure limitations, insufficient training, weak institutional support, and resource availability constraints as major barriers to technology integration (Paquinol et al., 2024; Hero et al., 2021; Espinosa et al., 2025). In the present context, however, many of these challenges appear to be less pronounced, suggesting that the schools have already made progress in addressing basic technological and institutional requirements.

This indicated that while similar factors are acknowledged in the literature, their impact in the current setting is not as restrictive. It is notable that external factors such as geographic and socio-economic conditions emerge as more persistent concerns, highlighting a digital divide that extends beyond the control of teachers and classroom-level interventions. Unlike internal school-based factors that can be addressed through training and policy support, these external constraints require broader systemic and community-level interventions.

The findings suggest that technology integration in instructional management is already established and functioning within the district. However, the remaining challenges point to deeper systematic issues, particularly in digital equity, infrastructure reliability, and sustained professional development. This implies that while basic integration has been achieved, there is still a need to strengthen conditions that will support more inclusive, innovative, and transformative use of technology in teaching and learning.

Significant Difference in the use of Tangible and Intangible Technologies between Mainland and Coastal Teachers

The findings indicate that there is no statistically significant difference in the use of both tangible and intangible technologies between mainland and coastal teachers. This suggests that geographic location does not exert a substantial influence on teachers' technology utilization in instructional management. One probable explanation for this outcome lies in the standardized structure of the public education system, wherein teachers, regardless of school location, are governed by uniform curricular requirements, administrative protocols, and reporting mechanisms. These institutional expectations necessitate the consistent use of similar technological tools, thereby reducing variability in technology use across different geographic contexts.

Moreover, the absence of significant difference implies that technology utilization among teachers is largely anchored in functional and routine instructional demands. Core teaching responsibilities such as lesson preparation, classroom presentation, communication with stakeholders, and student performance tracking require the use of basic and accessible technologies that are common across schools. Consequently, both mainland and coastal teachers converge in their use of these tools, not because of identical contextual conditions, but because of the shared nature of their professional tasks.

This finding may also reflect the presence of common systemic constraints that limit variation in technology use. Factors such as limited access to sustained professional development, uneven technological infrastructure, and significant workload demands may be experienced similarly across both mainland and coastal settings. These shared constraints can restrict teachers' capacity to expand or diversify their use of technology, resulting in comparable levels of utilization despite potential differences in school location. Thus, the lack of significant difference suggests that technology use is shaped more by institutional and professional conditions than by geographic factors.

Significant difference in the Extent of Technology Application in instructional management between mainland and coastal teachers

The findings reveal that there is no statistically significant difference in the extent of technology application in instructional management between mainland and coastal teachers. This indicates that both groups apply technology at a relatively similar level in supporting instructional processes. One explanation for this pattern is that the application of technology is closely tied to standardized instructional practices, which are consistent across schools regardless of location. Teachers are required to perform similar functions, such as lesson planning, assessment, and communication, all of which increasingly incorporate digital tools as part of routine practice.

In addition, the absence of significant difference suggests that technology application remains predominantly operational in nature, wherein digital tools are utilized to enhance efficiency and manage instructional responsibilities rather than to transform pedagogical approaches. Since these operational uses are widely embedded in the educational system, teachers across different contexts exhibit similar levels of technology application.

The findings also point to a shared level of technological capacity and limitation among teachers. Both mainland and coastal educators may have comparable access to training opportunities, institutional support, and technological resources, which contributes to similar patterns in the extent of technology use. At the same time, persistent challenges such as limited advanced ICT training, time constraints, and competing professional demands may inhibit the development of more sophisticated or innovative applications of technology. As a result, technology is applied consistently but not extensively expanded across both groups.

The lack of significant difference underscores that the extent of technology application in instructional management is influenced less by geographic location and more by broader systemic factors, including teacher preparedness, institutional expectations, and the structural conditions within which teachers operate. This suggests that efforts to enhance ICT integration should focus on strengthening these underlying factors rather than solely addressing location-based disparities.

Relationship of Teacher Attributes in Integrating Technology in Instructional Management

Relationship of Teacher Attributes to the Extent of Technology Use

The relationship between teacher attributes and the extent of technology use in instructional management reveals that age and participation in technology-related trainings are significant determinants of ICT integration practices. The negative relationship between age and extent of technology use suggests that younger teachers tend to engage more frequently in the use of digital tools for instructional purposes compared to older teachers. This finding may be attributed to differences in technological exposure and adaptability across generations. Younger teachers are generally more immersed in digital environments during their academic preparation and early professional experiences, which enhances their familiarity and confidence in using educational technologies. In contrast, older teachers may have been trained under more traditional instructional frameworks where technology was not yet a central component of pedagogy, resulting in a slower adaptation process when integrating digital tools into established teaching practices.

In addition, the positive and highly significant relationship between the number of technology-related trainings attended and the extent of technology use underscores the essential role of professional development in facilitating ICT integration. This implies that teachers who have undergone more training are more capable of and more inclined toward utilizing technology in instructional management. Training programs enhance not only technical proficiency but also pedagogical competence in aligning digital tools with instructional objectives, thereby increasing teachers' readiness and confidence in applying technology in actual classroom settings.

These findings align with the studies of Manaba, Pinero, and Futulan (2025), who reported that younger teachers and those with ICT training are generally more tech-savvy and more effective in utilizing digital tools in instructional practices. Similarly, Akram et al. (2022) and Ali, Nazir, and Sabir (2024) emphasized that personal competencies and access to professional development opportunities are critical determinants of successful technology integration. Their findings support the notion that teacher-related factors, particularly age-related adaptability and training exposure, play a more decisive role in ICT utilization than contextual or school-based factors.

Generally, the results suggest that the extent of technology use in instructional management is primarily shaped by individual capacity-building variables, particularly age and professional training. This highlights the importance of sustained and targeted professional development programs that enhance teachers' digital competencies and support continuous adaptation to evolving educational technologies.

Relationship of Teacher Attributes to Perceived Benefits of Technology Integration

The relationship between teacher attributes and perceived benefits of technology integration in instructional management indicates that only selected variables such as sex, school location, and school population exhibit statistically significant relationships, while the remaining attributes do not show significant associations. The weak positive but significant relationship between sex and perceived benefits suggests that there are slight variations in how male and female teachers perceive the advantages of technology use in instructional processes.

Although the effect size is minimal, this finding implies that gender-related differences in experience, confidence, or engagement with technology may subtly influence how its benefits are perceived in instructional settings.

Similarly, the significant positive relationships observed for school location and school population suggest that contextual factors play a meaningful role in shaping teachers' perceptions of technology benefits. Teachers in certain school environments and those handling larger student populations may perceive greater advantages from technology integration due to its functional role in improving instructional efficiency, communication, and classroom management. In larger schools, for instance, the complexity and volume of instructional tasks may increase reliance on digital tools, thereby reinforcing the perception that technology provides practical and operational benefits. Likewise, differences in school location may reflect variations in institutional support, access to resources, and technological culture, all of which can influence how teachers evaluate the usefulness of ICT in their professional practice.

In contrast, age, highest educational attainment, number of trainings attended, school size, and availability of technology do not demonstrate significant relationships with perceived benefits. This suggests that perceptions of technology benefits may have become relatively uniform across different teacher profiles, possibly due to widespread exposure to ICT in contemporary educational settings. It may also imply that once teachers are engaged in technology use, their recognition of its benefits is less dependent on individual background characteristics and more influenced by their immediate teaching context and practical experiences.

These findings align with the studies of Her et al. (2021) and Espinosa et al. (2025), who reported that teachers with stronger digital skills and competence tend to perceive greater benefits from ICT integration. Similarly, Paquinol et al. (2024) emphasized that contextual factors such as school resources, environment, and institutional support significantly shape teachers' perceptions of the advantages of technology use. Collectively, these studies reinforce the notion that perceived benefits of ICT integration are shaped by a combination of individual competencies and contextual conditions, highlighting the interplay between teacher characteristics and the instructional environment in determining how technology is valued in educational practice.

Relationship of Teacher Attributes to Encountered Barriers in Technology Integration

The analysis of the relationship between teacher attributes and the barriers encountered in integrating technology in instructional management indicates that no teacher-related variable demonstrates a statistically significant association with perceived barriers. This suggests that difficulties experienced in technology integration are not meaningfully differentiated by age, sex, educational attainment, training exposure, or school-related characteristics such as location, size, population, and availability of technology.

This pattern implies that barriers to ICT integration are experienced in a relatively uniform manner across teachers, regardless of their individual or institutional profiles. Such uniformity suggests that the challenges encountered are not primarily rooted in personal competencies or demographic differences, but are instead influenced by broader and more pervasive conditions within the educational system. In this sense, the experience of barriers appears to transcend individual attributes, pointing to the presence of common constraints that affect teachers in a similar way.

At a deeper level, this finding may be understood in relation to systemic and organizational limitations that shape the implementation of technology in schools. Constraints such as inadequate technical support, inconsistent infrastructure, limited access to reliable resources, and competing instructional demands may operate across school contexts, thereby producing a shared experience of difficulty among teachers. Consequently, variations in personal background or school classification do not substantially alter the nature or intensity of these barriers.

These results align with the perspective of existing literature, which emphasizes that challenges in ICT integration are largely structural and institutional rather than individual. Studies by Espinosa et al. (2025), Hero et al. (2021), and Paquinol et al. (2024) similarly highlight that barriers are more strongly associated with organizational readiness, policy support, and infrastructure capacity than with teacher demographics or qualifications. This underscores the need for systemic interventions that focus on strengthening institutional

support mechanisms, improving technological infrastructure, and ensuring sustained technical assistance, rather than concentrating solely on teacher-level characteristics.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the study, the conclusions derived from the findings, and the corresponding recommendations based on the results of the investigation on the integration of technology in instructional management among teachers in the Lagonoy South District.

This study examined the attributes of teachers who integrate technology in instructional management, including their extent of use, perceived benefits, and encountered barriers. The findings indicate that teachers who integrate technology are generally within the young to middle-aged group, with a greater proportion of female educators. Most respondents possess a bachelor's degree and are pursuing graduate studies, reflecting a workforce that is engaged in continuous professional development. However, exposure to technology-related training remains moderate, with some teachers having limited or no recent training, which may influence the depth and quality of technology integration.

In terms of school context, teachers are predominantly assigned in mainland, large-sized schools with high student populations. These schools are generally equipped with essential ICT resources such as laptops, desktop computers, printers, projectors, and smart televisions, enabling teachers to perform routine instructional tasks efficiently. However, access to more advanced technologies, such as tablets and fully maximized learning management systems, remains limited, indicating that while basic infrastructure is available, opportunities for more advanced and innovative integration are constrained.

The findings further reveal that teachers frequently utilize technology in routine instructional management tasks, particularly in lesson planning, preparation of instructional materials, data management, and communication with students and parents. This indicates that technology has become embedded in essential teaching functions. However, its application is less consistent in more complex instructional processes, such as providing digital feedback, managing student learning tasks through online platforms, and facilitating interactive or collaborative learning environments. This suggests that technology integration remains largely functional and efficiency-oriented rather than transformative in promoting higher-order learning experiences.

Teachers generally perceive technology as highly beneficial in improving instructional efficiency, enhancing student engagement, and supporting pedagogical practices. Technology facilitates access to diverse learning resources, simplifies administrative tasks, and contributes to the development of essential learner competencies. Despite these positive perceptions, institutional support in terms of sustained training and continuous professional development appears less emphasized, which may limit teachers' capacity to fully utilize available digital tools for teaching and learning practices.

Although barriers to technology integration are not strongly perceived, certain challenges remain evident, particularly those related to internet connectivity, access to updated digital resources, and time constraints in preparing technology-enhanced lessons. The lack of significant relationships between teacher attributes and encountered barriers suggests that these challenges are largely systemic rather than individual, indicating that external conditions play a more critical role than personal characteristics.

The findings also show that there are no significant differences in the use and application of technology between teachers in mainland and coastal schools, suggesting that technology integration practices are relatively consistent across locations. Furthermore, younger teachers and those with greater exposure to technology-related training tend to demonstrate higher levels of technology integration, highlighting the role of professional development and adaptability in shaping instructional practices.

These findings lead to the conclusion that while technology is already integrated into routine instructional management, its use remains largely at a basic and functional level. The limited use of advanced digital platforms and interactive tools indicates that technology has not yet been fully maximized to support transformative teaching and learning processes. Although teachers recognize the benefits of technology, the extent of integration

is influenced by access to resources, quality of training, and institutional support systems may it be in the national or local level. Moreover, the challenges encountered in technology integration are primarily structural in nature, emphasizing the need for system-level interventions rather than solely focusing on individual teachers' characteristics.

In light of these findings, it is recommended that schools implement continuous and practice-oriented professional development programs that go beyond one-time training sessions. Instead of conducting isolated seminars, schools may organize **quarterly ICT workshops** focused on specific skills such as creating online assessments, using learning management systems, and designing interactive instructional materials. Each session may include hands-on activities where teachers produce actual outputs, such as a digital lesson plan or an online quiz, which can be directly used in their classes. To ensure continuity, schools may require follow-up outputs or demonstrations of application during Learning Action Cell (LAC) sessions.

Teachers, particularly those with limited exposure to ICT, may be supported through a **school-based mentoring system.** School heads may assign ICT-proficient teachers as mentors to small groups of teachers, where short weekly or biweekly coaching sessions can be conducted. During these sessions, mentors may guide teachers in tasks such as setting up a Google Classroom, creating digital assessments, or troubleshooting basic technical issues. This peer-support approach will allow teachers to learn at a manageable pace within their actual teaching context.

Schools are also encouraged to institutionalize the use of learning management systems such as google classroom, Moodle, Schoology and Edmodo, to promote continuous and structured integration in instruction. Among these platforms, google classroom or Edmodo may be considered more practical options due to their accessibility, ease of use, and low technical requirements, particularly in public-school contexts. School administrators may develop simple guidelines, such as requiring at least one online activity per week or per lesson unit, to ensure gradual but consistent integration. Monitoring may be done through periodic checking of class platforms or submission of screenshots as evidence of use.

To address infrastructure concerns, school leaders may prioritize improving internet access by **allocating part of the school's Maintenance and Other Operating Expenses (MOOE)** for connectivity upgrades or load support for teachers during online tasks. Request to the Mayor, or **Department of Information and Communications Technology (**DICT) for free Wi-Fi or other government institutions may also be made coordination with local government units and agencies may also be initiated to request additional internet support or equipment. Where connectivity remains limited, schools may adopt **offline strategies**, such as using downloadable materials or sharing files through flash drives or local networks.

School heads may also ensure the effective use of existing ICT resources by creating a **simple inventory and scheduling system**. For example, a shared logbook or digital schedule may be used to manage the borrowing of projectors, laptops, or other devices. This ensures that all teachers have fair access and that available resources are maximized rather than underutilized.

Teachers are encouraged to gradually integrate more **interactive and student-centered tools** by starting with simple applications such as online quizzes or multimedia presentations before progressing to more advanced platforms. For instance, teachers may begin by incorporating one interactive activity per lesson, such as a short quiz or video-based discussion, and gradually increase the use of these tools as they gain confidence.

The results and findings of this study may be presented to the Administration (DepEd) to formalize and recognize the on-the-ground status of barriers in integrating technology in Instructional Management.

Finally, schools may strengthen institutional support by designating an **ICT coordinator or technical support team** responsible for assisting teachers with technical concerns. This may include troubleshooting devices, assisting in setting up platforms, and maintaining ICT resources. In addition, schools may develop a **simple annual ICT plan** outlining training schedules, resource needs, and target outcomes to ensure that technology integration is sustained and systematically improved over time.

REFERENCES

1. Ahiaku, P. K. A., Uleanya, C., & Muyambi, G. C. (2025). Rural schools and tech use for sustainability: the challenge of disconnection. Education and Information Technologies, 30(9), 12557–12571. https://doi.org/10.1007/s10639-024-13311-9
2. Akram, H., Abdelrady, A. H., Al-Adwan, A. S., & Ramzan, M. (2022). Teachers' Perceptions of Technology Integration in Teaching-Learning Practices: A Systematic review. Frontiers in Psychology, 13, 920317. https://doi.org/10.3389/fpsyg.2022.920317
3. Amemasor, S. K., Oppong, S. O., Ghansah, B., Benuwa, B., & Essel, D. D. (2025). A systematic review on the impact of teacher professional development on digital instructional integration and teaching practices. Frontiers in Education, 10. https://doi.org/10.3389/feduc.2025.1541031
4. Anderson, C. (2024). What is technology integration? Focuskeeper. https://focuskeeper.co/glossary/what-is-technology-integration
5. Andrade, G. (2026). DepEd Computerization Program (DCP): Implementation, utilization, and practices. Pantao, International Journal of the Humanities and Social Sciences, 5(1). https://doi.org/10.69651/pijhss0501776
6. Aquino, J. A., Cempron, D. N. L., & Orongan, R. C. (2024). Professional development and digital competency as determinants on productivity of teacher education graduates. In Atlantis Highlights in Social Sciences, Education and Humanities, pp. 403–415. https://doi.org/10.2991/978-94-6463-554-6_33
7. Ayite, D. M. K., & Nyagorme, P. (2020). Role of emerging technology on academic achievement of students at the University of Cape Coast. Journal of Educational Technology and Online Learning, 3(3), 272–287. https://eric.ed.gov/?id=EJ1293759
8. Bice, H., & Tang, H. (2022). Teachers' beliefs and practices of technology integration at a school for students with dyslexia: A mixed methods study. Education and Information Technologies, 27(7), 10179–10205.
9. Creswell, J. W., & Creswell, J. D. (2018). Research design: Qualitative, quantitative, and mixed methods approaches (5th ed.). SAGE Publications.
10. Cuban, L. (2001). Oversold and underused: Computers in the classroom. Harvard University Press.
11. Czaja, S. J., & Sharit, J. (1998). Age differences in attitudes toward computers. The Journals of Gerontology Series B, 53B(5), P329–P340. https://doi.org/10.1093/geronb/53b.5.p329
12. Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340. https://doi.org/10.2307/249008
13. Department of Education. (2010). Guidelines on the implementation of the DepEd Computerization Program (DepEd Order No. 78, s. 2010). https://www.deped.gov.ph
14. Department of Education. (2017). 2017 Brigada Eskwela implementing guidelines (DepEd Memorandum No. 43, s. 2017). https://www.deped.gov.ph
15. Department of Education. (2020). DepEd Order No. 8, s. 2020. https://www.deped.gov.ph
16. Department of Education. (2023). Revised guidelines on the implementation of the DepEd Computerization Program (DepEd Order No. 16, s. 2023). https://www.deped.gov.ph
17. Development Asia. (2017). Five ways to use information and communication technology for education. https://development.asia/insight/five-ways-use-information-and-communication-technology-education
18. Disonglo, M. P., & Limpot, M. Y. (2023). Digital literacy, pedagogical knowledge, and research skill: a structural equation model in professional competence of teachers. Asian Journal of Education and Social Studies, 42(4), 106–123. https://doi.org/10.9734/ajess/2023/v42i4928
19. Elizabeth, A., Küng, E., & du Plessis, E. (2024). Challenges for pedagogical effectiveness in an ever-changing education landscape. Education Sciences, 14(4), 349. https://doi.org/10.3390/educsci14040349
20. Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. Educational Technology Research and Development, 47(4), 47–61. https://doi.org/10.1007/bf02299597
21. Espinosa, A., et al. (2025). Bridging a digital divide: A critical analysis of contextual factors affecting ICT integration in Philippine schools. Issues in Educational Research, 35(2). http://www.iier.org.au/iier35/espinosa-2.pdf

22. Francom, G. M. (2019). Barriers to technology integration: A time-series survey study. Journal of Research on Technology in Education, 52(1), 1–16. https://doi.org/10.1080/15391523.2019.1679055
23. Garzon, J. A., Garzon, J. R., & Garzon, J. R. (2023). Teachers' Digital Literacy and Self-Efficacy in Blended Learning. Knowledge Commons. https://doi.org/10.17613/cmjv-1386
24. Hero, J. L., et al. (2021). Mastering innovations in ICT competence and practices of 21st century Filipino teachers. International Journal of Multidisciplinary Applied Business and Education Research, 2(4), 285–295. https://doi.org/10.11594/ijmaber.02.04.02
25. Javier, B. (2022). Practices of Filipino public high school teachers on digital teaching and learning technologies during the COVID-19 pandemic. International Journal of Computing Sciences Research, 6, 707–722. https://doi.org/10.25147/ijcsr.2017.001.1.67
26. Jean, B., & Ubayubay, R. M. (2025). Practices on the integration of technology and learners' reading performance in Misamis Oriental. American Journal of Multidisciplinary Research and Innovation, 4(2), 57–74. https://doi.org/10.54536/ajmri.v4i2.4387
27. Joshi, A., Kale, S., Chandel, S., & Pal, D. (2015). Likert scale: explored and explained. British Journal of Applied Science & Technology, 7(4), 396–403. https://doi.org/10.9734/bjast/2015/14975
28. Kapur, R. (2020). Understanding the meaning and significance of pedagogical approaches. ResearchGate. https://www.researchgate.net
29. Kunjiapu, S., Sinnappan, P., Salim, F. A. A., & Kunasegaran, M. (2025). Challenges and dilemmas of digitalization in Philippine education: a grassroots perspective. Journal of Public Administration and Governance, 14(2), 232. https://doi.org/10.5296/jpag.v14i2.22325
30. Law Insider. (n.d.). Student population. https://www.lawinsider.com/dictionary/student-population
31. Law Insider. (n.d.). School location. https://www.lawinsider.com/dictionary/school-location
32. Leithwood, K., & Jantzi, D. (2009). A review of empirical evidence about school size effects: A policy perspective. Review of Educational Research, 79(1), 464–490. https://doi.org/10.3102/0034654308326158
33. Li, M. (2024). Exploring the digital divide in primary education: A comparative study of urban and rural mathematics teachers' TPACK. Education and Information Technologies, 30(2), 1913–1945. https://doi.org/10.1007/s10639-024-12890-x
34. Lucas, Z. F. (2022). Teachers' preparedness in the use of ICT and school's licensure passing rate. AIDE Interdisciplinary Research Journal, 2(1).
35. Manaban, G., Piñero, B., & Futalan, M. C. (2025). Mathematics teachers' competence and barriers in ICT integration. Journal of Interdisciplinary Perspectives, 3(7). https://doi.org/10.69569/jip.2025.299
36. Merriam-Webster. (n.d.). Age. https://www.merriam-webster.com/dictionary/age
37. Merriam-Webster. (n.d.). Location. https://www.merriam-webster.com/dictionary/location
38. Merriam-Webster. (n.d.). Tangible. https://www.merriam-webster.com/dictionary/tangible
39. Mishra, P., & Koehler, M. J. (2006). Technological Pedagogical Content Knowledge: a framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x
40. Nessipbayeva, O. (2012). The competencies of the modern teacher. https://files.eric.ed.gov/fulltext/ED567059.pdf
41. Pandov, K. (2022). Digital game-based learning: A systematic review of barriers and teachers' beliefs. DIVA. https://share.google/f62FXOzFfU9vuverF
42. Paquinol, J. T., Taganas, W. R., & Comon, J. D. (2024). Digital competence among Araling Panlipunan teachers. European Modern Studies Journal, 8(4), 167–198. https://doi.org/10.59573/emsj.8(4).2024.10
43. Puentedura, R. R. (n.d.). Transformation, technology and education model. https://www.scirp.org/reference/referencespapers?referenceid=3818404
44. Roa, R. O. (2021). Technology integration in the classroom of Sta. Lucia Junior High School. International Journal of Engineering Research & Technology, 10(5).
45. Scheerens, J., Hendriks, M., & Luyten, H. (2014). School size effects: Review and conceptual analysis. Springer Briefs in Education, pp. 7–40. https://doi.org/10.1007/978-3-319-06814-5_2
46. Selwyn, N. (2011). Education and technology: Key issues and debates. Bloomsbury Academic.
47. Tomaro, Q. P. V. (2018). ICT integration in the educational system of Philippines. Journal of Governance and Public Policy, 5(3).

48. Tondeur, J., van Braak, J., Siddiq, F., & Scherer, R. (2016). Time for a new approach to prepare future teachers for educational technology use. Computers & Education. https://www.sciencedirect.com
49. Turbanada, M. Y., Alvarez, M. D., Chan, C. J., Adriatico, J. D., & Morales, R. A. (2025). Technology integration among public secondary school teachers in Northern Samar. Asian Journal of Advanced Research and Reports, 19(6), 446–460. https://doi.org/10.9734/ajarr/2025/v19i61072
50. UNESCO. (2023). Technology in education: A tool on whose terms? https://doi.org/10.54676/habj1624
51. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540
52. Volman, M., & Van Eck, E. (2001). Gender equity and information technology in education. Review of Educational Research, 71(4), 613–634. https://doi.org/10.3102/00346543071004613
53. Vu, P. (2014). Availability and use of digital technologies in P-12 classrooms. Issues and Trends in Learning Technologies. https://journals.uair.arizona.edu/index.php/itet/article/view/17933/17904
54. Wisdomlib.org. (2024). Perceived benefit: significance and symbolism. https://www.wisdomlib.org/concept/perceived-benefit