

Advancing Technology Integration in School Administration: Leadership in the Digital Age

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Abstract

This study investigated the transformative role of school heads in implementing and sustaining digital technologies within public educational institutions. It examined how leadership practices adapted to the evolving technological landscape by identifying the strategies, competencies, and frameworks that empower leaders to foster a digitally responsive administrative culture.

The study utilized a descriptive quantitative research design and employed a total enumeration sampling technique involving 61 public elementary and secondary school principals from the Schools Division of Cavite Province (Indang II, Trece Martires City, and Mendez Districts). Data were gathered through a researcher-developed, expert-validated survey questionnaire administered through Google Forms, and were analyzed using Frequency Distribution and Percentage, Weighted Mean and Standard Deviation, the Mann–Whitney U Test, the Kruskal–Wallis H Test, and Spearman's Rank Correlation Coefficient.

The demographic profile revealed that school heads were predominantly older, female, holders of master's degrees, highly experienced, and had participated in DepEd-organized ICT workshops. Respondents strongly agreed that technology efficiently streamlined administrative tasks, enhanced communication, strengthened decision-making through data tracking, and fostered openness and data accessibility. The highest agreement was noted for school heads' provision of clear vision and goals for technology integration, as well as the facilitation of professional development to enhance staff digital skills. Digital platforms were highly rated for managing records, securing financial data, improving accountability, disseminating announcements, supporting professional development, and overseeing project implementation.

Findings indicated that age and experience significantly shaped perceptions of technology integration, while education level and ICT training were significant for specific domains; no significant differences were observed based on sex. Leadership strategies demonstrated a significant relationship with supporting data-driven decision-making and with promoting transparency and accountability, but not with administrative efficiency or communication and collaboration.

Based on the findings, the study concludes that while school heads demonstrate strong readiness and positive perceptions toward technology integration, gaps remain in resource allocation, auditing, parental engagement, and project-monitoring functions. The study recommends the enhancement of digital leadership capacity, differentiated professional



development, and stronger systemic support, and proposes the SMART-LEAD Program (Strengthening Management and Administrative Readiness through Technology Leadership) to guide schools in strengthening technology-enabled, evidence-based, transparent, and inclusive leadership in school administration.

Keywords: *accountability, digital leadership, ICT integration, school administration, technology adoption*

INTRODUCTION

In the evolving landscape of 21st-century education, school administrators are increasingly expected to lead with digital competence and strategic foresight. The integration of technology into school administration has transformed traditional leadership roles, requiring school heads to manage not only human and material resources but also digital infrastructures, data systems, and virtual communication platforms. In the Philippines, this shift is particularly evident as schools adapt to post-pandemic realities, where digital tools are essential for instructional supervision, stakeholder engagement, and operational efficiency.

Despite growing efforts to incorporate technology into education, a significant research gap remains in understanding how school leaders effectively manage and sustain technology integration specifically within administrative functions. Most existing studies focus heavily on classroom instruction and student learning, with limited attention given to the administrative side of school operations, and there is a lack of comprehensive analysis of the leadership competencies and strategic practices necessary to lead digital transformation in school governance.

Globally, educational leadership frameworks have begun to reflect the demands of the digital age. Organizations such as the International Society for Technology in Education (ISTE) have developed standards emphasizing digital citizenship, data-informed decision-making, and systemic improvement. Locally, Republic Act No. 10844, the Department of Information and Communications Technology (DICT) Act of 2015, reinforces the importance of equipping school leaders with the tools, skills, and strategies to manage and integrate technology effectively in administrative functions.

Despite this growing body of literature, there remains a notable gap in understanding how school administrators in developing contexts, particularly in Southeast Asia, strategically integrate technology into administrative functions. Much of the existing research focuses on instructional technology or teacher practices, with limited attention to the administrative dimension of digital leadership. This study addresses these gaps by examining the role of school leadership in advancing technology integration within administrative operations, specifically among public elementary and secondary school principals in Cavite Province, identifying effective leadership strategies, challenges encountered, and the level of readiness among school leaders in embracing technological innovation for administrative advancement.

The study is anchored on the Technology Leadership for the Twenty-first Century Principal framework (Flanagan & Jacobsen, 2003), which emphasizes that effective technology use in schools is closely tied to strong instructional and administrative leadership — particularly vision-building, resource allocation, staff development, and policy implementation. This framework provided the conceptual lens for examining how school heads' demographic profile,

perceptions of technology integration, and leadership strategies interact to shape administrative, financial, communication, and monitoring outcomes in school governance.

Statement of the Problem

This study aimed to examine the role of school heads in advancing technology integration in school administration in the digital age, specifically among public elementary and secondary school principals in the Schools Division of Cavite Province.

Specifically, it sought answers to the following questions:

1. What is the demographic profile of school heads in terms of:
 - 1.1 age;
 - 1.2 sex;
 - 1.3 education;
 - 1.4 years of experience in school administration; and
 - 1.5 ICT training background?
2. How do school heads perceive the integration of technology in school administration in terms of:
 - 2.1 enhancing administrative efficiency;
 - 2.2 improving communication and collaboration;
 - 2.3 supporting data-driven decision-making; and
 - 2.4 promoting transparency and accountability?
3. What leadership strategies and practices in the digital age do school heads employ to advance technology integration in school administration?
4. How do school heads integrate technology in their administration in terms of:
 - 4.1 administrative;
 - 4.2 financial;

4.3 communication; and

4.4 monitoring domains?

5. Does the demographic profile of school heads correspond to a significant difference in how they perceive the integration of technology in school administration?

6. Does the perceived integration of technology in school administration correlate with the strategies and practices they implement in their school administration?

7. Based on the findings, what recommendations can be proposed to strengthen school leadership for effective technology integration in school administration?

Hypotheses

Based on the inferential questions presented above, the researcher formulated the following null hypotheses to be tested:

Ho1: The demographic profile of school heads does not correspond to a significant difference in how they perceive the integration of technology in school administration.

Ho2: The perceived integration of technology in school administration does not correlate with the strategies and practices school heads implement in their school administration.

METHODS

Research Design

This study employed a descriptive quantitative research design to systematically examine the role of school heads in advancing technology integration within school administration. The design focused on collecting measurable data to describe trends and associations among variables such as age, sex, years of experience, ICT training background, perceived benefits of technology, and leadership strategies, without manipulating any variable, thereby ensuring that findings reflected actual conditions in the field. Data were gathered through a structured survey questionnaire administered in person and online, allowing for standardized responses across a representative sample of school heads from public elementary and secondary schools.

Population and Sampling

The population consisted of all public elementary and secondary school principals within the Schools Division of Cavite Province, specifically the Indang II, Trece Martires City, and Mendez Districts — a total of 69 principals directly engaged in advancing technology integration in school administration. To ensure inclusivity and accuracy, the study employed a total enumeration sampling technique, involving all eligible principals within the defined scope, thereby capturing diverse implementation practices that may have influenced the outcomes of technology integration.

Respondents of the Study

The respondents consisted of 61 elementary and secondary school principals who completed the survey instrument, out of a total population of 69 principals across 50 elementary and 19 high schools in Indang II District, Trece Martires City, and Mendez District. Principals were selected as respondents because they served as the primary leaders and decision-makers in their respective schools, placing them at the center of administrative, financial, communication, and monitoring functions, and uniquely positioning them to assess how technology is integrated into these domains.

Research Instrument

A structured survey questionnaire served as the primary research instrument, designed to collect quantitative data on the demographic and professional profile of school heads, their perceptions of technology's role in enhancing school operations, and the leadership strategies and practices they adopted to sustain digital integration. The instrument consisted of four main sections: (1) demographic data, including age, sex, years of administrative experience, and ICT training background; (2) school heads' perceptions of technology's contribution to administrative efficiency, communication and collaboration, data-driven decision-making, and transparency and accountability; (3) leadership strategies and practices employed to advance technology integration; and (4) the extent of technology integration across administrative, financial, communication, and monitoring domains. The instrument was validated by a panel of experts in educational leadership and research to ensure alignment with the study's objectives and conceptual framework.

Validity and Reliability of the Instrument

Content validity was established through consultation with a panel of experts, including school administrators, ICT specialists, and educational researchers, who evaluated each item for its compatibility with the study's objectives and its relevance to the key variables under investigation. Following content validation, a pilot testing phase was conducted with 30 school heads possessing characteristics similar to the target respondents, to ensure the instrument was comprehensible, coherent, and suitable for its intended use. Revisions were made based on pilot feedback to improve clarity and remove ambiguities. The completed questionnaire was then distributed to a comparable group of respondents outside the primary sample, and internal consistency was assessed to confirm the instrument's reliability prior to full-scale administration.

Data Gathering Procedure

Data collection began with a formal letter to the Schools Division Superintendent requesting permission to conduct the study, followed by similar correspondence to the Public Schools District Supervisor and to the principal of each participating school. Upon securing the necessary approvals, respondents were formally invited to participate, with the invitation clarifying the study's purpose, the voluntary nature of participation, and assurances of confidentiality. Data were collected using Google Forms, with succinct, relevant items in multiple-choice and short-answer formats; the generated link was distributed via email and messaging platforms along with instructions and submission deadlines. Responses were monitored in real time and exported to Google Sheets for subsequent statistical analysis.

Data Analysis

The data gathered were statistically treated using descriptive and inferential statistics, computed using IBM SPSS Statistics (IBM Corp., 2021), with the level of significance for all inferential tests set at 0.05.

Frequency Distribution and Percentage were used to determine the demographic profile of the respondents.

Weighted Mean and Standard Deviation were computed to determine school heads' perceptions of technology integration, their leadership strategies and practices, and the extent of technology integration across administrative domains.

Mann–Whitney U Test was used to determine whether a significant difference existed between school heads' perceptions of technology integration and demographic variables with two categories, namely sex and ICT training background.

Kruskal–Wallis H Test was used to determine whether a significant difference existed across demographic variables with more than two categories, namely age, education, and years of experience.

Spearman's Rank Correlation Coefficient was applied as a non-parametric measure to determine whether a significant relationship existed between school heads' perceived integration of technology and the leadership strategies and practices, they employed.

RESULTS

The findings of the study are presented below according to the statement of the problem, with each table followed by an interpretation of the data.

1. Demographic Profile of School Heads

Table 1.1

Frequency and Percentage Distribution of the Demographic Profile of School Heads in Terms of Age

	Frequency	Percent (%)
37–41 years old	4	6
42–46 years old	18	30
47–51 years old	18	30
52 years old and above	21	34
Total	61	100

School heads were predominantly in the older age brackets, with 34% aged 52 and above and 30% each in the 42–46 and 47–51 ranges, while only 6% were 37–41 years old. This age distribution points to a leadership landscape rich in institutional experience, though the limited presence of younger leaders suggests a need for structured, ongoing upskilling in digital governance and ICT integration to complement the stability that experienced leaders provide (Grepon et al., 2021; Padolina-Alcantara, 2023).

Table 1.2

Frequency and Percentage Distribution of the Demographic Profile of School Heads in Terms of Sex

	Frequency	Percent (%)
Male	13	21
Female	48	79
Total	61	100

A marked sex disparity was observed, with 79% of school heads being female and 21% male. This reflects a broader pattern in the education sector where women increasingly occupy leadership positions, and is consistent with literature associating collaborative, distributed leadership styles with effective digital transformation (Raptis et al., 2022; Sujaya, 2023).

Table 1.3

Frequency and Percentage Distribution of the Demographic Profile of School Heads in Terms of Education

	Frequency	Percent (%)
Master's Degree	52	85
Doctorate Degree	9	15

	Frequency	Percent (%)
Total	61	100

The overwhelming majority of respondents held advanced degrees — 85% with a master's degree and 15% with a doctorate — reflecting a strong culture of academic achievement among school leaders. This advanced educational profile positions school heads to address the complex demands of technology integration, though continuous professional learning remains essential given the rapid pace of technological change.

Table 1.4

Frequency and Percentage Distribution of the Demographic Profile of School Heads in Terms of Years of Experience

	Frequency	Percent (%)
11–15 years	2	3
16–20 years	21	34
21–25 years	20	33
26 years and above	18	30
Total	61	100

The majority of school heads were highly experienced, with 34% having 16–20 years of service, 33% with 21–25 years, and 30% with 26 years or more; only 3% had 11–15 years of experience. This wealth of experience provides a strong foundation for navigating digital

transformation, though it also underscores the value of succession planning and mentorship to inject fresh perspectives into leadership renewal (Capacite, 2021; Hamzah et al., 2025).

Table 1.5

Frequency and Percentage Distribution of the Demographic Profile of School Heads in Terms of ICT Training Background

	Frequency	Percent (%)
Took ICT-related subject/s in college or graduate school	13	21
Attended seminar/s on ICT integration	16	26
Attended DepEd-organized ICT workshops	26	43
Received in-school ICT mentoring or coaching	2	3
Completed ICT certification course	4	7
Total	61	100

DepEd-organized ICT workshops were the most common form of training (43%), followed by seminars (26%) and college/graduate coursework (21%), while only 7% completed formal ICT certification and 3% received in-school mentoring. This pattern suggests that while broad, department-driven exposure to ICT is common, more intensive and individualized training remains limited — a gap that, per Martín et al. (2023) and Suryaman and Setiyani (2023), may constrain the depth of digital leadership capacity if left unaddressed.

2. Perceived Integration of Technology in School Administration

Table 2.1

*Mean and Standard Deviation of Perceived Integration of Technology in School Administration
in Terms of Enhancing Administrative Efficiency*

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. Technology streamlines routine tasks such as scheduling and documentation.	3.97	0.18	Strongly Agree
2. Digital tools reduce the time spent on manual processes.	3.93	0.25	Strongly Agree
3. School heads can monitor day-to-day operations more efficiently through digital platforms.	2.39	0.49	Disagree
4. Administrative records are more accessible through online systems.	3.93	0.25	Strongly Agree
5. Workflow automation improves responsiveness to administrative concerns.	3.87	0.39	Strongly Agree
6. Online systems improve submission and retrieval of school forms and reports.	3.92	0.28	Strongly Agree
7. Technology supports faster documentation of teacher and	3.43	0.50	Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
staff performance.			
8. Scheduling systems help reduce meeting conflicts and delays.	3.93	0.25	Strongly Agree
9. Financial transactions are more efficient with digital accounting tools.	3.34	0.48	Agree
10. Inventory and procurement processes are better managed through digital platforms.	3.90	0.30	Strongly Agree
Grand Mean	3.66	0.34	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Respondents strongly agreed that technology streamlines routine tasks ($M = 3.97$, $SD = 0.18$) and reduces time spent on manual processes ($M = 3.93$, $SD = 0.25$), reflecting strong consensus that digital tools enhance efficiency by minimizing redundancies and clerical errors. The lowest-rated item concerned monitoring day-to-day operations through digital platforms ($M = 2.39$, $SD = 0.49$, Disagree), pointing to a gap between the potential of technology and its actual use in supervisory functions — an area consistent with findings from Raptis et al. (2022, 2024) and Aziz and Rahman (2023), which link administrative efficiency gains to institutional support and training rather than access alone.

Table 2.2

*Mean and Standard Deviation of Perceived Integration of Technology in School Administration
in Terms of Improving Communication and Collaboration*

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. Technology enables timely communication with teachers and staff.	3.97	0.18	Strongly Agree
2. Messaging platforms streamline updates and urgent notices.	3.49	0.50	Agree
3. Video conferencing allows flexible and inclusive meetings.	3.31	0.47	Agree
4. Cloud-based tools promote shared access to documents and files.	3.36	0.66	Agree
5. Social media is effectively used to engage parents and the wider school community.	2.46	0.50	Disagree
6. Centralized communication tools enhance collaboration among department heads.	3.84	0.37	Strongly Agree
7. School heads can gather feedback from stakeholders more easily using online tools.	3.90	0.30	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
8. Collaborative planning is improved through shared digital workspaces.	3.93	0.25	Strongly Agree
9. Communication logs help track responses and follow-ups.	3.90	0.30	Strongly Agree
10. Mobile apps help school administrators stay connected anytime, anywhere.	3.98	0.13	Strongly Agree
Grand Mean	3.61	0.37	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Mobile applications ($M = 3.98$, $SD = 0.13$) and timely communication with staff ($M = 3.97$, $SD = 0.18$) received the strongest agreement, indicating that mobile and digital tools are widely valued for internal connectivity. In contrast, the use of social media to engage parents and the wider community was the lowest-rated item ($M = 2.46$, $SD = 0.50$, Disagree), suggesting that while technology strengthens internal collaboration, its role in external stakeholder engagement remains underutilized — consistent with Reis-Andersson (2024).

Table 2.3

Mean and Standard Deviation of Perceived Integration of Technology in School Administration in Terms of Supporting Data-Driven Decision-Making

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. Technology assists in collecting real-time data on	3.93	0.25	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
school operations.			
2. Data dashboards support evidence-based planning.	3.92	0.28	Strongly Agree
3. Reports generated through digital systems guide academic improvements.	3.90	0.30	Strongly Agree
4. Enrollment and attendance data are analyzed to inform school policies.	3.82	0.39	Strongly Agree
5. Platforms allow tracking of students' socio-emotional and behavioral data.	2.39	0.49	Disagree
6. Teacher evaluation results are more systematically analyzed using digital tools.	3.90	0.30	Strongly Agree
7. Data from technology tools inform the school's professional development priorities.	3.93	0.25	Strongly Agree
8. Administrative decisions are more reliable when based on data visualizations.	3.92	0.33	Strongly Agree
9. Customized reports help track resource allocation and	3.89	0.32	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
effectiveness.			
10. Decision-making is strengthened through long-term data tracking and analysis.	3.95	0.22	Strongly Agree
Grand Mean	3.76	0.31	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

This domain obtained the highest overall grand mean (3.76), with strong agreement across nearly all items, indicating that technology is widely recognized as enabling evidence-based leadership (Grepon et al., 2021; Hassan & Berkovich, 2023). The exception was the use of platforms to track students' socio-emotional and behavioral data ($M = 2.39$, $SD = 0.49$, Disagree), revealing a gap in the holistic use of technology that captures non-academic dimensions of student well-being alongside academic and operational data.

Table 2.4

Mean and Standard Deviation of Perceived Integration of Technology in School Administration in Terms of Promoting Transparency and Accountability

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. Technology ensures that school reports are accessible and verifiable.	3.95	0.22	Strongly Agree
2. Attendance and participation can be tracked digitally for	3.90	0.35	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
greater accountability.			
3. Financial transparency is improved through digital reporting systems.	3.85	0.36	Strongly Agree
4. Online platforms allow parents to view updates and student progress.	2.41	0.50	Disagree
5. Staff performance is better monitored through digital feedback systems.	3.11	0.32	Agree
6. Audit trails in software help identify irregularities in data or reporting.	3.84	0.37	Strongly Agree
7. Stakeholders can review key school decisions and reports online.	3.89	0.32	Strongly Agree
8. Feedback collection through digital means improves responsiveness and openness.	3.92	0.28	Strongly Agree
9. Data privacy policies are enforced and monitored through digital systems.	3.93	0.25	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
10. Technology fosters a culture of openness and shared responsibility.	3.95	0.22	Strongly Agree
Grand Mean	3.68	0.32	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

The highest-rated items were school reports being accessible and verifiable and technology fostering a culture of openness (both $M = 3.95$, $SD = 0.22$), reflecting strong internal accountability. The lowest-rated item was parents' ability to view updates and student progress through online platforms ($M = 2.41$, $SD = 0.50$, Disagree), indicating that while technology is embraced for internal accountability, its role in external transparency toward parents remains limited (Polinio et al., 2023).

3. Leadership Strategies and Practices to Advance Technology Integration

Table 3

Mean and Standard Deviation of Leadership Strategies and Practices School Heads Employ to Advance Technology Integration in School Administration

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. School heads provide clear vision and goals for technology integration.	3.97	0.18	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
2. Professional development opportunities are offered to enhance staff digital skills.	3.97	0.18	Strongly Agree
3. School heads allocate resources effectively to support technology initiatives.	2.23	0.42	Disagree
4. Collaboration among staff is encouraged to share best practices in technology use.	3.79	0.41	Strongly Agree
5. School heads model the use of technology in their own administrative tasks.	3.92	0.28	Strongly Agree
6. Feedback from teachers and staff is actively sought to improve technology integration.	3.92	0.28	Strongly Agree
7. Partnerships with external organizations are established to support technology adoption.	3.31	0.47	Agree
8. Policies are implemented to ensure ethical and responsible use of technology.	3.95	0.22	Strongly Agree
9. School heads regularly evaluate the effectiveness of	3.89	0.37	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
technology initiatives.			
10. A culture of innovation is fostered to encourage experimentation with new technologies.	3.93	0.25	Strongly Agree
Grand Mean	3.69	0.31	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Providing a clear vision for technology integration and offering professional development opportunities were the most strongly endorsed leadership strategies (both $M = 3.97$, $SD = 0.18$), consistent with Suryaman and Setiyani (2023) and Martín et al. (2023), who emphasize visionary leadership and continuous training as foundational to digital transformation. The lowest-rated item was effective resource allocation for technology initiatives ($M = 2.23$, $SD = 0.42$, Disagree), revealing a disconnect between strategic vision and the operational support needed to sustain and scale technology initiatives.

4. Technology Integration Implemented Across Administrative Domains

Table 4.1

Mean and Standard Deviation of Different Technology Integration Implemented in Terms of Administrative Functions

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. The school uses digital platforms to manage student	3.90	0.30	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
records and enrollment.			
2. Scheduling of meetings and events is facilitated through technology-based systems.	3.16	0.45	Agree
3. Administrative reports are generated using digital tools.	3.39	0.49	Agree
4. Technology supports policy implementation and decision-making.	3.25	0.47	Agree
5. Document management is streamlined through electronic filing systems.	3.85	0.40	Strongly Agree
6. Attendance of staff and students is monitored using digital platforms.	3.44	0.59	Agree
7. School heads use technology to track administrative compliance.	3.46	0.53	Agree
8. Resource allocation is guided by data from digital systems.	3.89	0.32	Strongly Agree
9. Administrative workflows are automated through technology.	3.84	0.37	Strongly Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
10. Technology integration has improved efficiency in school administration.	3.85	0.36	Strongly Agree
Grand Mean	3.60	0.43	Strongly Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Managing student records and enrollment ($M = 3.90$, $SD = 0.30$) and data-guided resource allocation ($M = 3.89$, $SD = 0.32$) were rated highest, consistent with Grepon et al. (2021) and Doctor (2022) on the value of centralized digital systems for accuracy and effective planning. Scheduling of meetings and events through technology-based systems was comparatively the lowest-rated item ($M = 3.16$, $SD = 0.45$, Agree), suggesting less consistent adoption of scheduling tools relative to record-keeping and resource-management systems.

Table 4.2

Mean and Standard Deviation of Different Technology Integration Implemented in Terms of Financial Functions

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. The school uses computerized systems for budgeting and financial planning.	3.43	0.53	Agree
2. Payroll is processed through digital or automated platforms.	3.39	0.49	Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
3. Financial reports are generated using technology-based systems.	3.31	0.50	Agree
4. Expenditures are tracked using digital tools.	3.33	0.47	Agree
5. Technology ensures transparency in financial transactions.	3.36	0.48	Agree
6. School heads use digital systems for auditing purposes.	2.39	0.67	Disagree
7. Procurement processes are supported by technology.	3.82	0.39	Strongly Agree
8. Financial data is securely stored in digital platforms.	3.89	0.32	Strongly Agree
9. Technology integration reduces errors in financial management.	3.85	0.36	Strongly Agree
10. Digital systems improve accountability in financial operations.	3.87	0.34	Strongly Agree
Grand Mean	3.46	0.46	Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Financial data security ($M = 3.89$, $SD = 0.32$) and accountability in financial operations ($M = 3.87$, $SD = 0.34$) were rated highest, reflecting confidence in digital systems for safeguarding and tracking financial transactions. Use of digital systems for auditing, however, was the lowest-rated item overall in this domain ($M = 2.39$, $SD = 0.67$, Disagree), pointing to a gap in digital auditing capacity that echoes findings from Grepon et al. (2021) and Castillo and Cay (2024) on the need for stronger digital oversight mechanisms.

Table 4.3

Mean and Standard Deviation of Different Technology Integration Implemented in Terms of Communication Functions

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. School-wide announcements are delivered through digital platforms (emails, SMS, school apps).	3.84	0.42	Strongly Agree
2. Virtual meetings (via Zoom, Teams, etc.) are regularly conducted with staff, parents, or students.	2.59	0.53	Agree
3. Online portals are used for disseminating official memos, policies, and updates.	3.26	0.60	Agree
4. Feedback and surveys are collected electronically from stakeholders to inform decision-making.	3.39	0.53	Agree
5. Internal chat or messaging	3.41	0.53	Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
systems (like Slack, MS Teams) facilitate real-time staff communication.			
6. Digital newsletters are published and shared with the school community.	3.26	0.60	Agree
7. Student information systems allow parents and teachers to communicate about student progress and concerns online.	3.39	0.53	Agree
8. Event coordination (scheduling, invitations, reminders) is managed through digital calendars and apps.	3.34	0.54	Agree
9. Incident or concern reporting is streamlined using online forms or platforms.	3.39	0.53	Agree
10. Professional development resources and training are communicated and accessed digitally by staff.	3.57	0.53	Strongly Agree
Grand Mean	3.35	0.53	Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

School-wide digital announcements ($M = 3.84$, $SD = 0.42$) and digitally accessed professional development resources ($M = 3.57$, $SD = 0.53$) were the most strongly endorsed items, while regularly held virtual meetings with staff, parents, or students was the lowest-rated ($M = 2.59$, $SD = 0.53$, Agree). This suggests that although digital platforms are effective for one-way dissemination of information, interactive and collaborative uses of technology remain comparatively underdeveloped, possibly due to connectivity constraints or a continued preference for face-to-face interaction (Raptis et al., 2023; Reis-Andersson, 2024).

Table 4.4

Mean and Standard Deviation of Different Technology Integration Implemented in Terms of Monitoring Functions

Indicators	Mean	Standard Deviation	Verbal Interpretation
1. Teacher performance is monitored using digital platforms.	3.36	0.55	Agree
2. Student progress is tracked through technology-based systems.	3.48	0.54	Agree
3. School operations are monitored using digital dashboards.	3.85	0.40	Strongly Agree
4. Compliance with policies is tracked through digital tools.	3.48	0.54	Agree
5. Technology supports evaluation of instructional practices.	3.46	0.53	Agree

Indicators	Mean	Standard Deviation	Verbal Interpretation
6. Monitoring reports are generated using digital systems.	3.49	0.54	Agree
7. Attendance monitoring is facilitated by technology.	3.43	0.59	Agree
8. School heads use technology to oversee project implementation.	2.41	0.50	Disagree
9. Technology integration improves accountability in monitoring processes.	3.52	0.54	Strongly Agree
10. Monitoring systems provide real-time data for decision-making.	3.25	0.47	Agree
Grand Mean	3.37	0.52	Agree

Note. 1.00–1.49 Strongly Disagree 1.50–2.49 Disagree 2.50–3.49 Agree 3.50–4.00 Strongly Agree

Digital dashboards for monitoring school operations received the highest rating ($M = 3.85$, $SD = 0.40$), while the use of technology to oversee project implementation was the lowest-rated item across the entire results section ($M = 2.41$, $SD = 0.50$, Disagree). This indicates that technology-driven oversight is well-established for routine operational monitoring but remains underutilized for tracking longer-term projects and initiatives (Grepon et al., 2021; Ong, 2024).

5. Significant Difference in Perceived Integration of Technology When Grouped According to Profile

Table 5

Kruskal–Wallis H and Mann–Whitney U Test of the Perceived Integration of Technology in School Administration When Grouped According to Profile

Profile	Domain	H / U	df	p	Interpretation	Decision
Age	Enhancing administrative efficiency	19.316	3	<.001	Significant	Reject Ho
	Improving communication and collaboration	12.548	3	.006	Significant	Reject Ho
	Supporting data-driven decision-making	19.308	3	<.001	Significant	Reject Ho
	Promoting transparency and accountability	44.049	3	<.001	Significant	Reject Ho
Sex	Enhancing administrative efficiency	274	—	.474	Not Significant	Fail to Reject Ho
	Improving communication and collaboration	275.5	—	.509	Not Significant	Fail to Reject Ho
	Supporting data-driven decision-making	208.5	—	.065	Not Significant	Fail to Reject Ho

Profile	Domain	H / U	df	p	Interpretation	Decision
	Promoting transparency and accountability	303.5	—	.876	Not Significant	Fail to Reject Ho
Education	Enhancing administrative efficiency	189.5	—	.332	Not Significant	Fail to Reject Ho
	Improving communication and collaboration	130.5	—	.031	Significant	Reject Ho
	Supporting data-driven decision-making	55.5	—	<.001	Significant	Reject Ho
	Promoting transparency and accountability	66	—	<.001	Significant	Reject Ho
Experience	Enhancing administrative efficiency	15.349	3	.002	Significant	Reject Ho
	Improving communication and collaboration	13.482	3	.004	Significant	Reject Ho
	Supporting data-driven decision-making	16.049	3	.001	Significant	Reject Ho
	Promoting	33.251	3	<.001	Significant	Reject Ho

Profile	Domain	H / U	df	p	Interpretation	Decision
	transparency and accountability					
ICT training	Enhancing administrative efficiency	0.601	4	.963	Not Significant	Fail to Reject Ho
	Improving communication and collaboration	6.649	4	.156	Not Significant	Fail to Reject Ho
	Supporting data-driven decision-making	25.83	4	<.001	Significant	Reject Ho
	Promoting transparency and accountability	25.913	4	<.001	Significant	Reject Ho

Note. Age, experience, and ICT training were tested using the Kruskal–Wallis H Test; sex and education were tested using the Mann–Whitney U Test. Significance level set at .05.

Significant differences in perceptions of technology integration were found across age groups in all four domains ($p < .001$ to $.006$) and across years of experience in all four domains ($p < .001$ to $.002$), indicating that age and experience are consistent predictors of differing perceptions — younger, less experienced administrators may show greater openness to technology relative to more tenured counterparts who rely on established practices. Education level yielded significant differences in three of the four domains (communication and collaboration, data-driven decision-making, and transparency and accountability), while ICT training was significant only for the more complex domains of data-driven decision-making and transparency and accountability. No significant differences were found by sex ($p = .065$ to $.876$), indicating that male and female school heads share similar perceptions of technology integration, consistent with Raptis et al. (2024).

6. Relationship Between Perceived Integration of Technology and Leadership Strategies and Practices

Table 6

Relationship Between the Perceived Integration of Technology and the Strategies and Practices Implemented in School Administration

Domain of Perceived Integration	Spearman's r	p (2-tailed)
Administrative efficiency	0.063	.630
Communication and collaboration	-0.180	.166
Supporting data-driven decision-making	-0.326*	.010
Promoting transparency and accountability	1.000**	<.001

Note. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

Leadership strategies and practices showed a near-perfect positive correlation with promoting transparency and accountability ($r = 1.000$, $p < .001$), a moderate significant negative correlation with supporting data-driven decision-making ($r = -0.326$, $p = .010$), and weak, non-significant correlations with administrative efficiency ($r = 0.063$, $p = .630$) and communication and collaboration ($r = -0.180$, $p = .166$). These results indicate that leadership strategies are most strongly and directly aligned with fostering transparency and accountability, while their relationship to data-driven decision-making is inverse — suggesting that strong leadership vision alone does not guarantee effective evidence-based practice unless paired with technical competence and infrastructure (Rasdi et al., 2024). The non-significant correlations with administrative efficiency and communication suggest these domains are shaped more by system availability and user adoption than by leadership strategy alone.

7. Proposed SMART-LEAD Program

Based on the findings, the SMART-LEAD Program — Strengthening Management and Administrative Readiness through Technology Leadership — is proposed as a structured, continuous capacity-building initiative for school heads and leadership teams. The program is organized around six interconnected components: Leadership Development (digital leadership workshops, peer mentoring, and leadership assessment); Data-Driven Decision-Making (data analytics, digital dashboards, and collaborative data review); Stakeholder Engagement (digital platforms, social media, and feedback mechanisms for community participation); Professional Development (ICT training, on-demand learning resources, and recognition of digital competencies); Monitoring and Accountability (digital dashboards, auditing tools, and project-tracking systems); and Inclusive Technology Planning (differentiated training, personalized technical support, and peer-buddy systems). Collectively, these components aim to establish a culture of technology-enabled, evidence-based, transparent, collaborative, and inclusive leadership in school administration.

D. DISCUSSION

The findings affirm that school heads in the Schools Division of Cavite Province possess a leadership profile — older, predominantly female, highly educated, experienced, and DepEd-trained — that provides a strong foundation for digital leadership, consistent with the Technology Leadership for the Twenty-first Century Principal framework's (Flanagan & Jacobsen, 2003) emphasis on vision-building and staff development as pillars of successful technology integration. Across nearly all domains, respondents strongly agreed that technology enhances administrative efficiency, communication, data-driven decision-making, and transparency, mirroring international and local evidence that digital leadership and distributed, collaborative practices bolster administrative adaptability (Raptis et al., 2022, 2024; Aziz & Rahman, 2023).

However, a consistent pattern emerged across nearly every results table: while routine, internally facing functions (record-keeping, reporting, internal communication, data storage) were rated as strongly integrated, functions requiring more advanced or externally facing technology use — real-time supervisory monitoring, social media engagement with parents, digital auditing, virtual meetings, and oversight of project implementation — were rated lower, several falling into the 'Disagree' range. This suggests that technology integration in school administration, at present, is uneven: it has matured in operational and reporting functions but lags in supervisory, financial-audit, and community-engagement functions. This finding parallels literature on digital transformation barriers, which links such gaps to infrastructure limitations, uneven digital literacy, and insufficient specialized training (Aditya et al., 2022; EDUCAUSE Review, 2021).

The significant differences in perception associated with age, experience, education, and (for select domains) ICT training — alongside the absence of significant differences by sex — indicate that readiness for digital leadership is shaped more by professional background and preparation than by demographic category alone. This is consistent with prior Philippine and international studies linking digital literacy and leadership readiness to educational attainment and targeted training rather than to sex (Padolina-Alcantara, 2023; Suryaman & Setiyani, 2023).

The correlational findings offer perhaps the most striking insight: leadership strategies correlate almost perfectly with perceptions of transparency and accountability, yet correlate negatively with perceptions of data-driven decision-making, and show no significant relationship with administrative efficiency or communication. Taken together, this implies that visionary, policy-driven leadership strongly shapes how technology is perceived as fostering openness and accountability, but that translating leadership vision into effective, data-informed administrative practice requires more than vision alone — it requires resource allocation, technical infrastructure, and sustained capacity-building, echoing Rasdi et al. (2024).

E. CONCLUSION

Based on the findings, the study concludes that school heads in the Schools Division of Cavite Province are demographically well-positioned — experienced, well-educated, and ICT-trained — to champion digital transformation in school administration, and that they strongly perceive technology as effective in streamlining administrative operations, enhancing communication, strengthening data-driven decision-making, and promoting transparency and accountability. Clear leadership vision and professional development emerged as the most strongly endorsed leadership strategies, underscoring their centrality to successful technology integration.

At the same time, the study concludes that resource allocation, digital auditing, real-time supervisory monitoring, parental engagement through online platforms, and oversight of project implementation remain the weakest links in the current technology integration landscape, indicating that these areas warrant priority attention. The study further concludes that demographic factors — particularly age, experience, and educational attainment — meaningfully shape how school heads perceive technology integration, while sex does not, suggesting that professional development interventions should be differentiated by career stage and training background rather than by sex.

Finally, the study concludes that leadership strategies alone are not sufficient to guarantee effective technology-enabled administration across all domains; while leadership vision strongly drives perceptions of transparency and accountability, it must be paired with adequate resource allocation and technical capacity-building to meaningfully advance data-driven decision-making, administrative efficiency, and communication. The proposed SMART-LEAD Program is offered

as a structured response to these findings, providing a framework for strengthening digital leadership, data-informed practice, stakeholder engagement, and inclusive, sustained technology integration in school administration.

Recommendations

Based on the conclusions drawn, the following recommendations are offered:

1. Develop and implement a structured digital leadership program for school heads and teachers that includes ICT certification, ongoing mentorship, and opportunities to lead digital pilot projects, reinforcing their role as digital change agents.
2. Establish a school-wide digital innovation committee composed of school heads, teachers, and student representatives to regularly review and improve digital practices and sustain a culture of digital maturity and innovation.
3. Require school leaders to create and communicate a clear, actionable vision for technology integration, paired with mandatory, regularly scheduled professional development sessions on current digital tools and instructional technology.
4. Invest in comprehensive digital platforms that integrate administrative, financial, communication, and monitoring functions, with hands-on training for staff and periodic evaluation to address gaps such as digital auditing and project-implementation oversight.
5. Design differentiated professional development pathways that consider age, education, and ICT experience, offering personalized support such as peer coaching, digital learning modules, and flexible training schedules.
6. Promote leadership strategies that explicitly prioritize data-driven decision-making and organizational transparency, while simultaneously strengthening systemic supports such as infrastructure and collaborative culture to enhance administrative efficiency and communication.
7. Pilot and evaluate the proposed SMART-LEAD Program, involving school heads and teachers in its design and evaluation, and encourage future researchers to study its impact on sustaining digital transformation in school administration.

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