# Information And Communication Technology (ICT) Integration in Educational Management for School Leaders

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This study examined the integration of Information and Communication Technology (ICT) in educational management among school leaders in selected Schools Division Offices in Pangasinan Province, namely Alaminos City, Dagupan City, Pangasinan I, Pangasinan II, San Carlos City, and Urdaneta City. It aimed to determine the demographic profile of the respondents, assess the extent of ICT integration in terms of data management, school management digital collaborative tools, and privacy and security management, test for significant differences across profile variables, and develop a proposed framework to strengthen ICT integration among school leaders.

The study employed a descriptive-quantitative research design using a validated researcher-made survey questionnaire. Quantitative data were gathered from 150 school leaders. Frequency counts, percentages, weighted mean, t-test, and one-way ANOVA were used to analyze the data. Open-ended responses were summarized in the discussion only to clarify the survey results and support the proposed framework.

Findings revealed that the respondents were generally highly educated, experienced, and mostly in senior leadership positions. The overall extent of ICT integration was rated Often with a weighted mean of 3.47, indicating that ICT was regularly practiced in school management. Among the domains, Privacy and Security Management obtained the highest mean of 3.55 (Always), while Data Management and School Management Digital Collaborative Tools were both rated Often. No significant differences were found across most profile variables; however, significant differences were noted in privacy and security management when grouped according

to sex, highest educational attainment, and years of experience. These findings served as the basis for proposing a framework to enhance ICT integration in educational management.

***Keywords: ICT integration, educational management, school leaders, digital governance, data management, privacy and security management, collaborative digital tools***

## I. INTRODUCTION

In the 21st century, the integration of Information and Communication Technology (ICT) into educational management has become a global imperative. The rapid advancement of digital technologies requires educational institutions to strengthen leadership systems, improve administrative efficiency, and support quality teaching and learning. Globally, school leaders are expected to use ICT not only for instruction-related support but also for planning, communication, data management, and decision-making. Regañon (2023) emphasized that school heads' technological leadership significantly influences teachers' ICT integration in instruction, showing that digital competence at the leadership level is essential to effective school operations.

Consistent with this global direction, ICT has changed governance and administrative procedures in educational institutions. Volante et al. (2025) noted that digital governance in the Philippine context allows schools to manage, route, and streamline administrative processes through automated systems. These changes can produce more responsive and accountable school management; however, their success depends on the technical competence, readiness, and sustained capacity-building of school leaders.

Leadership readiness is therefore central to ICT integration. Alajmi (2022) found that digital leadership among school principals significantly increases teachers' technology integration, particularly during periods of disruption such as the COVID-19 pandemic. This finding shows that ICT adoption is not merely a technical concern; it is also a leadership responsibility that requires vision, support, collaboration, and continuous professional development.

At the level of classroom and school practice, ICT improves teaching effectiveness, reporting, communication, and performance monitoring, but implementation differs among

educators and leaders. Hero (2020) emphasized that demographic factors, such as gender and teaching experience, influence how teachers utilize ICT. This suggests that individual characteristics and professional exposure should be considered when designing ICT capacity-building programs for school leaders.

Gender composition is also relevant in the Philippine education workforce. Macabangon and Sambo (2023) reported that teaching remains largely female-dominated, with female teachers comprising the overwhelming majority of respondents in their study. This profile has implications for ICT integration because access, confidence, professional development opportunities, and leadership mobility may shape how educators participate in digital transformation. Strengthening ICT competencies among both female and male school leaders supports more inclusive and adaptable school management.

Educational background and leadership experience further affect technology leadership. Doğu and Yıldırım (2023) explained that administrators' educational preparation and experience are associated with technological leadership self-efficacy. In schools, leaders with stronger academic preparation and longer administrative exposure may be better positioned to guide ICT adoption, promote digital literacy, and support 21st-century skills such as collaboration, communication, and critical thinking.

In terms of institutional management, ICT can streamline administrative and instructional tasks, strengthen information systems, and provide wider access to educational data. Di Yuna et al. (2025) emphasized that technology integration in education management improves operational responsiveness but also presents barriers, including unequal technological capacity, limited digital literacy, and cybersecurity risks. These issues show that ICT integration must address both efficiency and data protection.

In the Philippines, the Department of Education (DepEd) has recognized the importance of ICT through initiatives such as the DepEd Computerization Program, which aims to provide schools with ICT tools and infrastructure. Despite these initiatives, implementation challenges remain, including inadequate training, limited resources, and uneven digital readiness across regions. Alayan (2022) reported that while teachers and learners may possess basic ICT literacy,

school heads often demonstrate only average technological leadership, indicating a continuing need to strengthen leadership capacity.

At the local level, the Schools Division Offices in Pangasinan have introduced initiatives intended to enhance ICT use in schools. For example, Lumayao Integrated School in San Quintin implemented projects such as Enhancing Literacy through Collaborative Expertise (ELCE) to improve educational outcomes. These efforts show that local schools are beginning to use technology-supported approaches; however, there remains a need to assess how school leaders integrate ICT into actual educational management practices.

This need is aligned with Sustainable Development Goal (SDG) 4, which promotes inclusive and equitable quality education and lifelong learning opportunities. By strengthening ICT competencies among school leaders, schools can improve administrative efficiency, data management, communication, and instructional support. These improvements contribute to more responsive school systems and better support for learners and teachers.

Effective ICT integration can also improve communication within the school community, support resource management, and enable data-driven decision-making. However, these benefits require continuous professional development, reliable infrastructure, and clear policy support. Without these enabling conditions, ICT tools may be used only for basic tasks rather than for strategic school improvement.

For this reason, the present study was conducted in the province of Pangasinan under the Department of Education Region I. It focused on school leaders from selected Schools Division Offices where elementary and secondary schools are increasingly expected to incorporate ICT into administrative and instructional activities. By examining respondents' profiles, levels of ICT integration, and areas requiring improvement, the study provides a basis for developing a strategic framework for stronger, more sustainable ICT leadership in public schools.

## Literature Review

This study is grounded in several interrelated theories that support the integration of Information and Communication Technology (ICT) in educational leadership and management. These theories emphasize the importance of leadership behavior, technological adoption, and organizational change in the educational context. Each provides a foundation for understanding how school leaders can effectively integrate ICT to enhance teaching, learning, and administrative efficiency. These theories are Transformational Leadership Theory, Technology Acceptance Model (TAM), Diffusion of Innovations Theory, TPACK framework (Technological Pedagogical Content Knowledge), and Systems Theory in Educational Management.

Transformational Leadership Theory posits that leaders can inspire and motivate their followers to exceed expectations by creating a shared vision, encouraging innovation, and fostering commitment to change (Bass & Avolio, 1994) . In the context of ICT integration, school leaders who practice transformational leadership are more likely to initiate, sustain, and support technological advancements in schools. Studies show that transformational leadership significantly influences teachers' acceptance and use of ICT tools (Al-Husseini & Elbeltagi, 2018). Such leaders serve as role models, invest in professional development, and promote a culture of collaboration and continuous improvement, all of which are essential for successful ICT implementation.

In the Philippines, the Department of Education (DepEd) has been promoting the integration of Information and Communication Technology (ICT) in schools to enhance teaching and learning. Transformational leadership theory can play a crucial role in this initiative. School leaders can create a shared vision for ICT integration, aligning with DepEd's goals and objectives. Encouraging innovation and calculated risk-taking can help schools explore new ways to use ICT in education. Investing in teacher training and development can build capacity and confidence in using ICT tools. School leaders should model the use of ICT tools and promote a culture of innovation and collaboration. Providing ongoing training and support can help teachers develop the skills and confidence to integrate ICT into their teaching practices. School leaders can explore partnerships with stakeholders to address resource constraints and leverage resources for ICT integration. By applying transformational leadership theory, school leaders in the Philippines can

inspire and motivate teachers to effectively integrate ICT into their teaching practices, ultimately enhancing student learning outcomes.

The Technology Acceptance Model (TAM) by Davis (1989) is a widely used framework that explains how users come to accept and use technology. It suggests that perceived usefulness and perceived ease of use are primary factors influencing individuals' decision to adopt technology. For school leaders, understanding and experiencing the usefulness and usability of ICT tools influence their likelihood of integrating these tools into school management systems. Recent studies have extended TAM to include leadership perspectives, indicating that when school heads find ICT beneficial and easy to implement, they are more likely to champion its use (Venkatesh & Bala, 2020).

TAM can be applied to understand the adoption of ICT tools in Philippine schools. School leaders in the Philippines are more likely to adopt ICT tools if they believe these tools will improve school management, teaching, and learning. ICT tools that are user-friendly and easy to implement will have a higher chance of adoption among school leaders and teachers. The Department of Education's investments in ICT infrastructure, such as computer labs and internet connectivity, can influence perceived usefulness and ease of use. Providing teachers with training and support can enhance their perceived ease of use and usefulness of ICT tools. Schools in rural areas may face challenges in adopting ICT tools due to limited resources and infrastructure. Some school leaders and teachers may be hesitant to adopt new technologies, affecting perceived usefulness and ease of use. The DepEd's ICT4E Strategic Plan provides a framework for ICT adoption and integration, aligning with TAM's emphasis on perceived usefulness and ease of use. The increasing tech-savviness of Filipino students and teachers can facilitate the adoption and effective use of ICT tools. School leaders should demonstrate the benefits and usefulness of ICT tools to teachers and stakeholders. Providing ongoing support and training can enhance teachers' perceived ease of use and usefulness of ICT tools. Regularly monitoring progress and addressing challenges can help sustain ICT adoption and integration. By understanding the factors influencing technology acceptance, school leaders in the Philippines can promote the effective adoption and integration of ICT tools, ultimately enhancing teaching and learning outcomes.

**Statement of the Problem**

This study aimed to explore the challenges and opportunities faced by school leaders in the Schools Division Offices of Pangasinan Province of Alaminos, Dagupan, Pangasinan I, Pangasinan II San Carlos, and Urdaneta City in implementing technology integration in educational administration.

Specifically, this study sought to answer the following questions:

1. What is the demographic profile of the respondents in terms of;
    a. age;
    b. sex;
    c. position/designation;
    d. highest educational attainment;
    e. years of experience as school head; and
    f. ICT-related trainings/seminar?
2. What is the extent of ICT integration of the school leaders along:
    a. data management;
    b. school management digital collaborative tools; and
    c. privacy and security management?
3. Is there a significant difference between the extent of ICT integration of the school leaders across their profile variables?
4. What framework can be proposed to strengthen the ICT integration of the school leaders?

## II. METHODOLOGY

This chapter presents the research methodology employed in the study to examine ICT integration among school leaders in the Province of Pangasinan. It details the research design, locale of the study, respondents and sampling procedures, research instrument, data collection process, validation of the questionnaire, and statistical tools used to analyze the gathered data.

To ensure a systematic investigation, this study adopted the Input-Process-Output (IPO) framework. The Input phase considered the respondents' demographic profile and ICT-related conditions. The Process phase involved quantitative data gathering and statistical analysis. The Output phase was the development of a proposed ICT integration framework intended to enhance digital governance and institutional efficiency within the Schools Division Offices of Alaminos City, Dagupan City, Pangasinan I, Pangasinan II, San Carlos City, and Urdaneta City.

The procedures described herein were selected to ensure the validity, reliability, and objectivity of the findings and to provide a scientific basis for the proposed intervention in educational administration.

### Research Design and Strategy

This study employed a descriptive-quantitative research design to determine the extent of ICT integration in educational management among school leaders. The design was appropriate because the study measured the respondents' demographic profile, described their level of ICT integration, and tested whether significant differences existed when the respondents were grouped according to their profile variables.

A researcher-made survey questionnaire was used as the primary instrument. The questionnaire gathered numerical data on the respondents' profile and on the extent of ICT integration along data management, school management digital collaborative tools, and privacy and security management. The responses were measured using a four-point Likert scale.

The quantitative data were analyzed using frequency counts, percentages, weighted means, t-test, and one-way ANOVA. Responses to open-ended items were used only as supporting discussion in Chapter 3 and were not treated as a separate qualitative research method.

**Population and Locale of the Study**

The study was conducted in the province of Pangasinan under the Department of Education Region I, specifically in the Schools Division Offices of Alaminos City, Dagupan City, Pangasinan I, Pangasinan II, San Carlos City, and Urdaneta City. These divisions include public elementary and secondary schools, making them relevant settings for assessing ICT integration in educational management.

The primary population of the study consisted of school leaders, particularly school heads and department heads from elementary and secondary schools in the identified Schools Division Offices. These respondents were included because they are directly involved in school decision-making, administrative management, and ICT-related implementation.

Here is the breakdown of the sample size for each SDO, using a proportionate/ allocation across six SDOs, n = 150 (total sample size). The numbers are rounded to the nearest whole number to get the final sample size.

The formula used to determine the total sample size:

$$nh = Nh/N \times n$$

Where:

nh = sample size for stratum h

Nh = population size of stratum h

N = total population size (1,529)

n = total sample size (150)

**Data Gathering Tool**

The study used a researcher-made survey questionnaire as the primary data-gathering instrument. The questionnaire contained items on the respondents' demographic profile and the extent of ICT integration in three domains: data management, school management digital collaborative tools, and privacy and security management. The extent of ICT integration was measured using a four-point Likert scale: 4 - Always, 3 - Often, 2 - Seldom, and 1 - Never.

**Data Gathering Procedure**

The data gathering procedure was conducted in a structured and systematic manner to maintain the accuracy and integrity of the research. The researcher first secured the necessary permissions from the concerned regional and division offices and prepared the approved survey questionnaire, informed consent forms, and other required documents.

The survey questionnaires were administered to the identified school leaders from the selected Schools Division Offices. Clear instructions were provided to the respondents, and sufficient time was given for completion. The accomplished questionnaires were retrieved, checked for completeness, encoded, and subjected to statistical analysis.

## III. RESULTS AND DISCUSSION

This chapter consists of the presentation, analysis, and interpretation of data to answer the research problems. Data were presented using tables to facilitate understanding of the problems in Chapter 1.

**TABLE 1**
**SUMMARY OF DEMOGRAPHIC PROFILE OF THE RESPONDENTS**

| Profile Variable | Category | Frequency | Percent |
|---|---|---|---|
| **Age** | 25-30 | 2 | 1.3 |
| | 31-35 | 7 | 4.7 |
| | 36-40 | 10 | 6.7 |
| | 41-45 | 50 | 33.3 |
| | 46 and above | 81 | 54.0 |
| | Total | 150 | 100.0 |
| **Sex** | Male | 48 | 32.0 |
| | Female | 102 | 68.0 |
| | Total | 150 | 100.0 |
| **Position/Designation** | Principal I | 4 | 2.7 |
| | Principal II | 0 | 0.0 |
| | Principal III | 4 | 2.7 |
| | Principal IV | 60 | 40.0 |
| | Head Teacher I | 1 | 0.7 |
| | Head Teacher II | 8 | 5.3 |
| | Head Teacher III | 26 | 17.3 |
| | Head Teacher IV | 16 | 10.7 |
| | Head Teacher V | 13 | 8.7 |
| | Head Teacher VI | 18 | 12.0 |
| | Head Teacher VII | 0 | 0.0 |
| | Total | 150 | 100.0 |
| **Highest Educational Attainment** | Bachelor's Degree | 6 | 4.0 |
| | Master's Degree (ongoing) | 17 | 11.3 |
| | Master's Degree (completed) | 31 | 20.7 |
| | Doctorate (ongoing) | 30 | 20.0 |
| | Doctorate (completed) | 66 | 44.0 |
| | Total | 150 | 100.0 |
| **Years of Experience** | 0-3 years | 24 | 16.0 |
| | 4-6 years | 27 | 18.0 |
| | 7-9 years | 37 | 24.7 |
| | 10 years and above | 62 | 41.3 |
| | Total | 150 | 100.0 |

| | | | |
|---|---|---|---|
| **ICT-Related Trainings/Seminars** | Basic ICT Literacy - Attended | 119 | 79.3 |
| | Basic ICT Literacy - Not attended | 31 | 20.7 |
| | Microsoft Office/Google Workspace - Attended | 71 | 47.3 |
| | Microsoft Office/Google Workspace - Not attended | 79 | 52.7 |
| | Data Privacy and Cybersecurity - Attended | 27 | 18.0 |
| | Data Privacy and Cybersecurity - Not attended | 123 | 82.0 |
| | Educational Technology Integration - Attended | 64 | 42.7 |
| | Educational Technology Integration - Not attended | 86 | 57.3 |
| | Others (Social Media, Marketing, OER) - Attended | 11 | 7.3 |
| | Others (Social Media, Marketing, OER) - Not attended | 139 | 92.7 |

Table 1 presents the consolidated demographic profile of the respondents. The data show that the respondents were generally mature, experienced, and academically prepared for school leadership, as 54.0% were 46 years old and above, 44.0% had completed doctoral studies, and 41.3% had 10 years and above of leadership experience. The group was predominantly female (68.0%) and largely composed of senior leaders, particularly Principal IVs and Head Teachers. In terms of ICT-related trainings, most respondents had attended Basic ICT Literacy training (79.3%); however, participation was lower in Microsoft Office/Google Workspace (47.3%), Educational Technology Integration (42.7%), Data Privacy and Cybersecurity (18.0%), and specialized trainings such as Social Media, Marketing, and OER (7.3%). Interpreted through the Technology Acceptance Model and Diffusion of Innovations Theory, this profile suggests that basic digital exposure is already present, but adoption of advanced ICT practices still depends on training, perceived ease of use, and institutional support.

**TABLE 2**

**EXTENT OF ICT INTEGRATION OF THE SCHOOL LEADERS IN DATA MANAGEMENT (USING ICT TO MANAGE AND UTILIZE DATA FOR SCHOOL IMPROVEMENT)**

| Indicators | Mean | Descriptive Equivalent |
|---|---|---|
| I use digital applications (e.g., MS Office, WPS, Google Drive, Google Forms, and Google Sheets) for managing student records. | 3.69 | Always |
| I regularly generate reports using ICT applications (e.g., MS Office, WPS, Google Drive, Google Forms, Google Sheets). | 3.79 | Always |
| I store and retrieve school data using cloud-based platforms (e.g., Google Workspace, Microsoft 365, Dropbox, Microsoft OneDrive, Amazon, Web Service, Slack, Trello). | 3.22 | Often |
| I analyze school data to support decision-making by utilizing a variety of tools and methodologies to gather, process, and interpret relevant information such as (Statistical Software, **Excel/Google Sheets, and** SurveyMonkey) | 3.36 | Often |
| I monitor student performance using digital dashboards (e.g., MS Office, WPS, Google Drive, Google Forms, Google Sheets) | 3.37 | Often |
| I use ICT applications (FB Page, Instagram, Messenger, Microsoft Teams, Snapchat, Skype, Telegram, Twitter,) to communicate with teachers, staff, and parents | 3.81 | Always |
| I utilize video conferencing platforms (e.g., Zoom, Google Meet, Microsoft Teams, Slack, Skype) for school planning and policy development. | 3.30 | Often |
| I provide training or support to teachers and staff on ICT-related matters. | 3.22 | Often |
| I use ICT applications to manage school finances and resources (e.g., MS Office, WPS) | 3.45 | Often |
| I regularly evaluate and update ICT systems and infrastructure in my school. | 3.21 | Often |
| **Weighted Mean** | **3.44** | **Often** |

*Legend : 3.50 - 4.00 – Always; 2.50 - 3.49 – Often; 1.50 - 2.49 – Seldom; and 1.00 - 1.49 – Never*

Table 2 shows the results on the extent of ICT integration in Data Management among school leaders (n = 150), with an overall weighted mean of 3.44 (Often). This indicates that ICT is regularly used in school data management but is not yet fully maximized. Through the lens of the Technology Acceptance Model, the high use of familiar tools such as MS Office, Google Drive, Google Forms, and messaging applications suggests that school leaders are more likely to use tools they perceive as useful and easy to operate. From Systems Theory, the result also shows that data management is already connected to school reporting, communication, and decision-making, although more advanced systems remain underused.

The highest-rated indicator is the use of ICT applications for communication with stakeholders (M = 3.81, Always). This supports Transformational Leadership Theory because school leaders use digital communication to coordinate people, share direction, and sustain school operations. The use of ICT for report generation (M = 3.79, Always) and student record management (M = 3.69, Always) further shows that ICT has become part of routine administrative work.

Another high result is generating reports using ICT applications (M = 3.79, Always) and using digital tools for managing student records (M = 3.69, Always). These findings show that ICT is widely used for documentation and reporting tasks. According to UNESCO (2018), digital tools improve accuracy, efficiency, and accessibility of school data, which supports better decision-making.

**TABLE 3**

**DIFFERENCE BETWEEN THE EXTENT OF ICT INTEGRATION OF THE SCHOOL LEADERS ACROSS THEIR PROFILE VARIABLES UNDER RESPONDENTS' SEX**

| | F-Value | Sig-Value |
|---|---|---|
| Data Management | 0.514 | 0.475 |
| School Management Digital Collaborative Tools | 0.077 | 0.782 |
| Privacy And Security Management | 5.741 | 0.018 |
| **Overall Weighted Mean** | **0.706** | **0.402** |

Table 3 shows that there is no significant difference between male and female school leaders in overall ICT integration (F = 0.706, p = 0.402). Data Management (F = 0.514, p = 0.475) and School Management Digital Collaborative Tools (F = 0.077, p = 0.782) also showed no significant differences. This indicates that sex does not generally determine the extent of ICT use among school leaders.

In terms of specific areas, Data Management (F = 0.514, p = 0.475) and School Management Digital Collaborative Tools (F = 0.077, p = 0.782) also show no significant differences. This indicates that both groups perform equally well in managing data and using digital tools for communication and collaboration. According to the Department of Education (2020), ICT integration should be inclusive and accessible to all school leaders, regardless of gender, which is supported by these findings.

However, Privacy and Security Management showed a significant difference (F = 5.741, p = 0.018). This suggests that differences in cybersecurity practice may be related to exposure, confidence, or role-based responsibilities rather than sex alone. From TAM, the result implies that perceived usefulness and ease of use of security practices may vary across users and should be addressed through equal training opportunities.

## IV. CONCLUSIONS AND RECOMMENDATIONS

Based on the findings, the following conclusions are drawn:

School leaders are generally highly educated, experienced, and mostly in senior positions; however, gaps remain in advanced ICT training, particularly in cybersecurity, educational technology integration, productivity tools, and specialized digital communication skills. ICT integration among school leaders is at a moderate to high level, with strong emphasis on privacy, communication, and reporting, but weaker implementation in advanced digital management systems, structured collaboration platforms, and ICT infrastructure development. There is generally no significant difference in ICT integration across most demographic variables, which implies that ICT use is relatively uniform and not strongly influenced by age, position, or training

attendance. However, privacy and security management are significantly influenced by sex, educational attainment, and years of experience, indicating that cybersecurity competence may depend on exposure, education, and practical administrative experience. The study concludes that ICT integration is already established in schools but needs strengthening in advanced, strategic, and technical areas to achieve fuller digital transformation. School leaders should attend advanced ICT training on cybersecurity, data privacy, digital leadership, cloud-based systems, and educational technology integration. These programs should focus not only on attendance but also on hands-on application, monitoring, and follow-through so that training translates into actual school management practice. Schools should also allocate sufficient funding to improve ICT facilities, internet connectivity, technical assistance, and access to reliable digital platforms. Schools and administrators are encouraged to adopt the proposed ICT integration framework. Future studies may examine how ICT leadership affects student performance, teacher productivity, and school operational efficiency, and may further investigate the barriers to advanced ICT integration across different school contexts.

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