

Technology-Driven Strategies in Transformational Leadership: Practices of School Heads in Public Elementary Schools

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Abstract

This study examined the extent to which public elementary school heads implement technology-driven strategies and how these relate to transformational leadership practices across five leadership domains—School Planning, School Operations, Instructional Leadership, Professional Leadership, and Communication. Anchored on Contingency Theory, Transformational Leadership Theory, and General Systems Theory, the study utilized a descriptive research design involving 110 respondents: 55 school heads and 55 teachers from a Schools Division in Albay. Data were collected through a researcher-made questionnaire measured on a 4-point Likert scale and analyzed using Frequency Count, Percentage Technique, Weighted Mean, and ANOVA. Results showed that technology-driven instructional leadership was highly practiced (mean 3.50), particularly in encouraging ICT integration in teaching, while school operations was the least practiced domain (mean 2.49), with cloud-based applications and online stakeholder engagement identified as recurring problem areas. Communication and professional leadership were moderately practiced, although virtual mentoring, digital grievance mechanisms, and personalized digital support registered low mean scores. Significant differences were found across technology-driven leadership domains ($F = 3.60 > 2.87$) and transformational leadership dimensions ($F = 8.07 > 3.24$), with Inspirational Motivation emerging as the highest-rated transformational leadership indicator and Individualized Consideration as the weakest. The study concludes that technology-driven transformational leadership is unevenly implemented, indicating the need for a leadership training design that enhances digital operations, structured mentoring, data-driven governance, and communication systems. The study supports SDG 4 (Quality Education) by strengthening digital competence and instructional leadership, and SDG 9 (Industry, Innovation, and Infrastructure) through its focus on ICT-based governance and digital systems. It also reinforces institutional sustainability by enhancing school governance processes, supporting teacher development, and promoting resilient, technology-enabled learning environments.

Keywords: Communication, Descriptive Research, Instructional Leadership, Professional Leadership, School Heads, School Operations, School Planning, Technology-Driven Strategies, Transformational Leadership

1. Introduction

Increasing demands for digital transformation in education have prompted school heads to integrate technology into school management, instructional supervision, and communication with stakeholders. While global and national educational systems increasingly emphasize technology as an engine for innovation and improved governance, many elementary schools still face constraints in resources, digital training, and preparedness. These conditions highlight the relevance of examining how school heads apply technology-driven strategies as transformational leaders capable of inspiring change, improving instructional quality, and strengthening organizational effectiveness. International frameworks, national policies, and local initiatives collectively point to the critical role of school leaders in leveraging digital tools to improve decision-making and support teacher development (UNESCO, 2022; World Bank, 2023; ISTE, 2024; DepEd Order No. 24, s. 2020). The present study builds on these directions by determining the technology-driven strategies practiced by public elementary school heads and evaluating how these relate to transformational leadership practices. Findings aim to support leadership development initiatives, enhance digital competence, and inform policy and capacity-building efforts.

1.1 Background of Technology-Driven Leadership in Basic Education

School heads are increasingly expected to utilize technology to enhance school operations, instructional services, and communication. Yet challenges persist due to limited ICT resources, uneven digital skills, and varying levels of institutional readiness. This underscores the need to analyze how school leaders utilize digital tools and strategies within their leadership roles. Global organizations highlight the relevance of technology in bridging educational gaps and supporting inclusive, equitable learning (UNESCO, 2022; World Bank, 2023). In the Philippines, Republic Act No. 11337 promotes innovation across sectors, including education, while DepEd Order No. 24, s. 2020 identifies school heads as technology leaders responsible for ICT integration in management and instruction. This alignment establishes a clear rationale for examining

school heads' technology-driven practices as part of transformational leadership, especially in public elementary schools facing diverse contextual realities.

1.2 Themes and Insights from Literature on Technology Integration and Transformational Leadership

The literature consistently recognizes technology as a catalyst for effective transformational leadership. Global frameworks emphasize technology-based governance, data-informed decision-making, and equitable access to learning resources (United Nations, 2020). Philippine policies such as the DepEd 5-Point Agenda (Department of Education, 2024) and DepEd Orders No. 24, s. 2020 and No. 29, s. 2022 highlight ICT-supported management, monitoring, and evaluation as essential leadership functions. Research studies affirm that technology improves decision-making, administrative efficiency, and instructional support (Ramos & Bauyot, 2025). Leadership competencies such as adaptability, problem-solving, and supportiveness significantly shape digital fluency (De Los Reyes & Paglinawan, 2024). Teacher-focused studies show that digital literacy strengthens pedagogical effectiveness, collaboration, and critical thinking (Labisig & Baluyos, 2022; William et al., 2025; Cantutay & Taganas, 2024). Leadership-focused literature highlights essential competencies for navigating digital transformation, including strategic vision, communication, decision-making, and resilience (Ambon et al., 2023; Wolfenden et al., 2023). International and Philippine studies confirm the positive influence of transformational leadership on school climate, teacher performance, and student achievement (John, 2021; Mwita, 2022; Marchan & Formanes, 2023; Pana, 2024; Catelo & Caballes, 2024; Malco, 2024). Other works emphasize that technology-supported leadership fosters innovation, inclusive education, and digital maturity among teachers (Espinosa & Quines, 2025; Fabunan & Cabal, 2025; Gabato, 2025; Costache, 2025). Collectively, these studies affirm the strong interrelationship between digital leadership and transformational leadership but highlight the need for further research on how public elementary school heads integrate technology within multiple leadership domains.

1.2 Local, National, and Global Context of Technology Leadership in Schools

This study was conducted in one of the four Schools Divisions in the province of Albay. The division comprises diverse school environments including lowland, coastal, and upland settings, which influence how school heads implement technology-driven leadership strategies. The division's ongoing digital initiatives aligned with DepEd Order No. 24, s. 2020 provide an appropriate context for examining digital preparedness and adaptive leadership. Nationally, DepEd promotes ICT-based governance through professional standards, computerization programs, and monitoring systems. Local government units and NGOs also support digital learning initiatives that directly affect school-level implementation. Globally, UNESCO, the World Bank, and ISTE emphasize the role of school leaders in accelerating digital transformation, supporting equitable learning, and building institutional resilience. This multi-level context reinforces the relevance of examining technology-driven transformational leadership in Philippine public elementary schools.

1.3 Theoretical and Conceptual Foundations of Technology-Driven Transformational Leadership

This study draws on three foundational theories. Contingency Theory (Fiedler, 1960) highlights that leadership effectiveness depends on situational conditions such as resource availability, digital readiness, and institutional support. Transformational Leadership Theory (Bass, 1985) identifies four dimensions—Idealized Influence, Inspirational Motivation, Intellectual Stimulation, and Individualized Consideration—essential for inspiring change, fostering innovation, and motivating teachers, all of which align strongly with technology integration. General Systems Theory (von Bertalanffy, 1940) conceptualizes schools as interconnected systems where administrators, teachers, learners, and technology interact to achieve goals. The conceptual framework organizes the study through five domains of technology-driven strategies—school planning, school operations, instructional leadership, professional leadership, and communication—linked to transformational leadership outcomes. This integrated perspective supports the development of a training design that enhances technology-driven leadership among school heads.

1.4 Research Gaps and Rationale for Examining School Heads' Technology-Driven Strategies

Although research exists on digital leadership, teaching digital competence, and transformational leadership, studies rarely examine how elementary school heads integrate technology across multiple leadership functions. Much of the literature focuses on secondary schools, international contexts, or isolated dimensions of leadership. This study addresses these gaps by assessing the extent of school heads' technology-driven strategies in five leadership domains, analyzing transformational leadership practices as perceived by teachers and school heads, identifying differences across contextual and demographic variables, and producing a leadership training design aligned with national digital reforms. The findings will guide capacity-building programs that strengthen digital governance, instructional support, and professional development in elementary schools.

1.5 Alignment with Relevant Sustainable Development Goals (SDGs)

The focus of this study on technology-driven transformational leadership among public elementary school heads aligns with several Sustainable Development Goals (SDGs) that emphasize quality education, innovation, and institutional strengthening. In particular, the study supports SDG 4 (Quality Education) by promoting improved digital competence, enhanced instructional supervision, and equitable access to technology-enabled learning environments. It also aligns with

SDG 9 (Industry, Innovation, and Infrastructure) through its emphasis on ICT integration in school planning, operations, and data-driven management. The involvement of school communities and stakeholders further reflects SDG 11 (Sustainable Cities and Communities), as effective digital leadership fosters collaborative and resilient learning communities. Additionally, the study contributes to SDG 16 (Peace, Justice, and Strong Institutions) by reinforcing transparent, accountable, and evidence-based school governance. Finally, the study corresponds to SDG 17 (Partnerships for the Goals) by highlighting the need for collaboration among DepEd, local government units, NGOs, and community partners to sustain digital transformation in education. Overall, the study demonstrates strong alignment with global educational and institutional development goals.

1.6 Importance of the Study to Multidisciplinary Sustainability

The study holds significant relevance to multidisciplinary sustainability because technology-driven transformational leadership strengthens educational systems across interconnected domains. It supports educational sustainability by enhancing teaching and learning processes through improved instructional leadership, teacher development, and digital integration. It advances technological sustainability by promoting the long-term adoption of ICT in school governance, communication, and decision-making. The focus on leadership competencies, resilience, and continuous improvement contributes to organizational sustainability, enabling schools to adapt effectively to changing educational demands. Moreover, by supporting the development of digitally empowered learners and equitable access to technological resources, the study reinforces socio-economic sustainability and helps prepare communities for an increasingly digital society. Strengthened school–community partnerships also contribute to community sustainability, ensuring that technology adoption is inclusive, collaborative, and capable of enduring over time. Through these contributions, the study promotes holistic and future-oriented sustainability in education, technology, governance, and community development.

2. Material and methods

2.1 Research Design

The study employed a descriptive research design, which is used to describe and interpret existing conditions without manipulating variables (McCombes, 2023). This approach provided a systematic way to examine the extent to which technology-driven strategies and transformational leadership practices were implemented among public elementary school heads. The primary method of data collection was a survey, which allowed the researcher to gather information on perceptions, experiences, and practices related to technology-driven leadership (Gay et al., 2012). Data collected through structured questionnaires were analysed using Frequency Count, Percentage Technique, Weighted Mean, and F-Test (ANOVA) to determine leadership patterns and identify areas for developing a leadership training program.

2.2 Locale of the Study

The study was conducted in one Schools Division Office in the province of Albay. A total of 55 public elementary schools from various clusters within the division served as sources of data. The locale offered a relevant context for examining technology-driven leadership practices based on existing DepEd policies and local digital initiatives.

2.3 Respondents of the Study

The respondents consisted of 55 elementary school heads and 55 selected teachers from public elementary schools within the chosen division. These participants were selected to provide a balanced perspective on technology-driven transformational leadership. School heads were included because they directly implement leadership strategies, while teachers were selected because they observe and experience these practices in their daily work. Their combined perspectives offered comprehensive insights into leadership behaviours and their effects on teaching and learning.

2.4 Sample and Sampling Procedure

A total of 110 respondents were included: 55 school heads and 55 teachers, representing three clusters of public elementary schools in the division. The selection was strategic to ensure that both administrative and instructional viewpoints were represented. All respondents received questionnaires, and all instruments were retrieved, resulting in a 100 percent return rate. Continued coordination and follow-up helped ensure complete and reliable data collection.

2.5 Research Instrument

The study used a researcher-made survey questionnaire. Part I measured the extent of technology-driven transformational leadership practices across five domains: School Planning, School Operations, Instructional Leadership, Professional Leadership, and Communication. Each indicator was rated using a 4-point Likert scale from 1 (Poorly Practiced) to 4 (Highly Practiced). Part II assessed transformational leadership practices based on Idealized Influence, Intellectual Stimulation, Individualized Consideration, and Inspirational Motivation, using the same scale. The structured format of the questionnaire allowed for consistent measurement of leadership practices as perceived by both school heads and teachers.

2.6 Data Gathering Procedure

Before administering the questionnaire, the Dean of the Graduate School endorsed a request letter addressed to the Schools Division Superintendent and the school heads of the selected public elementary schools. Upon approval, permission letters and questionnaires were distributed to respondents with clear instructions. Completed questionnaires were retrieved on scheduled dates. All responses were compiled, organized, and prepared for statistical analysis. Full retrieval was achieved through regular follow-up and coordination with school officials.

2.7 Data Analysis Techniques

The study used Frequency Count to determine how often each response option was selected (Aliaga & Gunderson, 2002). The Percentage Technique converted these frequencies into proportional values for clearer comparison (Best & Kahn, 2006). Weighted Mean was applied to summarize responses and determine the overall extent of technology-driven transformational leadership practices (Taylor, 2015). The F-Test or ANOVA (Broto, 2007) was used to identify significant differences among variables. The null hypothesis was rejected when the computed F-value exceeded the critical value at the 0.05 level of significance, indicating a significant difference among group means. All formulas and computations followed standard ANOVA procedures.

2.8 Ethical Considerations

Ethical standards were strictly followed. Informed consent was obtained from all respondents, who were informed of the study's purpose, processes, and their right to withdraw at any time. Confidentiality and anonymity were assured by avoiding the collection of identifying information and restricting data access to the researcher. All responses were used solely for academic purposes and were analysed impartially to maintain the integrity of participants' contributions.

3. Results and Discussion

3.1 Technology-Driven Strategies of School Heads

3.1.1 School Planning

Results showed that technology-driven strategies in school planning were moderately practiced, with an overall mean of 3.15. Integrating ICT in the preparation of the School Improvement Plan (SIP) registered the highest mean of 3.68, interpreted as highly practiced. In contrast, engaging stakeholders through online consultations obtained the lowest mean of 2.42, interpreted as slightly practiced. Other practices—including the use of data analytics, alignment with DepEd policies, and tracking technology-driven initiatives—were moderately practiced. These results indicate that school heads are more proficient in applying ICT for formal planning processes than for inclusive, technology-mediated stakeholder engagement. The limited use of online consultations suggests barriers in skills, technology, or connectivity. This supports the findings of Almekhlafi, Ismail, and Hassan (2020), who emphasized that effective school planning requires clear, organized, and technology-based strategies that integrate stakeholder participation to ensure inclusive, data-driven decision-making.

3.1.2 School Operations

Findings revealed that technology-driven strategies in school operations were slightly practiced overall, with an average mean of 2.49. Enhancing communication through digital advisories obtained the highest mean of 3.15, interpreted as moderately practiced. Maintaining digital records was also moderately practiced. However, using online scheduling tools, establishing data privacy protocols, and especially utilizing cloud-based applications (mean 1.75) were only slightly practiced. These findings suggest that school heads rely more on basic communication technologies than on advanced operational tools such as cloud-based systems. Constraints may include limited technical expertise, inadequate infrastructure, or insufficient funding. Maala and Lagos (2022) similarly noted that although school heads demonstrate technological leadership, full integration of advanced tools into daily operations remains limited, emphasizing the need for targeted capacity-building and digital resource management training.

3.1.3 Instructional Leadership

Technology-driven instructional leadership was found to be highly practiced overall, with a mean of 3.50. Encouraging teachers to use ICT in instruction achieved the highest mean of 3.79, classified as highly practiced. Supporting blended and flexible learning also ranked highly (mean 3.53). Meanwhile, technical support for ICT, digital monitoring of academic progress, and assessment of digital learning strategies were moderately practiced. These findings show that while school heads are strong advocates of ICT integration, there is less consistency in providing systematic support and monitoring mechanisms for teachers. Abdullah and Kadir (2023) similarly found that strong digital leadership among principals enhances teachers' digital competency, underscoring the need for continual training and structured support to ensure effective and sustained ICT implementation in instruction.

3.1.4 Professional Leadership

Professional leadership practices were moderately practiced overall, with an average mean of 3.17. Promoting teacher participation in online training (mean 3.64) and encouraging engagement in online professional networks (mean 3.52) were highly practiced. Providing access to digital resources and evaluating professional development outcomes were moderately practiced, while conducting virtual mentoring and coaching sessions (mean 2.39) was slightly practiced. These results imply that although school heads actively promote online professional learning, structured virtual coaching and individualized digital support are less established. Esguerra and Quinto (2025) also observed that while teachers benefit from professional development opportunities, gaps remain in specialized areas and leadership support. The findings suggest prioritizing virtual mentoring systems to strengthen the overall impact of digital professional development.

3.1.5 Communication

Findings show that technology-driven communication strategies were moderately practiced (mean 3.06). Enhancing stakeholder engagement through social media had the highest mean of 3.47, classified as moderately practiced. Feedback systems, digital policy sharing, and virtual meetings were also moderately practiced, while online grievance and suggestion mechanisms were slightly practiced (mean 2.43). These results indicate effective use of social media for outreach but limited implementation of more structured, two-way digital communication systems. Harwanto et al. (2025) similarly reported that although digital tools promote transparency between schools and parents, feedback participation remains weak due to digital literacy gaps. This underscores the need for stronger digital grievance mechanisms and systematic two-way communication strategies.

3.1.6 Differences Across Technology-Driven Leadership Domains

ANOVA results showed a significant difference in the extent of technology-driven strategies across leadership domains ($F = 3.60 > 2.87$). Instructional Leadership was the most highly practiced (mean 3.50), followed by Professional Leadership (3.17), School Planning (3.15), and Communication (3.06). School Operations had the lowest mean of 2.49, interpreted as slightly practiced. These findings demonstrate uneven implementation of technology-driven leadership, with school heads applying technology more effectively in teaching and learning contexts than in operational management. Rayray (2023) also noted strong digital leadership among school administrators, with operational areas identified as needing improvement. This supports the need for specialized training on digital operations, cloud-based tools, and structured technology systems to balance leadership performance across all domains.

3.2 Challenges Identified in Technology-Driven Leadership Practices

The results revealed several recurring challenges, with the lowest mean scores observed in cloud-based operations (mean 1.75), online stakeholder consultations (2.42), virtual mentoring (2.39), digital grievance mechanisms (2.43), personalized digital feedback (2.18), and digital collaboration (2.08). These reflect limitations in infrastructure, digital skills, support structures, and confidence in advanced technologies. Such challenges align with findings by Maala and Lagos (2022), Harwanto et al. (2025), and Cantos & Callo (2022), who emphasized the need for sustained capacity building, reliable digital infrastructure, and improved leadership support. These gaps justify professional development interventions focusing on cloud-based systems, digital engagement, data security, and personalized digital coaching to strengthen school-level technology-driven leadership.

3.3 Differences and Relationships Among Leadership Variables

Significant differences were also found among transformational leadership domains ($F = 8.07 > 3.24$). Inspirational Motivation had the highest mean (3.52), followed by Idealized Influence (3.32) and Intellectual Stimulation (3.31), all moderately practiced. Individualized Consideration had the lowest mean of 2.66, indicating weaker performance in personalized support. These variations suggest that while school heads excel in motivating staff and articulating a clear digital vision, they provide less individualized assistance to teachers. This reflects findings by Rayray (2023) and Esogon, Gumban, and Guitche (2024), who noted that inspirational motivation enhances teacher morale, whereas individualized consideration does not consistently translate into improved performance. Strengthening personalized mentoring, teacher engagement, and differentiated digital support is therefore necessary to achieve balanced transformational leadership across all dimensions.

4. Conclusion & Recommendations

The findings of the study indicate that school heads demonstrate varying levels of technology-driven strategies and transformational leadership practices, with instructional leadership emerging as the most extensively practiced and school operations as the least utilized in terms of technology integration. Significant differences were found across all technology-driven leadership domains, and transformational leadership dimensions likewise showed variations, with Inspirational Motivation rated highest and Individualized Consideration rated lowest. These results confirm that school heads' practices range from slightly to highly practiced across indicators and that the differences observed necessitate the development of

a leadership training design targeting the least practiced areas to enhance technology-driven transformational leadership in public elementary schools.

Based on the conclusions, the study recommends strengthening professional development programs focused on improving the use of technological tools for administrative processes, community engagement, and cloud-based applications to support more efficient school operations. Communication systems may be enhanced through improved use of social media, virtual meeting tools, and digital feedback mechanisms, while professional leadership can be reinforced through online mentoring, coaching, and continuous teacher training. Instructional leadership may be supported by providing clear technical guidance and regular monitoring of teaching practices. The leadership training program developed from the study's findings may be implemented to build school heads' competencies in technology-oriented transformational leadership, and future research may be conducted to examine the long-term effects of such leadership on teachers, learners, and overall school performance.

Compliance with ethical standards

This study adhered to institutional and academic ethical standards for research involving human participants. No experimental interventions were conducted. All participating school heads and teachers joined voluntarily, and confidentiality and responsible data handling were strictly observed throughout the study.

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Conflict of interest statement

The author declares no financial or personal conflicts of interest in the conduct, analysis, or reporting of this research. No external individual or institution influenced the study's processes or outcomes.

Statement of ethical approval

The study involved survey-based data collection with prior permission obtained from the concerned Schools Division authorities and school administrators. As the research posed no physical, psychological, or legal risk to participants, formal ethics board approval was not required. All procedures complied with accepted ethical guidelines for social science and educational research.

Statement of informed consent

Informed consent was obtained from all respondents. Participants were informed about the study's purpose, voluntary nature, confidentiality protections, and their right to withdraw at any time. No personal or identifying information was included in the final report.

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