IGNATIAN
INTERNATIONAL JOURNAL FOR MULTIDISCIPLINARY RESEARCH
www.icceph.com
ISSN 2984-9942

TECHNOLOGY INTEGRATION IN SCHOOL MANAGEMENT AND ADMINISTRATIVE EFFICIENCY IN PUBLIC ELEMENTARY SCHOOLS: A QUANTITATIVE STUDY

Ricardo Jr. G. Vidal

Doctor of Education Major in Educational Management Program,
Graduate School, Bataan Peninsula State University- Main Campus
Balanga City, Bataan, Philippines

ABSTRACT

This study examined the level of technology integration in school management and its relationship with administrative efficiency in public elementary schools in the Mariveles District, Division of Bataan, during School Year 2025–2026. A quantitative descriptive-correlational design was employed. The respondents were 18 school heads selected through total enumeration and 157 teachers selected through stratified random sampling, for a total of 175 participants. Data was gathered using a validated questionnaire covering digital record management, communication and information flow, scheduling and monitoring systems, online reporting and documentation tools, timeliness, record accuracy and reliability, decision-making efficiency, and operational productivity. Frequency, percentage, weighted mean, standard deviation, Mann–Whitney U test, Kruskal–Wallis H test, Pearson correlation, and regression analysis were used. Technology integration was rated highly integrated (M = 3.52, SD = 0.41), while administrative efficiency was rated highly efficient (M = 3.53, SD = 0.42). Significant differences in technology integration were found according to age and educational attainment, while sex and years of service showed no significant overall differences. Technology integration had a strong positive relationship with administrative efficiency ($r = .805$, $p < .001$) and explained 67.0% of its variance ($R^2 = .670$). The findings indicate that purposeful use of digital systems supports faster processing, improved information access, reliable records, and more productive school operations. A Technology Integration Enhancement Plan is recommended to strengthen standardization, staff capability, data quality, and sustained digital governance.

Keywords: *technology integration, school management, administrative efficiency, digital governance, public elementary schools*

INTRODUCTION

Digital technology has reshaped educational administration by enabling faster communication, organized records, online reporting, and data-supported decisions. In public elementary schools, these functions are especially important because school heads and teachers must meet instructional responsibilities while complying with recurring administrative and reporting requirements. When digital tools are aligned with actual workflows, they can reduce repetitive tasks and make information more accessible, accurate, and useful for school improvement.

International and national education frameworks emphasize digital transformation as a means of strengthening institutional effectiveness. The Organisation for Economic Co-operation and Development highlighted the importance of digital capacity and evidence-based governance in education systems, while the Department of Education's Basic Education Development Plan 2030 identifies digitalization and innovation as important directions for improving basic education delivery (Department of Education, 2021; OECD, 2020). These directions make it necessary to examine not only whether schools use technology, but also whether its use produces measurable administrative benefits.

Despite expanding access to digital platforms, implementation may remain uneven. Schools may use electronic records, messaging applications, scheduling tools, and online submission systems at different levels of consistency. Infrastructure, user capability, leadership support, data standards, and the fit between a tool and an administrative task can influence results. Local evidence is therefore needed to identify which dimensions are already strong and which require focused improvement.

The study is anchored in the Technology Acceptance Model, Diffusion of Innovations Theory, and Systems Theory. The Technology Acceptance Model explains how perceived usefulness and ease of use influence actual technology utilization (Davis, 1989). Diffusion of Innovations Theory describes how innovations spread within an organization and how relative advantage, compatibility, complexity, trialability, and observability shape adoption (Rogers, 2003). Systems Theory views a school as a set of interdependent functions, suggesting that improvements in records, communication, monitoring, and reporting can influence the efficiency of the whole organization (von Bertalanffy, 1968).

Accordingly, this study investigated technology integration in public elementary school management and its association with administrative efficiency. The findings are intended to support evidence-based planning, staff development, workflow standardization, and responsible digital governance in basic education.

Research Questions

This study aimed to examine the influence of technology integration in school management on the administrative efficiency of public elementary school administrators in public elementary schools using a descriptive-correlational quantitative research design.

Specifically, it sought to answer the following questions:

1. How may the school heads and teachers describe their demographic profile in terms of:
    1.1 age;
    1.2 sex;
    1.3. position;
    1.4 length of service; and
    1.5 educational attainment?
2. What is the level of technology integration in school management in terms of:
    2.1 digital record management;
    2.2 communication and information flow;
    2.3 scheduling and monitoring systems; and
    2.4 online reporting and documentation tools?
3. What is the level of administrative efficiency in terms of:
    3.1 timeliness;
    3.2 accuracy and reliability;
    3.3 decision-making efficiency; and
    3.4 productivity?
4. Are there significant differences in the level of technology integration when respondents are grouped according to their profile variables?
5. Is there a significant relationship between technology integration and administrative efficiency?
6. To what extent does technology integration significantly predict administrative efficiency?
7. Based on the results, what Technology Integration Enhancement Plan may be developed?

Hypotheses of the Study

1. There is no significant difference in the level of technology integration in school management when respondents are grouped according to their demographic profile
2. There is no significant relationship between technology integration in school management and administrative efficiency in public elementary schools.

METHODOLOGY

Research Design and Locale

The study used a quantitative descriptive-correlational design to describe the study variables, test group differences, determine their relationship, and estimate the predictive influence of technology integration on administrative efficiency. It was conducted in 18 public elementary schools in the Mariveles District, Division of Bataan, during School Year 2025–2026. No variable was manipulated, and responses were obtained from participants in their natural school setting.

Respondents and Sampling

The respondents consisted of 18 school heads and 157 teachers, for a total of 175 participants. All school heads were included through total enumeration. Teachers were selected through stratified random sampling with proportional allocation across the 18 schools, followed by random selection within each school. This approach provided representation from schools of different sizes while preserving each eligible teacher's opportunity to participate.

Research Instrument

A structured questionnaire was adapted and modified from literature on technology integration and school administration. Part I covered demographic characteristics. Part II measured technology integration across four dimensions, and Part III measured administrative efficiency across four dimensions. Parts II and III used a four-point scale from 1 (Strongly Disagree) to 4 (Strongly Agree). Composite means of 3.25–4.00 were interpreted as Highly Integrated or Highly Efficient; 2.50–3.24 as Integrated or Efficient; 1.75–2.49 as Less Integrated or Less Efficient; and 1.00–1.74 as Not at All Integrated or Not at All Efficient. The instrument underwent expert content review and pilot testing. Internal consistency was evaluated through Cronbach's alpha, with .70 set as the minimum acceptable criterion.

Data Gathering and Ethical Considerations

Required institutional permissions were secured before data collection. Participants received an explanation of the study, provided informed consent, and were informed that participation was voluntary and that they could withdraw without penalty. No, personally identifying information was reported. Completed questionnaires were checked for completeness, encoded, and stored securely. Data was used only for educational research purposes, and results were reported in aggregate form.

Data Analysis

Frequency and percentage described respondent profiles. Weighted mean and standard deviation summarized technology integration and administrative efficiency. Because the grouped data did not meet the assumption of normality, Mann–Whitney U and Kruskal–Wallis H tests were used for differences across profile groups. Pearson's r measured the relationship between the main variables, and simple linear regression estimated the predictive contribution of technology integration. All inferential tests used an alpha level of .05.

Scope and Limitations

The study focused on school management rather than classroom instruction and included only public elementary school heads and teachers in the district. Findings reflect self-reported perceptions collected during one school year and may not represent private schools, secondary schools, non-teaching personnel, parents, or learners. The regression result indicates statistical prediction, not proof of causation; infrastructure,

leadership, organizational culture, and other unmeasured factors may also influence administrative efficiency.

RESULTS

Part I. Profile of the Respondents

Table 1 presents the profile of the respondents in terms of age, sex, position, length of service.

Table 1. Profile

Profile	*f*	%
Age		
20 to 29 years old	51	29.14
30 to 39 years old	81	46.29
40 to 49 years old	34	19.43
60 years old and above	9	5.14
Sex		
Male	24	13.71
Female	151	86.29
Position		
Teacher	157	89.71
School Head	18	10.29
Length of Service		
Less than 5 years	47	26.86
5 to 10 years	34	19.43
11 to 15 years	31	17.71
16 to 20 years	15	8.57
more than 20 years	48	27.43
Highest Educational Attainment		
Bachelor's Degree	44	25.14
Bachelor's Degree with MA Units	86	49.14
Master's Degree	22	12.57
Master's Degree with Doctoral Units	19	10.86
Doctorate Degree	4	2.29

Number of Cases = 175

In terms of age, the largest group consisted of respondents aged 30 to 39 years old, with 81 respondents or 46.29% of the total. This was followed by those aged 20 to 29 years old, comprising 51 respondents or 29.14%. Meanwhile, 34 respondents or 19.43% were aged 40 to 49 years old, while 9 respondents or 5.14% were 60 years old and above.

With respect to sex, the majority of the respondents were female, numbering 151 or 86.29%. In comparison, 24 respondents or 13.71% were male. This shows that female respondents substantially outnumbered male respondents in the study.

In terms of position, most of the respondents were teachers, with 157 respondents or 89.71%. On the other hand, 18 respondents or 10.29% were school heads.

Regarding length of service, the largest group had rendered more than 20 years of service, consisting of 48 respondents or 27.43%. This was followed by those with less than 5 years of service, with 47 respondents or 26.86%. Moreover, 34 respondents or 19.43% had served for 5 to 10 years, while 31 respondents or 17.71% had 11 to 15 years of service. The smallest group consisted of respondents with 16 to 20 years of service, numbering 15 or 8.57%

In terms of highest educational attainment, the largest group consisted of respondents with a Bachelor's Degree with Master's Degree units, comprising 86 respondents or 49.14% of the total. This was followed by respondents who had completed a Bachelor's Degree, with 44 respondents or 25.14%.

Meanwhile, 22 respondents or 12.57% had earned a Master's Degree, while 19 respondents or 10.86% had a Master's Degree with Doctoral units. Only 4 respondents or 2.29% had completed a Doctorate Degree.

The profile indicates that the respondent group is predominantly female, composed mainly of teachers, and concentrated in the 30–39 age bracket. Nearly three-fourths have pursued education beyond the bachelor's degree, while the distribution of years in service includes both beginning and highly experienced personnel. From the researcher's observation, this composition provides viewpoints from employees who are actively involved in day-to-day school operations and from personnel with extensive institutional experience. However, because teachers and female respondents constitute large majorities, the findings should be interpreted as more reflective of their experiences than those of school heads and male personnel.

This pattern is consistent with studies suggesting that demographic characteristics can shape exposure to, confidence in, and use of technology, although training and organizational support may lessen these differences. Akram et al. (2022) reported that demographic factors influence ICT use among school leaders, while Hero (2020) emphasized the role of continuous capacity building in improving administrators' technological competence. Likewise, Inan and Lowther (2021) noted that length of service may affect ICT utilization, and Ertmer and Ottenbreit (2022) linked educational attainment with confidence and efficiency in using digital platforms.

Part II. Technology Integration

Part II describes the level of technology integration in school management in terms of digital record management; communication and information flow; scheduling and monitoring systems; and online reporting and documentation tools.

Table 2. Technology Integration

Indicators	Mean	SD	DI
1. School records are stored using digital systems.	3.55	0.56	Strongly Agree
2. Learner information can be easily accessed through electronic databases.	3.54	0.55	Strongly Agree
3. Digital platforms are regularly used to update school records.	3.49	0.58	Strongly Agree
4. Electronic filing systems reduce paperwork in the school.	3.53	0.58	Strongly Agree
5. Digital record systems improve the security of school documents.	3.53	0.52	Strongly Agree
Digital Record Management	**3.53**	**0.44**	**Highly Integrated**
6. Digital communication platforms are commonly used in the school.	3.49	0.55	Strongly Agree
7. Important announcements are disseminated efficiently through technology.	3.54	0.54	Strongly Agree
8. Communication among teachers, administrators, and stakeholders is enhanced through technology.	3.58	0.50	Strongly Agree
9. Online messaging tools facilitate immediate information sharing.	3.58	0.54	Strongly Agree
10. Technology minimizes delays in communication within the school.	3.51	0.59	Strongly Agree
Communication and Information Flow	**3.54**	**0.43**	**Highly Integrated**
11. Digital tools are used in scheduling school activities.	3.53	0.54	Strongly Agree
12. Technology helps monitor the implementation of school programs.	3.53	0.51	Strongly Agree
13. Attendance and performance monitoring are facilitated through technology.	3.50	0.55	Strongly Agree
14. School activities are tracked effectively using digital systems.	3.49	0.56	Strongly Agree
15. Technology improves coordination of schedules among personnel.	3.55	0.52	Strongly Agree
Scheduling and Monitoring Systems	**3.52**	**0.46**	**Highly Integrated**
16. Online reporting systems are regularly utilized in the school.	3.46	0.57	Strongly Agree
17. Technology facilitates the preparation of reports and documents.	3.54	0.52	Strongly Agree
18. Online tools improve the accuracy of submitted reports.	3.54	0.54	Strongly Agree
19. Electronic submission of reports reduces administrative workload.	3.50	0.57	Strongly Agree
20. Online documentation systems improve record accessibility and retrieval.	3.53	0.58	Strongly Agree

Online Reporting and Documentation Tools	**3.51**	**0.47**	**Highly Integrated**
Overall	**3.52**	**0.41**	**Highly Integrated**

Legend: 3.25-4.00 Strongly Agree | Highly Integrated; 2.50-3.24 Agree | Integrated; 1.75-2.49 Disagree | Less Integrated; 1.00-1.74 Strongly Disagree | Not at All Integrated

Digital record management obtained a mean of 3.53 with a standard deviation of 0.44, interpreted as Highly Integrated. All indicators were rated Strongly Agree, with mean scores ranging from 3.49 to 3.55. The highest-rated indicator was that school records are stored using digital systems with a mean of 3.55, followed by the accessibility of learner information through electronic databases with a mean of 3.54. The lowest-rated indicator was the regular use of digital platforms to update school records, which obtained a mean of 3.49.

Communication and information flow received the highest dimension mean of 3.54, with a standard deviation of 0.43, and was interpreted as Highly Integrated. All indicators were rated Strongly Agree, with means ranging from 3.49 to 3.58. The highest ratings were recorded for the statements that technology enhances communication among teachers, administrators, and stakeholders and that online messaging tools facilitate immediate information sharing, both with a mean of 3.58.

Scheduling and monitoring systems obtained a mean of 3.52 and a standard deviation of 0.46, interpreted as Highly Integrated. The indicator means ranged from 3.49 to 3.55, and all were interpreted as Strongly Agree. The highest-rated statement was that technology improves the coordination of schedules among personnel, with a mean of 3.55. This was followed by the use of digital tools in scheduling school activities and the use of technology to monitor school programs, both with a mean of 3.53.

Online reporting and documentation tools obtained a mean of 3.51 and a standard deviation of 0.47, interpreted as Highly Integrated. The indicator means ranged from 3.46 to 3.54, with all items receiving a Strongly Agree interpretation. The highest-rated indicators were that technology facilitates the preparation of reports and documents and improves the accuracy of submitted reports, both with a mean of 3.54. The lowest-rated indicator was the regular utilization of online reporting systems, which obtained a mean of 3.46.

Overall, the results demonstrate that digital technology was highly integrated into school administrative processes, with an overall mean of 3.52 and standard deviation of 0.41. Among the four dimensions, Communication and Information Flow received the highest mean of 3.54, followed by Digital Record Management with 3.53, Scheduling and Monitoring Systems with 3.52, and Online Reporting and Documentation Tools with 3.51.

The consistently high ratings across all four dimensions indicate that technology has become embedded in routine school management rather than being used only for isolated tasks. Communication and information flow emerged as the strongest dimension, suggesting that respondents most readily experience the immediate benefits of digital messaging and rapid exchange of information. Nevertheless, the comparatively lower ratings for the regular updating of digital records and regular use of online reporting systems identify areas where implementation may still be uneven. As observed by the

researcher, schools appear digitally connected, but they may still need standardized procedures, scheduled updating, system interoperability, and continuing technical support to make technology use equally strong across all administrative functions.

The result supports Ronquillo et al. (2022), who found that digital record systems reduce paperwork and improve information accessibility, and Asio et al. (2022), who identified effective information flow as a predictor of administrative efficiency.

It also agrees with UNESCO (2023), who reported that automated scheduling improves workload management, and Ronquillo et al. (2022), who emphasized that web-based documentation tools strengthen transparency and reporting processes. Collectively, these studies support the finding that technology integration can improve records management, communication, monitoring, and documentation.

Part III. Administrative Efficiency

Part II describes the level of administrative efficiency in school management in terms of timeliness; accuracy and reliability; decision-making efficiency; and productivity.

Table 3. Administrative Efficiency

Indicators	Mean	SD	DI
1. Administrative reports are submitted on time.	3.50	0.55	Strongly Agree
2. School documents are processed efficiently.	3.57	0.52	Strongly Agree
3. Administrative requests are addressed promptly.	3.54	0.53	Strongly Agree
4. Deadlines for school operations are consistently met.	3.48	0.53	Strongly Agree
5. Technology contributes to faster completion of administrative tasks.	3.58	0.54	Strongly Agree
Timeliness of Administrative Tasks	**3.53**	**0.45**	**Highly Efficient**
6. School records are accurate and updated.	3.54	0.52	Strongly Agree
7. Errors in school records are minimal.	3.41	0.56	Strongly Agree
8. Data retrieval is reliable and efficient.	3.51	0.55	Strongly Agree
9. School records are properly maintained and organized.	3.52	0.54	Strongly Agree
10. Digital systems help ensure the accuracy of school records.	3.56	0.53	Strongly Agree
Accuracy and Reliability of School Records	**3.51**	**0.46**	**Highly Efficient**
11. School administrators have timely access to needed information.	3.54	0.51	Strongly Agree
12. Data from digital systems support decision-making processes.	3.47	0.53	Strongly Agree
13. Technology enables faster identification of school concerns.	3.53	0.52	Strongly Agree
14. Administrative decisions are based on accurate and updated data.	3.50	0.53	Strongly Agree
15. Technology improves the quality of school management decisions.	3.56	0.51	Strongly Agree

Decision-Making Efficiency	**3.52**	**0.46**	**Highly Efficient**
16. School operations are carried out efficiently.	3.57	0.50	Strongly Agree
17. Technology reduces the workload of school personnel.	3.53	0.51	Strongly Agree
18. Technology contributes to better utilization of resources.	3.57	0.50	Strongly Agree
19. Administrative tasks are completed with minimal delays.	3.50	0.53	Strongly Agree
20. Technology enhances the overall productivity of school operations.	3.51	0.55	Strongly Agree
Overall Productivity of School Operations	**3.54**	**0.45**	**Highly Efficient**
Overall	**3.53**	**0.42**	**Highly Efficient**

Legend: 3.25-4.00 Strongly Agree | Highly Efficient; 2.50-3.24 Agree | Efficient; 1.75-2.49 Disagree | Less Efficient; 1.00-1.74 Strongly Disagree | Not at All Efficient

Timeliness of administrative tasks obtained a mean of 3.53 with a standard deviation of 0.45, interpreted as Highly Efficient. The indicator means ranged from 3.48 to 3.58, and all items were rated Strongly Agree. The highest-rated indicator was that technology contributes to faster completion of administrative tasks, with a mean of 3.58. This was followed by the efficient processing of school documents, which obtained a mean of 3.57, and the prompt handling of administrative requests, with a mean of 3.54. The lowest-rated indicator was that deadlines for school operations are consistently met, with a mean of 3.48.

Accuracy and reliability of school records received a mean of 3.51 and a standard deviation of 0.46, interpreted as Highly Efficient. The means for the individual indicators ranged from 3.41 to 3.56, with all indicators interpreted as Strongly Agree. The highest-rated indicator was that digital systems help ensure the accuracy of school records, with a mean of 3.56. This was followed by the statement that school records are accurate and updated, with a mean of 3.54. The lowest-rated indicator was that errors in school records are minimal, which obtained a mean of 3.41.

Decision-making efficiency obtained a mean of 3.52 with a standard deviation of 0.46, interpreted as Highly Efficient. The indicator means ranged from 3.47 to 3.56, and all items received a Strongly Agree interpretation. The highest-rated indicator was that technology improves the quality of school management decisions, with a mean of 3.56. This was followed by the timely access of school administrators to needed information, with a mean of 3.54. The lowest-rated indicator was that data from digital systems support decision-making processes, with a mean of 3.47.

Overall productivity of school operations obtained the highest dimension mean of 3.54, with a standard deviation of 0.45, and was interpreted as Highly Efficient. The indicator means ranged from 3.50 to 3.57, with all statements rated Strongly Agree. The highest ratings were recorded for the efficient conduct of school operations and the better utilization of resources, both with a mean of 3.57. Technology's contribution to reducing the workload of school personnel obtained a mean of 3.53, while its contribution to the overall productivity of school operations received a mean of 3.51. The lowest-rated indicator was that administrative tasks are completed with minimal delays, with a mean of 3.50.

Overall, the administrative operations of the school were assessed as Highly Efficient, with a composite mean of 3.53 and standard deviation of 0.42. Among the four dimensions, Overall Productivity of School Operations obtained the highest mean of 3.54, followed by Timeliness of Administrative Tasks with 3.53, Decision-Making Efficiency with 3.52, and Accuracy and Reliability of School Records with 3.51.

The high composite rating for administrative efficiency suggests that respondents generally experience school processes as timely, accurate, responsive, and productive. Productivity received the highest dimension mean, showing that technology is perceived as particularly useful in carrying out operations and utilizing resources. However, the relatively lower ratings for minimizing record errors, using digital data to support decisions, and consistently meeting deadlines suggest that efficiency gains are not yet uniform. From the researcher's perspective, digital tools have accelerated administrative work, but stronger data-validation protocols, dashboard use, deadline monitoring, and staff training are still needed to convert available digital information into consistently error-free and evidence-based operations.

These findings corroborate Abulencia et al. (2022), who found that integrated digital workflows improve the timeliness of administrative tasks, and Ronquillo et al. (2022), who reported that digital record management improves data accuracy and reliability.

The results are also supported by Asio et al. (2022), who explained that digital management systems provide faster access to decision-making, and Abulencia et al. (2022), who found that digital systems improve operational productivity by reducing manual workload and enhancing task completion.

Part IV. Comparison of the Level of Technology Integration

Part IV presents the degree of differences in the respondents' perception on the level of technology integration when they are grouped according to profile.

Table 4. Level of Technology Integration vis-à-vis Age

Variables	Group	Mean	Mean Rank	H	Sig.	Decision on H_o	Interpretation
Digital Record Management	20 to 29 years old	3.40	73.17	9.07	0.03	Reject	Significant
	30 to 39 years old	3.61	96.27				
	40 to 49 years old	3.49	82.68				
	60 years old and above	3.73	110.56				
	20 to 29 years old	3.45	79.25	7.86	0.04	Reject	Significant
	30 to 39 years old	3.63	97.53				

Communication and Information Flow	40 to 49 years old	3.44	73.74				
	60 years old and above	3.65	97.06				
Scheduling and Monitoring Systems	20 to 29 years old	3.41	76.46	9.31	0.03	Reject	Significant
	30 to 39 years old	3.62	97.46				
	40 to 49 years old	3.40	75.88				
	60 years old and above	3.70	106.44				
Online Reporting and Documentation Tools	20 to 29 years old	3.35	72.16	14.06	0.01	Reject	Significant
	30 to 39 years old	3.65	100.69				
	40 to 49 years old	3.41	75.40				
	60 years old and above	3.68	103.25				
Overall	20 to 29 years old	3.40	73.28	12.15	0.01	Reject	Significant
	30 to 39 years old	3.63	100.11				
	40 to 49 years old	3.43	75.03				
	60 years old and above	3.69	103.44				

at .05 level of Sig.

The findings of the analysis using the Kruskal Wallis H-test, a non-parametric test which is appropriately used since the data failed the assumption of normality, reveal that there exist a significant differences in the respondents perception on the level of technology integration in terms of digital record management (H=9.07, p=.03), communication and information flow (H=7.86, p=.04), scheduling and monitoring systems (H=9.31, p=.03), and Online Reporting and Documentation Tools (H=14.06, p=.01), when respondents were grouped according to age. This was further confirmed by the overall H-coefficient of 12.15, significant at .01, which is statistically lesser than the alpha of .05, thus rejecting the null hypothesis.

Further analysis using Dunn's test, a post comparison test shows that the difference is found between the age of 60 years old and above with the mean 3.69 and a mean rank of 103.44 and the age group of 20 to 29 years old with a mean of 3.40 and a mean rank of 73.28.

The statistically significant differences by age indicate that respondents do not perceive technology integration in the same way across age groups. The higher overall rating of respondents aged 60 years and above than those aged 20–29 years suggests that age alone should not be treated as a barrier to effective technology use. From the researcher's observation, senior personnel may have developed stronger appreciation of digital systems because they can directly compare current technology-enabled processes with earlier manual practices. Still, the small number of respondents aged 60 and above

means that this result should be interpreted cautiously and should not be generalized as proof that older personnel are universally more technologically proficient.

The finding partly contrasts with Fasbender et al. (2023) and Ertmer and Ottenbreit-Leftwich (2022), who reported that younger personnel often adapt more quickly to digital platforms. However, those studies also emphasized that training, mentoring, experience, and institutional support can reduce age-related gaps. The present result therefore suggests that sustained exposure and organizational support may enable older personnel to value and use school-management technologies effectively, consistent with the Technology Acceptance Model's emphasis on perceived usefulness and ease of use (Davis, 1989).

Table 5. Level of Technology Integration vis-à-vis Sex

Variables	Group	Mean	Mean Rank	U	Sig.	Decision on H_o	Interpretation
Digital Record Management	Male	3.52	89.38	1779.00	0.88	Failed to Reject	Not Significant
	Female	3.53	87.78				
Communication and Information Flow	Male	3.56	89.13	1785.00	0.90	Failed to Reject	Not Significant
	Female	3.54	87.82				
Scheduling and Monitoring Systems	Male	3.54	91.06	1738.50	0.74	Failed to Reject	Not Significant
	Female	3.51	87.51				
Online Reporting and Documentation Tools	Male	3.49	88.00	1812.00	0.99	Failed to Reject	Not Significant
	Female	3.52	88.00				
Overall	Male	3.53	86.67	1780.00	0.89	Failed to Reject	Not Significant
	Female	3.52	88.21				

at .05 level of Sig.

The result of the analysis using the Mann Whitney U-test, a non-parametric test after the data failed the assumption of normality, data reveal that there exist not enough evidence that suggest thar there exist a significant difference in terms of digital record management (U=1779.00, p=.88), communication and information flow (U=1785.00, p=.90), scheduling and monitoring systems (U=1738.50, p=0.74), and online reporting and documentation tools (U=1812.00, p=0.99),, when respondent were grouped according to sex. This was further proven by the overall U-coefficient of 1780.00, significant at .89, which is statistically greater that alpha of .05, thus failing to reject the null hypothesis.

The absence of statistically significant differences by sex indicates that male and female respondents have comparable perceptions of technology integration across records management, communication, scheduling, monitoring, and online reporting. Although the group sizes are unequal, the nearly identical means and mean ranks

suggest that sex is not a meaningful basis for differentiating access to or use of technology in the participating schools. From the researcher's perspective, this may reflect relatively equal exposure to the same digital platforms, reporting requirements, and school-based technology practices.

This result supports Gebhardt et al. (2023), who argued that sex does not directly determine ICT effectiveness and that experience, training, and access to resources are more influential. It is also consistent with Inan and Lowther (2021), who found that differences between male and female school administrators were minimal and did not significantly affect overall administrative performance. Ertmer and Ottenbreit-Leftwich (2022) similarly emphasized that inclusive training and institutional support can bridge gender-based differences in technology adoption.

Table 6. Level of Technology Integration vis-à-vis Position

Variables	Group	Mean	Mean Rank	U	Sig.	Decision on H_o	Interpretation
Digital Record Management	Teacher	3.54	89.81	1128.50	0.15	Failed to Reject	Not Significant
	School Head	3.40	72.19				
Communication and Information Flow	Teacher	3.57	90.98	945.50	0.02	Reject	Significant
	School Head	3.30	62.03				
Scheduling and Monitoring Systems	Teacher	3.53	88.86	1278.00	0.49	Failed to Reject	Not Significant
	School Head	3.41	80.50				
Online Reporting and Documentation Tools	Teacher	3.54	90.96	948.00	0.02	Reject	Significant
	School Head	3.30	62.17				
Overall	Teacher	3.54	90.25	1060.00	0.08	Failed to Reject	Not Significant
	School Head	3.35	68.39				

at .05 level of Sig.

The result of the analysis using the Mann Whitney U-test, a non-parametric test after the data failed the assumption of normality, data reveal that there exist not enough evidence that suggest thar there exist a significant difference in terms of digital record management (U=1128.50, p=.15), and scheduling and monitoring systems (U=1278.00, p=0.49), when respondent were grouped according to sex. This was further proven by the overall U-coefficient of 1780.00, significant at .89, which is statistically greater that alpha of .05, thus failing to reject the null hypothesis.

However, significant difference is found in the responses of the teachers and school heads in terms of communication and information flow (U=945.50, p=.02), and online reporting and documentation tools (U=948.00, p=0.02), provided by the p-value of less than the alpha of .05, thus, failing to reject the null hypothesis.

The findings show that position produces differences in specific dimensions but not in overall technology integration. Teachers rated communication and information flow and online reporting and documentation significantly higher than school heads, possibly because teachers more frequently use messaging platforms, encode data, prepare reports, and submit documents as part of daily operations. School heads, by contrast, may evaluate these systems from an oversight and compliance perspective and may therefore be more critical. The non-significant overall difference indicates that both groups remain generally exposed to and engaged with school-management technology, although their roles shape how they experience particular digital functions.

This interpretation is consistent with Machado and Chung (2021), who explained that organizational position influences the type and level of technology engagement, and with Thannimalai and Raman (2022), who distinguished the strategic role of senior administrators from the operational role of personnel who implement digital processes. Abulencia et al. (2022), likewise reported that Philippine school heads tend to use technology for planning and monitoring, while teachers and staff more often handle encoding, reporting, and digital records. These role differences help explain the significant gaps in communication and online reporting despite the non-significant overall comparison.

Table 7. Level of Technology Integration vis-à-vis Years in Service

Variables	Group	Mean	Mean Rank	H	Sig.	Decision on H_o	Interpretation
Digital Record Management	Less than 5 years	3.44	78.02	6.81	0.15	Failed to Reject	Not Significant
	5 to 10 years	3.46	82.18				
	11 to 15 years	3.61	97.66				
	16 to 20 years	3.44	76.90				
	more than 20 years	3.63	99.13				
Communication and Information Flow	Less than 5 years	3.49	83.49	3.35	0.50	Failed to Reject	Not Significant
	5 to 10 years	3.58	94.32				
	11 to 15 years	3.55	86.71				
	16 to 20 years	3.40	71.57				
	more than 20 years	3.60	93.91				
	Less than 5 years	3.48	84.35	2.19	0.70	Failed to Reject	Not Significant
	5 to 10 years	3.51	87.37				

Scheduling and Monitoring Systems	11 to 15 years	3.46	83.10				
	16 to 20 years	3.45	83.67				
	more than 20 years	3.61	96.54				
Online Reporting and Documentation Tools	Less than 5 years	3.41	78.99				
	5 to 10 years	3.56	93.87				
	11 to 15 years	3.54	89.03	5.49	0.24	Failed to Reject	Not Significant
	16 to 20 years	3.39	71.60				
	more than 20 years	3.60	97.13				
Overall	Less than 5 years	3.46	79.62				
	5 to 10 years	3.53	89.40				
	11 to 15 years	3.54	89.69	5.06	0.28	Failed to Reject	Not Significant
	16 to 20 years	3.42	72.47				
	more than 20 years	3.61	98.98				

at .05 level of Sig.

The findings of the analysis using the Kruskal Wallis H-test, a non-parametric test which is appropriately used since the data failed the assumption of normality, reveal that there exist no significant differences in the respondents perception on the level of technology integration in terms of digital record management (H=6.81, p=.15), communication and information flow (H=3.35, p=.50), scheduling and monitoring systems (H=2.19, p=.70), and Online Reporting and Documentation Tools (H=5.49, p=.24), when respondents were grouped according to years in service. This was further confirmed by the overall H-coefficient of 5.06, significant at .28, which is statistically greater than the alpha of .05, thus failing to reject the null hypothesis.

The non-significant differences across years-in-service groups indicate that technology integration is experienced in broadly similar ways by both newer and more experienced personnel. Although respondents with more than 20 years of service obtained the highest overall mean, the differences were not large enough to be statistically significant. From the researcher's observation, common reporting requirements, school-wide platforms, peer assistance, and repeated exposure to digital tools may have created a shared level of technology use regardless of tenure. The finding also suggests that long service does not necessarily hinder technology adoption when appropriate support is available.

This result supports Ertmer and Ottenbreit-Leftwich (2022), who explained that targeted professional development and mentoring can overcome reluctance associated with longer service. It is also consistent with Rosales (2021), who found that continuous ICT training and peer support reduce gaps between novice and experienced personnel. Inan and Lowther (2021) similarly noted that experience can strengthen effective technology use when combined with sustained professional development.

Table 8. Level of Technology Integration vis-à-vis Highest Educational Attainment

Variables	Group	Mean	Mean Rank	H	Sig.	Decision on H_o	Interpretation
Digital Record Management	Bachelor's Degree	3.30	61.57	19.35	0.001	Reject	Significant
	Bachelor's Degree with MA Units	3.63	100.87				
	Master's Degree	3.61	95.86				
	Master's Degree with Doctoral Units	3.48	83.11				
	Doctorate Degree	3.50	82.13				
Communication and Information Flow	Bachelor's Degree	3.32	64.27	15.36	0.004	Reject	Significant
	Bachelor's Degree with MA Units	3.62	97.47				
	Master's Degree	3.58	90.16				
	Master's Degree with Doctoral Units	3.68	101.29				
	Doctorate Degree	3.40	70.50				
Scheduling and Monitoring Systems	Bachelor's Degree	3.31	65.90	15.56	0.004	Reject	Significant
	Bachelor's Degree with MA Units	3.61	97.62				
	Master's Degree	3.53	87.30				
	Master's Degree with Doctoral Units	3.65	102.47				
	Doctorate Degree	3.05	59.50				
Online Reporting and Documentation Tools	Bachelor's Degree	3.28	65.42	14.71	0.005	Reject	Significant
	Bachelor's Degree with MA Units	3.61	98.40				
	Master's Degree	3.58	92.89				
	Master's Degree with Doctoral Units	3.57	92.61				
	Doctorate Degree	3.30	64.00				
Overall	Bachelor's Degree	3.30	60.18	19.45	0.001	Reject	Significant
	Bachelor's Degree with MA Units	3.62	100.17				
	Master's Degree	3.58	92.30				
	Master's Degree with Doctoral Units	3.60	95.79				
	Doctorate Degree	3.31	71.75				

at .05 level of Sig.

The findings of the analysis using the Kruskal Wallis H-test, a non-parametric test which is appropriately used since the data failed the assumption of normality, reveal that there exist a significant differences in the respondents perception on the level of technology integration in terms of digital record management (H=9.35, p=.001), communication and information flow (H=15.36, p=.004), scheduling and monitoring systems (H=15.56, p=.004), and Online Reporting and Documentation Tools (H=14.71, p=.005), when respondents were grouped according to highest educational attainment. This was further confirmed by the overall H-coefficient of 12.15, significant at .01, which is statistically lesser than the alpha of .05, thus rejecting the null hypothesis.

Further analysis using Dunn's test, a post comparison test shows that the difference is found between the group of bachelor's degree with the mean 3.30 and a mean rank of 60.18 and the age group of doctorate degree with a mean of 3.31 and a mean rank of 71.75 were compared to the other groups which provided a much higher rating.

The significant differences according to educational attainment suggest that academic preparation is associated with how respondents perceive and use school-management technologies. Respondents with master's-level preparation or graduate units generally reported higher integration than those with only a bachelor's degree. This may indicate that graduate study provides greater exposure to research, data analysis, educational management, and technology-supported decision-making. However, the doctorate group was very small, with only four respondents, so its lower mean should be interpreted cautiously because a few responses can substantially affect the group result. Post hoc conclusions should also be limited to the group pairs specifically identified as significant by Dunn's test.

The finding supports Voogt and McKenney (2021), who associated advanced professional preparation with stronger capacity to integrate technology effectively, and UNESCO (2022), which linked educational attainment and professional learning opportunities with digital readiness. Siyam (2025), likewise found that personnel with higher academic qualifications showed greater confidence and efficiency in using digital platforms. These studies indicate that continuing graduate education and targeted capacity building may strengthen technology integration across qualification levels.

Part V. Relationship Between Variables

Part V presents the degree of relationship between technology integration and administrative efficiency.

Table 9. Relationship between Variables

Variables	r	Sig.	Decision on H_0	Interpretation
Technology Integration →Administrative Efficiency	0.805**	<.001	Reject	Significant

at .05 level of Significant

The results show a strong positive relationship between technology integration and administrative efficiency, as indicated by a correlation coefficient of r=0.805. The significance value was less than 0.001, which is below the 0.05 level of significance. Therefore, the null hypothesis was rejected. This indicates that the relationship between technology integration and administrative efficiency was statistically significant. The positive correlation means that higher levels of technology integration were associated with higher levels of administrative efficiency.

The coefficient of r=0.805 indicates a strong association, indicating that extensively integration of digital record management, communication platforms, scheduling and monitoring systems, and online reporting tools tend to demonstrate greater efficiency in completing administrative tasks, maintaining accurate records, supporting decision-making, and improving overall school operations.

The strong positive correlation indicates that schools reporting higher technology integration also tend to report higher administrative efficiency. In practical terms, consistent use of digital records, communication platforms, scheduling systems, and online reporting tools is associated with faster task completion, more reliable information, improved decision-making, and greater productivity. From the researcher's perspective, the result provides empirical support for strengthening digital systems as part of school-improvement planning. Nevertheless, correlation does not by itself establish causation, and other factors such as ICT infrastructure, leadership, staff competence, and technical support may also influence administrative efficiency.

The finding is supported by Abulencia et al. (2022), who reported that school management information systems improve administrative efficiency through automation and reduced encoding errors, and by Ramos (2025), who found that integrated systems improve coordination and reduce duplication of work. It also agrees with UNESCO (2023), who associated digital management systems with higher operational productivity, and Abulencia et al. (2022), who linked ICT integration with more efficient administrative decision-making.

Part VI. Regression Analysis

Part VI presents the extent technology integration predict administrative efficiency.

Table 10. Technology Integration toward Administrative Efficiency

Dependent	Predictors	B	SE	t	Sig.	R^2	F	Sig.	Remarks
Administrative Efficiency	Constant	0.52	0.162	3.21	0.002	.670	350.75	<.001	Reject (Significant)
	Technology Integration	0.85	0.046	18.73	0.000				

at .05 level of Sig.

The regression analysis revealed that technology integration significantly predicted administrative efficiency, F(1ⓜ,173)=350.75,p<.001. Technology integration had a positive and significant effect on administrative efficiency, B=0.85,SE=0.046,t=18.73,p<.001. This indicates that technology integration had a positive and significant influence on administrative efficiency. Specifically, a one-unit increase in technology integration was associated with an estimated 0.85-unit increase in administrative efficiency, assuming other factors remain constant.

The R^2value of 0.670 indicated that technology integration explained 67.0% of the variance in administrative efficiency. Therefore, the null hypothesis was rejected. The findings imply that greater integration of digital record management, communication systems, scheduling and monitoring tools, and online reporting platforms is associated with improved administrative efficiency.

The regression model indicates that technology integration is a substantial predictor of administrative efficiency, accounting for 67.0% of its observed variance. The positive coefficient means that higher technology-integration scores are associated with higher predicted administrative-efficiency scores. For the researcher, this indicates that investments in digital records, communication systems, monitoring tools, and online reporting can produce meaningful administrative benefits when they are consistently implemented. At the same time, the remaining 33.0% of unexplained variance confirms that efficiency also depends on factors outside the model, such as leadership practices, infrastructure quality, workload, staff capability, policies, and organizational culture. Because the study is nonexperimental and cross-sectional, the regression result should be interpreted as predictive association rather than definitive causation.

This result aligns with Abulencia et al. (2022), who found that electronic records and timely information enhance management efficiency, and with Ramos (2025), who showed that automated scheduling improves coordination and workload distribution. UNESCO (2023), likewise reported that web-based documentation systems strengthen transparency and administrative processes, while Leithwood et al. (2020) emphasized that leadership and organizational systems also contribute to school productivity. These findings support technology integration as a major, but not exclusive, contributor to administrative efficiency.

Conclusions

Respondents represented a broad range of ages, experience, and educational attainment, although the sample was predominantly female and composed mainly of teachers.

Technology was highly integrated into school management, with communication and information flow as the strongest area and online reporting and documentation as the comparatively lowest area.

Administrative operations were highly efficient, particularly in overall productivity, while record accuracy and reliability remained the area with the greatest room for improvement.

Technology-integration ratings differed significantly by age and educational attainment but not overall by sex, position, or years of service.

Technology integration was strongly and positively related to administrative efficiency and significantly predicted it, explaining 67.0% of the variance.

A structured enhancement plan is justified to standardize digital workflows, strengthen data quality, and sustain staff competence and support.

Recommendations

The district and school heads should adopt standard operating procedures for digital records, communication, scheduling, monitoring, and online reporting, including clear responsibilities, file-naming conventions, access rules, and retention practices. Capability-building should be differentiated by task and user need. Short, hands-on sessions, peer mentoring, job aids, and follow-up coaching should be prioritized over one-time general training.

Schools should conduct periodic data-quality reviews to identify duplicate, incomplete, outdated, or inconsistent records and should maintain secure backups and role-based access.

School heads should monitor digital indicators such as report turnaround time, error frequency, delayed submissions, platform utilization, and user support requests as part of school improvement planning.

Future studies should use larger and more balanced subgroups, including non-teaching staff, examine infrastructure and leadership variables, and use longitudinal or mixed method designs to clarify causal processes and user experiences.

Compliance with Ethical Standards

The researcher complied with the principles of informed consent, voluntary participation, the right to withdraw, anonymity, confidentiality, and data privacy. Reasonable measures were taken to protect participants' well-being and to store research data securely. No conflict of interest influenced the conduct or interpretation of the study. Plagiarism and fabrication were avoided, findings were reported without intentional bias, and the results were used solely for educational and research purposes. Artificial intelligence tools were used only to assist with language refinement and document formatting; the researcher retained responsibility for the accuracy, originality, analysis, and final content of the manuscript.

Acknowledgments

The researcher expresses sincere gratitude to the educational leaders, research advisers, validators, school heads, teachers, and institutional offices whose guidance, participation, and support made the study possible. Appreciation is likewise extended to all respondents for the time and professional insight they contributed to the research.

REFERENCES

Abulencia, C. C., Borlongan, C. G., De Guia, D. J. D., & Magtoto, C. R. M. (2022). Role of school management information system on school operations and administrative decision-making. International Journal of Academic Pedagogical Research, 6(7), 155–163.

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, Article 920317. https://doi.org/10.3389/fpsyg.2022.920317

Asio, J. M. R., Leva, E. F., Lucero, L. C., & Cabrera, W. C. (2022). Education Management Information System (EMIS) and its implications to educational policy: A mini-review. International Journal of Multidisciplinary: Applied Business and Education Research, 3(8), 1389–1398. https://doi.org/10.11594/ijmaber.03.08.01

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

Department of Education. (2021). Basic Education Development Plan 2030. Republic of the Philippines.

Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2022). Teacher beliefs and technology integration: The influence of experience and professional learning. Teaching and Teacher Education, 110, 103607. https://doi.org/10.1016/j.tate.2021.103607

Fasbender, U., Gerpott, F. H., & Rinker, L. (2023). Getting ready for the future, is it worth it? A dual pathway model of age and technology acceptance at work. Work, Aging and Retirement, 9(4), 358–375. https://doi.org/10.1093/workar/waac035

Gebhardt, E., Thomson, S., Ainley, J., & Hillman, K. (2023). Teacher gender and ICT. In E. Gebhardt, S. Thomson, J. Ainley, and K. Hillman, Gender differences in computer and information literacy: An in-depth analysis of data from ICILS (pp. 53–68). Springer. https://doi.org/10.1007/978-3-030-26203-7_5

Hero, J. L. (2020). The impact of technology integration in teaching performance. International Journal of Sciences: Basic and Applied Research, 48(1), 101–114.

Inan, F. A., & Lowther, D. L. (2021). Factors affecting technology integration in K–12 classrooms: The role of teaching experience and professional development. Journal of Research on Technology in Education, 53(3), 250–268. https://doi.org/10.1080/15391523.2020.1849752

Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership revisited. School Leadership & Management, 40(1), 5–22. https://doi.org/10.1080/13632434.2019.1596077

Machado, L. J., & Chung, C.-J. (2021). Integrating technology: The principals' role and effect. International Education Studies, 8(5), 43–53. https://doi.org/10.5539/ies.v8n5p43

OECD. (2020). Education at a glance 2020: OECD indicators. OECD Publishing. https://doi.org/10.1787/69096873-en

OECD. (2021). Education at a glance 2021: OECD indicators. OECD Publishing. https://doi.org/10.1787/b35a14e5-en

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press. (Original work published 1962)

Ramos, N. (2025). Optimizing organizational efficiency and instructional effectiveness through integrated educational technologies at Philippine Christian University. International Journal of Research Studies in Education, 14(5), 125–140. https://doi.org/10.5861/ijrse.2025.25851

Ronquillo, Z. T., Jr., Tagasa, R. B., Batino, M. R., & Aquino, M. S. (2022). School records and forms of selected public school: Headway and analysis of online management system.

International Journal in Information Technology in Governance, Education and Business, 4(1), 49–62.

Rosales, L. K. G. (2021). Technology integration: Implication for teachers' professional development. In The Southeast Asian Conference on Education 2021: Official conference proceedings. The International Academic Forum.

Siyam, N. (2025). Evaluating technology integration in education: A framework for professional development. Discover Education. https://doi.org/10.1007/s44217-025-00448-z

Thannimalai, R., & Raman, A. (2022). The influence of principals' technology leadership and professional development on teachers' technology integration in secondary schools. Malaysian Journal of Learning and Instruction, 15(1), 203–228.

UNESCO. (2023). Global education monitoring report 2023: Technology in education: A tool on whose terms? https://doi.org/10.54676/UZQV8501

Von Bertalanffy, L. (1968). General system theory: Foundations, development, applications. George Braziller.

Voogt, J., & McKenney, S. (2021). TPACK in teacher education: Are we preparing teachers to integrate technology effectively? Technology, Pedagogy and Education, 30(1), 1–15. https://doi.org/10.1080/1475939X.2020.1854237

APA Citation:

Vidal, R. J. G. (2026). TECHNOLOGY INTEGRATION IN SCHOOL MANAGEMENT AND ADMINISTRATIVE EFFICIENCY IN PUBLIC ELEMENTARY SCHOOLS: A QUANTITATIVE STUDY. Ignatian International Journal for Multidisciplinary Research, 4(10), 489–511. https://doi.org/10.5281/zenodo.23590878

ricardo.vidal@deped.gov.ph