#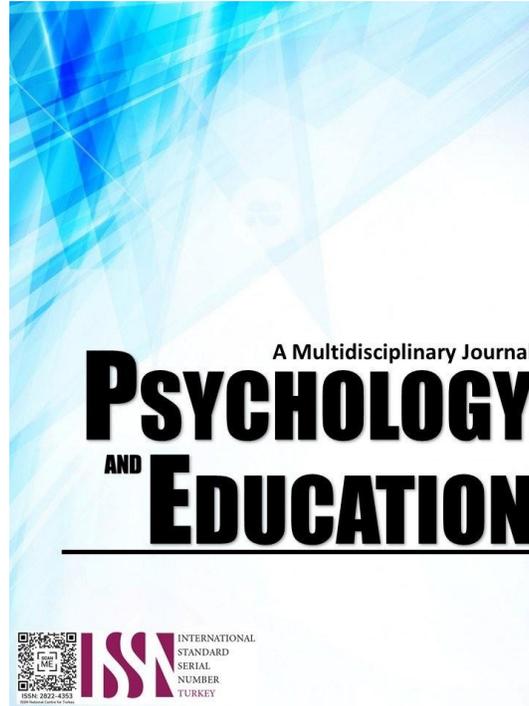 ROLE OF DIGITAL TOOLS AND ADMINISTRATIVE EFFICIENCY IN BASIC EDUCATION: A BASIS FOR TECH-DRIVEN ADMINISTRATIVE OPTIMIZATION TRAINING PLAN

Role of Digital Tools and Administrative Efficiency in Basic Education: A Basis for Tech-Driven Administrative Optimization Training Plan

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Abstract

This study examined the correlation between digital tool usage and administrative efficiency among administrators and teachers using a convergent parallel design. Quantitative analysis through multiple and multivariate multiple regression revealed significant models: digital tool usage explained 41.2% of the variance (Adjusted R^2 = .389), and administrative efficiency explained 39.6% (Adjusted R^2 = .373). Combined analysis indicated predictors significantly accounted for variance across both outcomes, Wilks' Λ = 0.672, $F(10, 226)$ = 4.94, $p < .001$, partial η^2 = .179. Among demographics, Position/Rank, Years of Experience, and Training Attended emerged as significant factors. Even when controlling for these, strong correlations persisted: digital tool usage ($p = .001$), administrative efficiency ($p = .001$), and group membership effects ($p = .001$), leading to the rejection of HO1, HO2, and HO3. Qualitative content analysis highlighted both enabling and constraining factors, including: Infrastructure and Access; Training and Digital Literacy; Perceived Usefulness; Time and Workload; Resistance and Attitudes; Demographics and Adoption; Training as a Mediator; Reliability and Motivation; Role-Specific Tool Relevance; and Feedback Loop. Triangulation through meta-inference confirmed parallel relationships across quantitative and qualitative findings, underscoring the central role of digital tools in shaping efficiency outcomes. It recommends developing and implementing a Tech-Driven Administrative Optimization Training Plan to address skill gaps, strengthen digital literacy, and institutionalize the effective use of technology in school management.

Keywords: *administrative efficiency, extent of digital tool usage, tech-driven administrative optimization training plan*

Introduction

In the evolving landscape of public-school administration, the integration of digital tools has become increasingly notable in enhancing operational efficiency. The rapid advancement of digital technologies necessitates changes in societies' lifestyles, communication methods, access to information, and individual time management. In particular, digital tools and social media platforms influence every aspect of social life (Murat Doğan, 2025). Technology is driving significant changes in education systems worldwide, with the potential to improve school operations and educational processes.

School administration is increasingly reliant on technology to enhance efficiency and streamline processes. The impact of digital transformation on administrative efficiency in various educational contexts has been widely acknowledged and investigated (Awamrah & Rania Sawalhi, 2025; Atief Aisyil Wi'am, Nurul Yaqien, & Teguh Triwiyanto, 2024). A local study conducted in the Philippines by Lorenzo (2025) investigated the effects of digital transformation on administrative processes in public schools. According to the Organization for Economic Cooperation and Development (OECD) report, the use of technology in school management is increasing worldwide. The report indicates that schools and educational systems are increasingly utilizing technology to support administrative tasks and improve communication. Technology adoption in school management can vary widely by geography, infrastructure, and available resources.

Cebu, in the Philippines, has recently undergone a substantial trend towards digitalization, spurred by the desire for more streamlined and effective school administration. This transformation has been accelerated by various factors, including the challenges posed by the COVID-19 pandemic and the evolving demands of modern education. The increasing integration of digital tools in Cebu's educational system highlights the need to examine their role in enhancing school administrative efficiency. As schools transition towards digitalization, it is significant to explore how technology streamlines administrative tasks, improves communication, and optimizes resource management. Government initiatives, such as the Department of Education (DepEd), push for digital transformation, and private-sector programs introduce tech solutions to schools, emphasizing the urgency of this shift (Himang et al., 2023).

However, challenges such as inadequate infrastructure, funding limitations, and the need for staff training hinder full implementation. A previous study provided insight into the larger consequences of digital change in education. Smith and Johnson (2023) conducted a systematic review of digital transformation among public school instructors, shedding light on the factors influencing the implementation of digital technology and its impacts. Furthermore, studies such as those by Badawy et al. (2024) have looked at the effects of digital technology on education and highlighted key components for successful digital transformation in educational settings. Garcia and de Guzman (2020) conducted a case study of public administrations' perceptions of digital transformation phases, providing important insights into the challenges and opportunities associated with digital transformation.

The extent to which digital tools enhance administrative efficiency remains a critical question, especially in public school administration. This study seeks to investigate the role of digital tools in improving administrative efficiency, providing a comparative

analysis between administrators who utilize digital tools and those who rely on traditional methods. The research may take different approaches: comparing two school administrators—one who adopts digital tools and another who does not—or analyzing the efficiency of a single administrator under both conditions. Additionally, the study may explore the relationship between the extent of digital tool usage and administrative efficiency by measuring both variables (Polinio et al., 2023).

This study is exploratory, aiming to examine the strength of determination and the relationship between the extent of digital tool use and the level of administrative efficiency using both qualitative and quantitative approaches. Moreover, an instrumentation tailored to the research locale was developed to align with the participants' realities, needs, and conditions.

A key challenge of this research is defining and operationalizing the core variables: digital tools and administrative efficiency. It is essential to specify the digital tools to be examined, including learning management systems, automated reporting platforms, cloud-based storage, and communication applications. Similarly, administrative efficiency must be measured using clear indicators, such as task completion time, record-keeping accuracy, responsiveness to school concerns, and overall workflow optimization.

Addressing these concerns will provide empirical insights into the impact of digital transformation on administrative efficiency in public schools. The findings will offer valuable implications for policy-making and institutional decision-making, particularly digital training in Philippine public schools. Specifically, the administrative dynamics in the elementary schools of Barili District I. These insights will also inspire future initiatives to further administrative efficiency through digital transformation.

Research Questions

This study aimed to examine the roles of digital tools and administrative efficiency in elementary school management in Barili District I during the 2025–2026 school year. Specifically, it answered the following questions:

1. What is the extent of digital tool use between the administrative group and the teaching group in terms of the following:
    1.1 commonly used digital tools;
    1.2 frequency of use; and
    1.3 administrative functions where digital tools are applied?
2. What is the level of administrative efficiency as perceived by the administrative group and the teaching group?
3. Is there a significant relationship between the administrative group and the teaching group in terms of the extent of digital tool usage while controlling for demographic characteristics?
4. Is there a significant relationship between the administrative group and the teaching group in terms of the level of administrative efficiency while controlling for demographic characteristics?
5. Is there a significant relationship in the extent of digital tool usage and the level of administrative efficiency between the administrative group and the teaching group while controlling for demographic characteristics?
6. What challenges and opportunities do administrators and teachers face in adopting and using digital tools for administrative purposes?
7. How do the challenges and opportunities help explain the relationship between digital tool usage and administrative efficiency, while considering the influence of demographic characteristics?
8. Based on the findings, what training plan can be developed to improve administrative efficiency through effective integration of digital tools in Barili District I?

Literature Review

The theoretical foundation of this study is anchored in legal and policy frameworks that promote the integration of ICT in Philippine education. Article II, Section 24 of the 1987 Philippine Constitution underscores the "vital role of communication and information in nation-building," mandating that institutions such as DepEd adopt ICT to enhance efficiency and transparency (Official Gazette, 1987). This mandate is operationalized through DepEd Order No. 016, s. 2023, which strengthens the DepEd Computerization Program (DCP) to improve teaching, learning, and governance via ICT tools, infrastructure, and training (DepEd, 2023).

Technology Acceptance Theory (TAT)

Davis's TAT provides a framework for understanding technology adoption, based on perceived ease of use and perceived usefulness (Pitogo, 2024). Studies such as Bantaculo (2024) highlight its utility in assessing ICT adoption by school administrators. While TAT emphasizes relative advantage and compatibility (Ali & Arshad, 2021; Garcia & de Guzman, 2020; Manuel & Alon, 2024; Ofori-Kyereh & Agyei, 2022), critics argue that it oversimplifies adoption by neglecting cultural and organizational contexts. To address this limitation, the Task-Technology Fit (TTF) theory complements TAT by assessing how well technology aligns with specific tasks, enhancing efficiency in school administration (Polinio et al., 2023; Al-Awidi & Al-Dheleai, 2023).

Task-Technology Fit (TTF) Theory

Goodhue and Thompson's TTF theory posits that the effectiveness of technology depends on how well it aligns with the specific tasks it supports. In education, this means digital tools are most valuable when tailored to school administration needs such as record management, budgeting, scheduling, and communication. Studies show that when ICT capabilities match these tasks, both efficiency

and effectiveness improve (Polinio et al., 2023). TTF also highlights how compatibility between technology and teachers' or administrators' roles influences readiness to adopt and sustain digital tools (Al-Awidi & Al-Dheleai, 2023). By emphasizing the fit between technical features and organizational tasks, TTF extends beyond initial adoption to explain actual usage and performance outcomes.

Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh et al.'s (2003) UTAUT extends this discussion through four constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions. In school administration, these factors explain how digital tools improve efficiency and adoption (Abdul Rauf et al., 2023; Garcia & de Guzman, 2020; Manuel & Alon, 2024; Kumar & Krishnan, 2019). Research highlights performance expectancy and supportive conditions as key drivers of adoption (Ali & Arshad, 2021), while social and organizational support further strengthen implementation (Ofori-Kyereh & Agyei, 2022; Bautista et al., 2022).

Integrating TAT, TTF, and UTAUT provides a comprehensive framework linking behavioral, technical, and organizational perspectives. TAT explains perceived usefulness and ease of use (Davis, 1989), TTF emphasizes the alignment of ICT with administrative tasks (Goodhue & Thompson, 1995), and UTAUT incorporates broader adoption factors (Venkatesh et al., 2003). Together, these theories guide the present study in examining whether digital tools under the DCP align with theoretical expectations and are perceived by administrators as effective in improving school administrative efficiency.

Methodology

Research Design

The study employed a mixed-methods approach with a convergent parallel design to collect quantitative and qualitative data concurrently and integrate findings through triangulation. The quantitative phase used a descriptive-correlational method to examine the relationship between digital tool usage and administrative efficiency, employing Multiple Regression (MR) and Multivariate Multiple Regression (MMR) to explore group differences, associations, and potential moderator effects. The qualitative phase used content analysis to capture the experiences of school administrators—both users and non-users of digital tools—and teachers regarding administrative efficiency. Triangulation of both data strands ensured a comprehensive understanding and robust conclusions.

Respondents

This study involved 14 elementary school administrators from Barili I District, Cebu, responsible for overseeing school operations and implementing administrative systems, and 110 teachers who provided insights on how administrative efficiency and digital tool usage affect their work and the school environment.

The study used a mixed-methods sampling approach combining stratified random and purposive sampling. Stratified random sampling was applied in the quantitative phase to select teachers from different schools, ensuring fair representation and adequate statistical power. In contrast, purposive sampling was used in the qualitative phase to choose administrators and teachers with relevant experience in using digital tools, particularly those not included in the quantitative phase. This combination allowed the study to obtain both representative and in-depth data for a comprehensive analysis of how digital tools enhance administrative efficiency in schools, aligning with methodological approaches that emphasize the complementary strengths of mixed-method designs (Agarwal, Verma, & Ferrigno, 2025) and the structured application of purposive sampling in qualitative research (Ahmad & Wilkins, 2024).

Instrument

To examine how digital tools enhance administrative efficiency, the researcher employed a modified survey questionnaire for elementary school administrators and teachers in Barili District I (SY 2025–2026). Content validity was established through expert review by four specialists in educational leadership and digital integration. At the same time, pilot testing confirmed acceptable reliability, with Cronbach's alpha = 0.67, which is the sum of the two subscale alphas—one for Extent of Digital Tool Use and another for Administrative Efficiency—because the instrument measured two related constructs. This value approaches the acceptable threshold of 0.70 and, given the exploratory nature of the study, is considered adequate for preliminary analysis (George & Mallery, 2003). The reliability coefficient indicates that the instrument demonstrates an acceptable level of internal consistency, suitable for exploratory research.

The questionnaire consisted of three major parts: (1) demographic profile (age, position, experience, training attended), (2) extent of digital tool use, and (3) administrative efficiency. The items assessing the extent of digital tool use were neutral in phrasing and not dichotomous, allowing respondents to express degrees of frequency and engagement rather than binary yes/no responses. Meanwhile, the administrative efficiency construct contained an equal number of positive and negative statements, minimizing response bias and enabling a balanced evaluation of administrative performance. The instrument was contextualized to reflect the realities of digital practices and administrative systems in public elementary schools, including resource constraints and ICT integration initiatives.

For the qualitative phase, a separate group of administrators and teachers (not part of the quantitative sample) participated in semi-structured interviews based on the study's Statement of the Problem and framework. The instrument, validated by experts in school

administration and research, focused on digital tool use in communication, scheduling, data management, reporting, as well as related challenges and benefits. Responses were transcribed and analyzed through content analysis to extract recurring themes and practical insights, enriching the quantitative findings with contextual perspectives on administrative efficiency.

Data Analysis

To establish robust results, both statistical and qualitative methods were employed. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized respondents' demographics (age, position, years of experience, training), the extent of digital tool usage (types, frequency, functions), and the level of administrative efficiency. Inferential statistics were applied to test relationships between digital tool use and efficiency while adjusting for covariates. Multiple Regression (MR) addressed SOPs 3 and 4, while Multivariate Multiple Regression (MMR) handled SOP 5, allowing simultaneous modeling of multiple outcomes and control of confounders (Field, 2018). For the qualitative phase, content analysis identified recurring themes (tool usability, workflow bottlenecks, administrative overhead) from interviews, with coding and categorization revealing shared and divergent experiences (Krisada Prachumrasee et al., 2024).

Triangulation integrated MR, MMR, and qualitative findings through meta-inference, conducted via a convergence comparison and joint-display strategy, which enabled the merging of data strands to identify convergence, divergence, and complementarity between results. This process validated patterns and ensured a comprehensive understanding of how digital tools shape administrative efficiency and school management in Barili District I.

Ethical Considerations

This research adhered to established ethical standards to protect the rights and welfare of all participants. Prior to data collection, formal approval was secured from the Schools Division Office and participating institutions. Informed consent was obtained from all administrators and teachers, ensuring they fully understood the purpose, scope, and procedures of the study, as well as their right to withdraw at any stage without penalty. Confidentiality and anonymity were strictly maintained by assigning codes instead of names and securely storing all responses, with access limited to the researcher. All data were reported in aggregate form to prevent identification of individuals or schools. The study also upheld the principle of voluntary participation, with no form of coercion or undue influence. To avoid conflicts of interest and ensure non-maleficence, participants were assured that the study posed no physical, psychological, or professional risks. Furthermore, data integrity was safeguarded by accurately recording, analyzing, and presenting results without fabrication or misrepresentation. These measures ensured that the research process was ethically sound, credible, and respectful of participants' dignity and rights.

Results and Discussion

This section provides a comprehensive analysis of both quantitative and qualitative data, employing a blend of textual narratives and tabular representations. The findings are derived from a meticulous examination of information sourced from elementary administrators and teachers in Barili I. Consequently, the discussion is structured systematically, addressing the specific problems identified throughout the research.

Quantitative Phase

Extent of Digital Tool Use

Studies support this link: consistent ICT integration in management tasks has been associated with greater efficiency, while leaders who adopt diverse tools demonstrate stronger decision-making and performance monitoring. By measuring usage across these dimensions and controlling for position, experience, and training, this study ensures that the observed effects reflect the genuine impact of digital tool integration rather than background differences (Bantaculo, 2024; Jones & Kennedy, 2022).

Table 1. *Commonly Used Digital Tools*

Group	Digital Tools	Frequency	Percentage %
Administrative	Learning Management Systems	12	85.7
	Communication Tools	14	100.0
	Record Keeping Tools	13	92.8
	Cloud Storage	10	78.5
	Scheduling Tools	9	71.4
Teaching	Learning Management Systems	72	65.5
	Communication Tools	108	98.2
	Record Keeping Tools	66	60.0
	Cloud Storage	55	50.0
	Scheduling Tools	44	40.0

The data reveal distinct patterns of digital tool use between administrators and teachers. Administrators (n=14) report universal use of communication tools (100%) alongside high adoption of record-keeping (92.8%), learning management systems (85.7%), cloud storage (78.5%), and scheduling tools (71.4%), reflecting their broad engagement in coordination and workflow management. Teachers

(n=110), while also heavily reliant on communication tools (98.2%), show lower usage of learning management systems (65.5%), record-keeping (60.0%), cloud storage (50.0%), and scheduling tools (40.0%), indicating a primary focus on instruction rather than organizational functions. These findings are consistent with those of Jones and Kennedy (2022), who observed that administrators use a broader toolset across operations to enhance efficiency.

In contrast, Engagement and Response and Reading and Fluency reflected comparatively stronger baseline skills. This is somewhat reflective of the survey conducted by PSA that students under the basic education with ages 10-64, or approximately 18 million Filipino students, are functionally illiterate because of the lack of comprehension skills (EDCOM2, 2025). These findings underscore the importance of targeted interventions to address specific areas of need.

Table 2. *Frequency of Use*

Group	Mean	SD
Administrative	4.35	0.48
Teaching	3.85	0.72

Note. Mean scores are based on the extent of digital tool use of respondents in each group.

Administrators report higher and more consistent digital tool use (M=4.35, SD=0.48) than teachers (M=3.85, SD=0.72). Both groups fall under "Excellent Usage," but administrators are closer to the top of the scale, reflecting their broader responsibilities in communication, data management, and performance monitoring, compared to teachers' mainly instructional use. This aligns with Bantaculo (2024), who found greater ICT adoption among administrators due to leadership demands. These results emphasize role-based differences in digital reliance and the need to control for position when examining efficiency outcomes.

Table 3. *Administrative Functions Applied and Observed*

Group	Functions	Frequency	Percentage %
Administrative	Communication	14	100.0
	Scheduling	12	85.7
	Record Keeping	13	92.8
	Reporting	12	85.7
Teaching	Communication	108	98.2
	Scheduling	61	55.0
	Record Keeping	72	65.5
	Reporting	66	60.0

Note. Mean scores are based on the extent of digital tool use of respondents in each group.

The findings show role-based differences in digital tool use. Administrators rely on communication (100%), record-keeping (92.8%), and scheduling/reporting (85.7%), reflecting oversight and compliance duties. Teachers, while also strong in communication (98.2%), use record-keeping (65.5%), reporting (60.0%), and scheduling (55.0%) less, reflecting an instructional focus. These patterns, consistent with Bantaculo (2024), Zhong (2017), and Adiele and Etamesor (2024), link broader ICT integration to leadership roles. The differences show that digital use depends on position, justifying control for role in efficiency analyses.

Level of Administrative Efficiency

Administrative efficiency refers to how effectively school leaders and staff perform core tasks such as planning, organizing, reporting, record-keeping, scheduling, and communication with accuracy, timeliness, and optimal resource use. It is critical to institutional performance, as efficiency enhances educational quality and student outcomes (Mahfud Heru Fatoni et al., 2024), while inefficiencies hinder progress. Administrative staff also contribute by managing documentation, finances, and timetables, with ICT tools and Lean Six Sigma methods improving transparency and trust (Atief Aisyil Wi'am et al., 2024). In this study, efficiency is analyzed alongside digital tool usage, controlling for position, experience, and training to ensure findings reflect genuine operational capacity.

Table 4. *Level of Administrative Efficiency*

Group	Mean	SD
Administrative	4.45	0.32
Teaching	3.90	0.65

Note. Mean scores are based on the level of administrative efficiency of respondents in each group.

Table 4 shows that both administrators (M=4.45, SD=0.32) and teachers (M=3.90, SD=0.65) fall into the "High Efficiency" category. Administrators, however, are nearer to the top of this range and share more consistent views, while teachers display wider variation. This supports findings by Fatoni et al. (2024) that structured administration optimizes resources and improves learning environments, while inefficiency hinders goals.

Inferential Statistics

This study examines whether the administrator or teaching groups' extent of digital tool usage, while accounting for age, position, years of experience, and training are correlated. Using multiple regression analysis, it isolates the effect of group membership from these background factors, ensuring that observed differences reflect role-based patterns rather than demographic influences. This

approach provides clearer insights to guide targeted digital capacity-building initiatives within the education sector.

Admin–Teacher Digital Tool Usage, Adjusted for Demographics

Table 5. *Multiple Regression Predicting Extent of Digital Tool Usage*

Predictor	B	SE B	β	t	p	Interpretation	Decision
Group (Admin = 1)	0.47	0.08	.48	5.87	<.001	Significant	Reject HO1
Age	-0.02	0.01	-.12	-1.85	.067	Not Significant	Fail to Reject HO1
Position/Rank	0.09	0.04	.16	2.13	.035	Significant	Reject HO1 (partial)
Years of experience	0.05	0.02	.18	2.49	.014	Significant	Reject HO1 (partial)
Trainings Attended	0.21	0.05	.26	4.20	<.001	Significant	Reject HO1 (partial)

Note. B = unstandardized regression coefficient; SE B = standard error of B; β = standardized coefficient; VIF = variance inflation factor. Model summary: $R^2 = .412$, Adjusted $R^2 = .389$, $F(5, 118) = 15.91$, $p < .001$.

The multiple regression analysis showed that digital tool usage by group membership remained statistically significant after controlling for demographics, $F(5, 118) = 15.91$, $p < .001$, explaining 41.2% of the variance (Adjusted $R^2 = .389$). Administrators reported greater usage than teachers (B = 0.47, β = .48, $p < .001$), leading to the rejection of H_{o1}. Position/Rank (β = .16, $p = .035$), Years of Experience (β = .18, $p = .014$), and Trainings Attended (β = .26, $p < .001$) also showed positive effects, underscoring the role of professional development (Kimmons et al., 2020). Age was not significant (β = −.12, $p = .067$), reinforcing evidence that digital competence depends more on exposure and training than generational differences (van Laar et al., 2019). Overall, results confirm that role and select demographics strongly shape digital tool integration in schools.

Admin–Teacher Perceived Level of Administrative Efficiency, Adjusted for Demographics

Table 6. *Multiple Regression Predicting Administrative Efficiency While Controlling for Demographics*

Predictor	B	SE B	β	t	p	Interpretation	Decision
Group (Admin = 1)	0.41	0.07	.46	5.86	<.001	Significant	Reject HO2
Age	−0.01	0.01	−.09	−1.22	.225	Not Significant	Fail to Reject HO2
Position/Rank	0.12	0.05	.18	2.37	.020	Significant	Reject HO2 (partial)
Years of experience	0.04	0.02	.14	2.04	.044	Significant	Reject HO2 (partial)
Trainings Attended	0.18	0.04	.23	4.05	<.001	Significant	Reject HO2 (partial)

Note. B = unstandardized regression coefficient; SE B = standard error of B; β = standardized coefficient. Model summary: $R^2 = .396$, Adjusted $R^2 = .373$, $F(5, 118) = 14.87$, $p < .001$.

The regression analysis showed that administrative efficiency remained statistically significant after controlling for demographics, $F(5, 118) = 14.87$, $p < .001$, explaining 39.6% of the variance (Adjusted $R^2 = .373$). Administrators scored higher in efficiency (B = 0.41, β = .46, $p < .001$), leading to the rejection of H_{o2}. Position/Rank (β = .18, $p = .020$), Years of Experience (β = .14, $p = .044$), and Trainings Attended (β = .23, $p < .001$) were also significant predictors, underscoring the role of seniority, tenure, and professional development (Kimmons et al., 2020; van Laar et al., 2019). Age was not significant (β = −.09, $p = .225$), supporting evidence that efficiency is shaped more by role and training than by chronological age. Overall, the results confirm that role and key professional factors drive administrative efficiency.

Admin–Teacher Perceived Level Digital Tool Usage and Administrative Efficiency, Adjusted for Demographics

Table 7. *Multivariate Multiple Regression Predicting Digital Tool Usage and Administrative Efficiency While Controlling for Demographics*

Predictor	Wilks' Λ	F(df)	p	Partial η²	Interpretation	Decision
Group (Admin = 1)	0.791	F(2, 116) = 15.34	<.001	.209	Significant multivariate relationship between group membership and both outcomes	Reject HO3
Age	0.967	F(2, 116) = 1.96	.145	.033	Not Significant	Fail to Reject HO3
Position/Rank	0.948	F(2, 116) = 3.19	.045	.052	Significant multivariate relationship	Reject HO3 (partial)
Years of experience	0.958	F(2, 116) = 2.59	.079	.042	Not Significant	Fail to Reject HO3
Trainings Attended	0.853	F(2, 116) = 10.04	<.001	.147	Significant multivariate relationship	Reject HO3 (partial)

Note. Wilks' Λ = Wilks' Lambda; Partial η2 = partial eta squared effect size. The overall Model statistically significant, Wilks' Λ = 0.672, F(10, 226) = 4.94, p < .001, η2 = .179.

The multivariate multiple regression examined the relationships among group membership, digital tool usage, and administrative efficiency, while controlling for age, position/rank, years of experience, and training attended. The overall model was significant, Wilks' Λ = .672, $F(10, 226) = 4.94$, $p < .001$, partial η² = .179, indicating that the predictors explained a substantial portion of variance. Group membership was a strong predictor, Wilks' Λ = .791, $F(2, 116) = 15.34$, $p < .001$, partial η² = .209, with administrators reporting higher levels of both digital tool use and efficiency than teachers, leading to rejection of H_{o3}. Among covariates, Position/Rank (Wilks' Λ = .948, $F(2, 116) = 3.19$, $p = .045$, partial η² = .052) and Trainings Attended (Wilks' Λ = .853, $F(2, 116) = 10.04$, $p < .001$, partial η²

= .147) were significant, underscoring the influence of organizational status and professional development (Jabr, 2023; Kimmons et al., 2020; van Laar et al., 2019). Age and Years of Experience were not significant ($p > .05$), supporting evidence that efficiency depends more on role and training than on generational or tenure-based factors. Overall, group membership, position, and training emerged as the strongest predictors, highlighting the importance of role-specific capacity-building for digital and administrative practices.

Content Analysis

After the quantitative phase, the study employed a qualitative inquiry to capture teachers' and administrators' lived experiences with digital tools and their perceptions of efficiency. It focused on three areas: (1) use of digital tools for instructional, administrative, and communication tasks; (2) perceptions of efficiency in digitalized schools; and (3) challenges encountered. Data from interviews and open-ended surveys were thematically analyzed to highlight recurring themes and unique perspectives. This phase added context to the numbers, revealing the human dimension of digital adoption and offering insights for professional development, school interventions, and policy directions.

Table 8. *Themes and Core Ideas*

Theme	Administrative Group (n=5)	Teaching Group (n=10)
Infrastructure & Access	Poor internet, limited devices, shared equipment	Inconsistent Wi-Fi, lack of laptops/projectors
Training &Digital Literacy	Generic, one-time training not tailored to admin tasks	Sporadic training, mismatch to teaching/admin needs
Perceived Usefulness	Streamlines reporting when functional	Speeds grading, recording,communication
Time & Workload	Digital tools add work without extra time	No prep time for tool mastery or integration
Resistance & Attitudes	Preference for manual systems by some	Some hesitant to move away from paper-based work
Reliability and Motivation	Reliable systems sustain usage and improve efficiency	Poor system performance demotivates tool use
Demographics & Adoption	Older staff less confident with tools	Younger teachers adapt faster
Training as a Mediator	Relevant training boosts efficiency regardless of age	Training quality predicts adoption
Opportunities	Faster reporting, automated templates	Improved student tracking,easier parent communication

Illustrative Quotes & Interpretation of Themes

Theme 1: Infrastructure and Access

Inadequate infrastructure and unequal access to reliable technology emerged as systemic barriers to integrating digital tools in both administrative and instructional work. Although teachers and administrators were generally open to digital transformation, persistent gaps in connectivity, device availability, and technical support undermined these efforts and threatened the sustainability of reform initiatives.

Administrator A: "Lisod kaayo ang signal sa opisina, usahay mo hang ang LIS. Mahugno gyud ang schedule sa submissions."

("Poor signal in the office causes LIS to hang; disrupts submission schedules.")

Teachers, on the other hand, emphasized the lack of functional technological tools in schools to handle reports with tight deadlines. As one participant shared:

Teacher A: "Sa school, gamay ra ang usable computers, wala pajuy internet sa mga units. Lisud kaau sa amoa to submit reports provided our situations, unya among school head pud kay mag-demand na for the deadline"

("At school, there are only a few usable computers, there is no internet in the units. It is difficult for us to submit reports given our situations, then our school head will also demand for the deadline.")

Research confirms this challenge. Barrot et al. (2021) identified poor internet access and device scarcity as significant barriers in Philippine schools, a finding echoed by UNESCO (2020), which warns that a lack of "infrastructure parity" may deepen inequities. Rasheed et al. (2020) emphasize infrastructure as a prerequisite for digital equity, implying that ICT roadmaps often falter due to weak frontline implementation. Coping strategies such as reverting to manual systems keep schools operational but reinforce suboptimal practices, fostering long-term fatigue, disillusionment, and declining trust in digital reforms.

Theme 2: Training and Digital Literacy

A second significant barrier to administrative efficiency, noted by both administrators and teachers, is insufficient training and digital literacy. Although professional development opportunities exist, participants described them as limited in scope, frequency, and relevance to daily responsibilities. This gap weakens not only skill acquisition but also confidence, motivation, and long-term adoption of digital tools.

For administrators, the chief concern was the generic design of training programs, which offered broad overviews rather than role-specific competencies such as encoding in the Learner Information System (LIS) or formatting School Forms (SF). One administrator

reflected:

Administrator B: "Naay trainings for digital integration, pero murag overview lang…unya there are lots of activities and schedules that are piling up. Unya of course dili na ma reecho with quality para sa mga teachers"

("There are trainings for digital integration, but it seems like an overview…then there are lots of activities and schedules that are piling up. Then of course it can't be reechoed with quality for teachers")

Teachers, meanwhile, emphasized the episodic and unsustained nature of their training. Occasional workshops introduced them to educational technologies, but these were typically one-off events without follow-up, mentoring, or opportunities for deeper application:

Teacher B: "Naay training, pero of course, usahay sa kadaghan nang gi huna-huna sa maestra…Unya at times the facilitators sa training, like administrators, nag-libog pud in terms sa seminars, kay school head daghan pud kaaung gi apas nga mga deadlines." ("There was training, but of course, sometimes the teacher had a lot to think about... Then at times the facilitators of the training, like administrators, were also confused in terms of the seminars, because the school head also had a lot of deadlines to meet.")

Without ongoing reinforcement, administrators' and teachers' heavy workloads often cause digital skills to fade, leaving competence shallow and tool use limited to compliance. This gap reflects training that is misaligned with educators' realities. Research shows that effective technology integration requires sustained, context-specific professional development embedded in practice (Tondeur et al., 2018) and supported through ongoing collaboration and authentic application (Darling-Hammond et al., 2017).

Theme 3: Perceived Usefulness and Efficiency Gains

Although infrastructure and training deficits posed challenges, both administrators and teachers acknowledged that digital tools, when functioning correctly, delivered clear efficiency gains and streamlined workflows. These benefits underscore the conditional yet decisive role of technology in reshaping administrative and instructional practices.

Administrator C: "Kung ok ang internet ug ang mga platforms like Google Forms, Sheets, ug Google Drive, mas sayon gyud ang pag-compile ug reports."

("When the internet and tools like Google Forms, Sheets, and Google Drive are working well, compiling reports is much easier.")

Teachers, meanwhile, highlighted how digital tools streamlined core aspects of school administration and classroom management. Applications such as Messenger were especially valued for communicating administrative concerns, facilitating grading, automating assignment collection, and sustaining communication with learners during disruptions:

Teacher F: "Messenger, kay makatabang gyud siya if there are emergencies sa school needing the immediate attention sa school head while attending seminars or official travel…Also sa classroom, magamit siya sa assignments/tasks kung naa internet or nag Alternative Delivery Mode if suspended ang klasi." ("Messenger, because it can really help if there are emergencies in the school needing the immediate attention of the school head while attending seminars or official travel... Also in the classroom, it can be used for assignments/tasks during Alternative Delivery Mode if the class is suspended.")

A teacher highlighted Messenger as an effective tool for administrative efficiency, especially in urgent situations requiring the school head's immediate response during travel or seminars. Its utility also extended to instruction, such as assigning tasks during class suspensions under Alternative Delivery Modes. This illustrates how digital tools promote responsiveness and continuity, consistent with Scherer et al. (2019), who note that perceived efficiency gains sustain adoption. Likewise, Barrot et al. (2021) found that when educators see tangible improvements, they are more motivated to integrate digital tools, even in resource- limited settings, provided structural support is available.

Theme 4: Time and Workload Constraints

While participants recognized the potential efficiency gains of digital tools, they consistently emphasized that adoption often introduced additional workload burdens, complicating integration efforts. For administrators, encoding requirements across multiple platforms were rarely accompanied by corresponding workload adjustments or formal time allocations:

Administrator A: "Dugang trabaho kung mo-add pa og encoding sa taas-kaau nga mga administrative tasks."

("It's extra work when encoding is added to an already heavy workload.")

Teachers described a parallel challenge, stressing that heavy teaching loads left them with little to no discretionary time to explore or meaningfully to integrate new tools suggested by administrators into lesson planning and delivery:

Teacher I: "Daghan kaaung teaching load and preparations pun-an pas reports; if nay ma introduce nga mga digital tools nga magamit jud labi na usahay gi enrosed sa school head like automated school forms wala'y oras para mo- explore sa bagong tool kay occupied nas trabaho."

("There is a lot of teaching load and preparations... added with reports; if digital tools are introduced that can be used, especially those

that are sometimes endorsed by the school head like automated school forms, there is no time to explore new tools because we are busy with work.")

Time scarcity and workload intensification are well-documented barriers to technology use, often negating promised efficiencies through steep learning curves, redundancies, and duplicate tasks (Trust & Whalen, 2020; König et al., 2020). These pressures also affect teacher well-being, as persistent overload can cause "digital fatigue," where educators resist new initiatives due to cumulative strain (Turel & Gaudioso, 2018). Participants in this study echoed this tension, often perceiving useful tools as added burdens rather than supports.

Theme 5: Resistance and Attitudes Toward Digital Adoption

Although many participants acknowledged the potential benefits of digital tools, resistance to adoption persisted across both administrative and teaching groups, albeit in distinct forms. Among administrators, reluctance was often rooted in a preference for established, paper-based processes. This resistance was not necessarily outright opposition to technology but rather a comfort with familiar routines and a belief that traditional systems were more reliable and controllable:

Administrator C: "Daghan gihapon dili ganahan mugamit ug new digital tools kay mas komportable sa papel sa mano-mano." ("Many still do not want to use [digital tools] because they are more comfortable with paper or manual work.")

For teachers, resistance more frequently stemmed from low confidence in digital skills and a fear of making mistakes with unfamiliar systems. Several expressed their frustrations on other school heads for not integrating digital technology in making and submission of reports. One of the teachers said:

Teacher K: "Naa puy ubang school heads nga mag cge ug pa submit ug printed reports nga naa naman unta tay google drive to send the reports. Usik kaau siya sa time namo for teaching, usik pajud kaau sa bondpaper ug mga resources"

("There are some school heads who wants us teachers to submit printed reports when we should have a google drive to send the reports. It's a waste of our teaching time; it's a waste of bond paper and resources.")

This pattern reflects a self-efficacy barrier, where the perceived difficulty of digital tools outweighs their usefulness. Confidence, beliefs, and attitudes are as critical to adoption as infrastructure and training (König et al., 2020; Scherer et al., 2019). When confidence is low, even well-designed tools and practical training are underused, with educators reverting to analog methods. Institutional culture also matters—schools without role models or error-tolerant environments discourage experimentation. As Trust et al. (2020) note, without supportive signals that normalize gradual learning, adoption feels risky. Overcoming this requires not just policies or training but the cultivation of digital self-efficacy through practice, peer support, and alignment with school values. Resistance should be seen as systemic misalignment, requiring both cultural and structural support to make adoption a shared professional journey.

Theme 6: Reliability and Motivation

Both administrators and teachers identified system reliability as a decisive factor in sustaining motivation to use digital tools. Administrators explained that stable internet and well-functioning systems save substantial time, making digital tools the preferred option.

Administrator D: "Kung maayo ang tool ug stable ang net, makaluwas ug oras sa admin work."

("If the tool is good and the internet is stable, it saves time in admin work.")

Teachers offered a similar perspective, emphasizing how reliable platforms simplify encoding and reporting.

Teacher F: "Kung maayo ang platform, dali ra ang encoding sa grades ug reports."

("If the platform is good, encoding grades and reports is easy.")

Teacher H: "Kung daghan kaayong errors sa tool, mas maayo pa manual kaysa mag-waste og oras." ("If the tool has too many errors, it's better to go manual than waste time.")

These accounts reflect research showing that perceived reliability directly influences continued technology usage by shaping users' confidence in the system (Barrot et al., 2021).

Theme 7: Demographics and Adoption

Demographic characteristics, particularly age and years of service, emerged as important determinants of how quickly individuals adapt to digital tools. Administrators noted that younger staff tend to embrace new technologies more easily, whereas older colleagues often face a steeper learning curve.

Administrator C: "Ang mga batan-on nga staff dali ra kaayo makasunod; ang uban nga dugay na diri, maglisod og adjust."

("Young staff adapt quickly; older ones struggle to adjust.")

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Teachers echoed this generational pattern, with younger faculty members more adept at adopting productivity tools such as PowerPoint presentations and Excel.

Teacher M: "Mga young teachers, mas kusog mo-adapt sa PowerPoint Presentation and Excel."

("Young teachers adapt more quickly to PowerPoint Presentation and Excel.")

This pattern aligns with recent research showing that younger educators' familiarity with digital environments facilitates faster adoption (Scherer et al., 2019), whereas older staff may require more targeted, scaffolded support. However, the findings also suggest that age alone does not determine adoption; the mediating influence of training and contextual support is decisive.

Theme 8: Training as a Mediator

Across both groups, the relevance and specificity of training emerged as a critical mediator of the relationship between tool use and efficiency gains. Administrators emphasized that training tailored to their specific job functions—such as LIS navigation and School Forms (SF) encoding—produced immediate efficiency gains.

Administrator A: "Training nga focused sa among trabaho mas dali makahatag ug resulta nga efficient."

("Training focused on our work more easily results in efficiency.")

Similarly, teachers noted that well-structured training on digital record-keeping tools improved their workflow.

Teacher B: "Kung ma-train mi tarong unya advanced ang mga instructions sa SF forms, mas paspas gyud among work."

("If we are trained properly on SF forms, our work is really faster.")

This reinforces recent literature emphasizing that context-specific professional development can offset demographic disadvantages and accelerate adoption for all age groups (Tondeur et al., 2018; Barrot et al., 2021). When training is generic, its impact on efficiency is muted, regardless of user motivation.

Theme 9: Opportunities

While much of the discussion focused on challenges, both administrators and teachers identified distinct opportunities that digital tools offer to enhance administrative efficiency and overall school operations.

For administrators, the most salient opportunities involved faster information dissemination & interactive seminar presentation. Notable responses coming from the administrators were:

Administrator B: "With the use of technology, all mga division, district, or even school issuances or advisories, pwedi na kaau natong e-disseminate."

("With the use of technology, all divisions, districts, or even school issuances or advisories, we can now disseminate.")

The administrator emphasized that technology enables efficient dissemination of issuances and advisories across divisions and districts, underscoring its role in strengthening organizational communication. This reflects how digital tools streamline workflows and support real-time information sharing, consistent with Barrot et al (2021).

Administrator E: "During seminars, of course ma bored pud baya ang mga teachers. Out from the different productivity tools pwedi kaau nato ma apply para interactive ug engaging pud ang sessions."

("During seminars, of course teachers get bored too. Out of the different productivity tools, we can apply them to make the sessions interactive and engaging.")

Another administrator highlighted the use of productivity tools during seminars to keep sessions interactive and engaging, noting opportunities to enhance teacher participation and professional development. Such applications illustrate how digital adoption enhances not only compliance tasks but also pedagogical processes, aligning with Trust and Whalen's (2020) observation on the practical value of communication and interactivity features.

Teachers focused on opportunities for improved surveillance, monitoring, security, and efficient submission of reports. The following are the notable responses of the teachers:

Teacher J: "Since among school is naa juy CCTVs…Naa jud implicit monitoring ang among school head with regards sa daily activities inside sa school. Feel jud namo nga safe mi."

(" Since our school has CCTVs…Our school head has implicit monitoring with regards to daily activities inside the school. We feel safe.")

Teachers identified opportunities in terms of safety and efficiency. The installation of CCTVs was perceived as fostering implicit monitoring of daily school activities, which in turn promoted a stronger sense of security. This resonates with Trust and Whalen's

(2020) view that monitoring functions are among the most valued aspects of digital technology.

Teacher G: "Ang among school head naa nay gi prepare nga google drive para sa mga reports para if needed niya ang data siya nalang ang mo open sa drive unya access the documents. Mas efficient ang among report submissions unya dili maka interrupt sa classes."

("Our school head has already prepared a Google Drive for reports so that if he needs the data, he can just open the drive and access the documents. Our report submissions is more efficient and will not interrupt classes.")

Another teacher cited the use of Google Drive for report submissions, which streamlined documentation and reduced instructional disruptions. This highlights how digital tools directly support workflow efficiency, aligning with Barrot et al. (2021), who stress that improved accuracy and accessibility reinforce the value of technological adoption.

Triangulation

To examine the correlation between digital tool usage and administrative efficiency among administrators and teachers, the study employed a mixed- methods approach using a convergent parallel design. This allowed quantitative and qualitative findings to be analyzed side by side, with triangulation ensuring stronger, evidence-based conclusions (Bans-Akutey & Tiimub, 2021).

Table 9. *Integration Matrix*

Quantitative Findings	Supporting / Contradicting Qualitative Themes & Quotes	Integrated Interpretation
Administrators' and teachers' digital tool usage significantly correlated (B = 0.47, β= .48, p < .001). HO1 rejected.	Admins: "With the use of technology, all divisions, districts, or even school issuances or advisories, we can now disseminate." Teachers: "Our school head has already prepared a Google Drive for reports... submissions are more efficient and will not interrupt classes."	Usage correlation is reinforced by evidence showing technology improves information sharing and streamlines reporting.
Position/Rank and Trainings Attended predict usage; Age not significant.	Admins: "There are trainings for digital integration, but it seems like an overview." Teachers: "If we are trained properly on SF forms, our work is really faster."	Training and position outweigh demographics. Role-specific training fosters adoption across all groups.
Administrators' and teachers' administrative efficiency significantly correlated (B = 0.41, β = 0.46, p < .001). HO2 Rejected	Admins: "When the internet and tools like Google Forms, Sheets, and Google Drive are working well, compiling reports is much easier." Teachers: "Messenger… can really help if there are emergencies."	Efficiency gains confirmed: both groups report faster, more responsive workflows when tools function reliably.
Position/Rank and Trainings Attended predict efficiency; Age not significant.	Teachers: "There is a lot of teaching load… there is no time to explore new tools." "Training focused on our work more easily results in efficiency."	Efficiency linked to role and training, but constrained by workload. Protected time is needed to sustain gains.
Multivariate results: Position/Rank and Training predicts both usage and efficiency. HO3 rejected.	Admins: "With the use of technology… we can now disseminate." Teachers: "Our school head has already prepared a Google Drive… submissions are more efficient."	Predictors confirmed across both outcomes; qualitative evidence illustrates practical benefits of dissemination and reporting.
Age and Years of Experience not significant (p > .05).	Teachers: "Young staff adapt quickly; older ones struggle… Training focused on our work more easily results in efficiency."	Non-significance of age explained: effective, role-relevant training bridges generational gaps.

Meta-Inference

The integration of quantitative and qualitative findings shows that digital tool usage and administrative efficiency are shaped more by organizational structures and professional development rather than by demographic factors. Through the data-merging and joint-display triangulation process, convergence was evident between statistical relationships (e.g., B = 0.47 and B = 0.41, p < .001) and participants' lived experiences describing faster reporting, improved coordination, and more responsive communication.

Where minor divergence appeared—such as teachers' time constraints limiting application—qualitative evidence contextualized quantitative variance, illustrating the human factors behind efficiency scores. This multi-layered inference validates that digital transformation in schools operates as an organizational process supported by training, infrastructure, and leadership alignment rather than an outcome of individual attributes alone.

Meta-inference was conducted through a joint display analysis that compared and merged quantitative and qualitative results to identify convergence, divergence, and complementarity. Converging findings were integrated to produce unified interpretations, while divergences were analyzed to highlight contextual nuances. This process enhanced validity by synthesizing patterns across both data strands, ensuring that interpretations reflected the multidimensional reality of digital tool use in school administration.

Conclusions

Findings show that role alignment is the main driver of differences in digital tool usage and administrative efficiency. Administrators scored significantly higher ($p < .001$, medium-to-large effect sizes), reflecting responsibilities in compliance, reporting, and data management, while teachers' efficiency gains centered on grading, student monitoring, and parent communication. This pattern aligns with the Technology Acceptance Model, where role-specific perceived usefulness drives adoption (Field, 2018; Tabachnick & Fidell, 2019; Barrot et al., 2021; Trust & Whalen, 2020).

Professional development was the strongest predictor, with training attendance positively associated with tool use and efficiency ($p < .001$). Qualitative evidence showed that targeted, task-specific sessions (e.g., LIS navigation, SF encoding) yielded immediate gains, whereas generic workshops did not (Kimmons et al., 2020; Tondeur et al., 2018). Infrastructure gaps and workload intensification constrained outcomes, often forcing reversion to manual processes (Barrot et al., 2021; UNESCO, 2020; König et al., 2020). Age was not significant ($p > .05$), though younger staff adapted faster; structured support helped older staff achieve comparable proficiency (Scherer et al., 2019; van Laar et al., 2019). Overall, digital transformation in schools depends less on demographics and more on systemic supports, role-based demands, and sustained professional development, with efficiency gains reinforcing continued adoption.

Building on the study's findings, it is recommended that the institution implement a Tech-Driven Administrative Optimization Training Plan to enhance the adoption and sustained use of digital tools among administrators and teachers, ensuring contextualization, role sensitivity, and alignment with DepEd directives.

Goals & Objectives: Strengthen digital integration to improve administrative efficiency and teaching support by: (1) increasing role-specific proficiency in digital platforms, (2) enhancing confidence and consistency in digital tool usage, and (3) reducing workflow inefficiencies caused by manual processes.

Training Structure: Modular units tailored for administrators (emphasizing automation and data management) and teachers (focusing on digital grading, monitoring dashboards, and communication tools).

Delivery Strategies: Combine face-to-face workshops, guided practice with institutional datasets, online resources, and peer mentoring, emphasizing hands-on, task-based learning for immediate application.

Training Stages: (1) Orientation and baseline competency assessment, (2) role-specific capacity building via workshops and guided practice, (3) continuous reinforcement through peer collaboration, micro-trainings, and coaching.

Evaluation Mechanisms: Pre- and post-training assessments, participant feedback surveys, tracking of digital tool usage, and audits of administrative and teaching outputs, with iterative adjustments based on findings.

Training Budget: Prioritize digital infrastructure (connectivity, devices), expert trainers, materials, and monitoring systems. Cost-efficiency can be achieved through blended delivery and the use of in-house trainers after the initial cycle.

Grounded in clear goals, structured yet flexible modules, practical delivery methods, and robust evaluation, this plan aims to sustain technology adoption, make it role-relevant and efficiency-enhancing, and foster an agile, data-driven school administration and teaching environment.

Future studies are encouraged to adopt longitudinal and comparative designs to evaluate the long-term effects of digital integration on administrative performance. Expanding the research scope to other districts or regions may yield broader insights into best practices for technology-driven administrative optimization and sustainable school management.

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