International Journal of Sustainable and Integrated Studies
Volume 1, Issue 4 | ISSN: 3155-6361
DOI: https://doi.org/10.65339/ijsis.V1.I4.282

Digital School Governance: The Relationship Between Principals' ICT Competence and Teachers' Technology Integration Practices in Urban Public Schools

Lorren P. Lojena[1], Mary Jane P. Bendol[1], Edelmhira C. Sereño[1], Fitz Gerald L. Fordan[1], Lotus B. Alegre[1], Ruby Bless D. Manticayan[1], Lovelyn P. Sevilla[1], Jaymie A. Rellon, PhD[2], Eduardo M. Tejeros III, PhD[2]

[1]*Student, Doctor of Philosophy in Education, Major in Educational Leadership, Central Mindanao Colleges, Kidapawan City, Philippines*
[2]*Faculty, Graduate School Education, Central Mindanao Colleges, Kidapawan City, Philippines*

Email of Corresponding Author: jaymierellon1020@gmail.com

Publication history:

Received: October 2, 2026 Accepted: November 12, 2026
Revised: November 9, 2026 Published: November 13, 2026

International Journal of Sustainable and Integrated Studies, Vol. 1, No. 4, pp. 282–288, November 2026.

Abstract

This study examined the relationship between principals' information and communication technology (ICT) competence and teachers' technology integration practices in selected urban public schools in the Philippines. An explanatory sequential mixed-methods design was employed, involving 250 teachers from approximately 20 schools through a reported stratified random sampling approach and 18 qualitative participants comprising principals, ICT coordinators, and teachers selected purposively from six schools. Data were gathered using five-point survey questionnaires and semi-structured interviews and analyzed through descriptive statistics, Pearson correlation, multiple regression, and thematic analysis. Results revealed high levels of principals' ICT competence ($M = 4.176$) and teachers' technology integration ($M = 4.156$), with a significant moderate positive relationship between the variables ($r = 0.482$, $p < .001$). Qualitative findings identified supportive digital leadership, accessible technical assistance, and encouragement for technology-based teaching as prominent themes. The study concluded that favorable perceptions of principals' ICT competence were associated with greater reported technology integration. Strengthening digital communication, technical support, cybersecurity, and inclusive instructional practices is recommended. However, self-reported data, incomplete methodological documentation, and inconsistent regression statistics limited causal and predictive interpretations. The findings contribute context-specific evidence for strengthening sustainable digital school governance, supporting Sustainable Development Goals 4 (Quality Education), 16 (Peace, Justice, and Strong Institutions), and 17 (Partnerships for the Goals) through responsible leadership, educational inclusion, and institutional collaboration.

Keywords: Digital Leadership; Digital School Governance; ICT Competence; Mixed-Methods Research; Principals; Technology Integration; Urban Public Schools

1. Introduction

Digital technology has become integral to instructional planning, assessment, communication, school administration, and professional collaboration. However, access to digital devices and platforms does not necessarily ensure effective technology integration. Educational institutions require competent digital leadership, appropriate governance, and sustainable instructional support to maximize technology's educational value. UNESCO (2023) and the Organisation for Economic Co-operation and Development (OECD, 2023) emphasize the importance of equity, evidence-based governance, and sustainable digital education systems. In the Philippines, the Digital Rise Program supports technology-driven improvements in educational quality (Department of Education, 2022). Within this context, the present study examines the relationship between principals' ICT competence and teachers' technology integration practices in selected urban public schools.

Principals' ICT competence encompasses technology operations and technical judgment, digital communication and collaboration, data-informed decision-making, cybersecurity, privacy and digital ethics, and digital resource planning and professional learning support. Teachers' technology integration practices include instructional planning and digital resource design, technology-enhanced teaching and learner engagement, digital assessment and feedback, inclusive learner support and communication, and professional collaboration and innovation. These dimensions highlight the importance of examining both school leadership capabilities and teachers' reported instructional practices. Digital school governance provides the institutional context for understanding this relationship rather than functioning as a separately measured variable.

Existing literature identifies digital leadership as an important consideration in teachers' adoption and integration of educational technologies. Studies have examined associations between technological leadership, institutional support, and classroom technology practices across different educational settings (AlAjmi, 2022; Kaya-Kasikci et al., 2023; Schmitz et al., 2023). Philippine studies similarly investigate school heads' technological leadership, ICT competence, and teachers' integration practices (Larawan et al., 2023; Maala & Lagos, 2022; Rayray, 2023). Yang et al. (2025) further emphasize capacity building and contextual conditions in understanding leadership–integration relationships. Collectively, these studies suggest that effective technology integration involves more than technical proficiency, requiring supportive leadership, professional collaboration, and attention to instructional needs.

At the global level, digital education initiatives increasingly emphasize equitable access, responsible technology use, and institutional capacity. Nationally, Philippine educational technology initiatives provide a policy context for strengthening school leadership and teachers' digital practices. Within urban public schools, principals' competence may be particularly relevant to technology-related decisions, professional assistance, and instructional coordination. Nevertheless, urban classification alone does not establish adequate connectivity, resources, or equitable access. Examining teachers' experiences within these settings therefore provides a localized perspective on digital leadership and classroom technology integration.

The study is primarily anchored in Social Cognitive Theory, which recognizes the interaction between environmental conditions and individual practices. From this perspective, principals' leadership support represents part of the school environment within which teachers engage in technology-related activities (Bandura, 1986). The Technological Pedagogical Content Knowledge framework further explains the importance of integrating technological knowledge with pedagogy and subject content to support meaningful instructional practices (Mishra & Koehler, 2006). These frameworks provide complementary perspectives for interpreting the relationship between leadership competence and technology integration. However, teacher self-efficacy and reciprocal causal relationships were not directly examined.

Although previous studies have explored technological leadership and teachers' technology integration, differences in leadership constructs, educational contexts, and instructional outcomes warrant further investigation (AlAjmi, 2022; Kaya-Kasikci et al., 2023; Schmitz et al., 2023). Philippine research provides relevant evidence but remains situated within particular institutional settings (Larawan et al., 2023; Maala & Lagos, 2022; Rayray, 2023). Yang et al. (2025) identify the importance of contextual conditions and capacity building, supporting a more differentiated examination of principals' ICT competence. Accordingly, this study aims to determine the levels of teacher-rated principals' ICT competence and teachers' self-reported technology integration, examine their statistical relationship, assess the reported contributions of five competence dimensions, and interpret quantitative findings through the experiences of principals, ICT coordinators, and teachers. The inquiry adopts an explanatory sequential mixed-methods approach while recognizing the limitations of self-reported and cross-sectional evidence.

The study aligns primarily with Sustainable Development Goal 4 (Quality Education) by examining digital leadership and technology integration practices relevant to instructional improvement and inclusive learning. It also supports SDG 16 (Peace, Justice, and Strong Institutions) through its emphasis on responsible digital

governance, privacy, ethical technology use, and institutional accountability. Furthermore, SDG 17 (Partnerships for the Goals) is relevant to the collaboration among school leaders, ICT coordinators, and teachers in supporting educational technology implementation. These connections reflect the study's focus on educational quality, institutional responsibility, and professional cooperation.

From a multidisciplinary sustainability perspective, the study contributes to educational, technological, and institutional sustainability by examining how principals' ICT competence relates to teachers' reported technology integration practices. Its findings may inform the review of digital leadership support, professional learning opportunities, technical assistance, privacy safeguards, and inclusive instructional practices. By emphasizing responsible governance, collaborative support, and the educational purpose of technology, the study provides evidence relevant to strengthening sustainable digital education practices in urban public schools.

2. Material and methods

2.1 Research Design

The study utilized an explanatory sequential mixed-methods design, beginning with a descriptive-correlational survey and multiple regression analysis, followed by qualitative inquiry. Preliminary quantitative findings reportedly guided the selection of interview participants and the development of follow-up questions. Quantitative and qualitative findings were subsequently integrated to identify converging evidence and explanatory gaps (Creswell & Creswell, 2022). The qualitative findings were treated as provisional because the available records did not establish a completed comparative multiple-case analysis.

2.2 Locale of the Study

The study was conducted in approximately 20 selected urban public schools in the Philippines. Urban classification provided the geographic context for examining digital school governance and instructional technology practices, consistent with the Philippine Statistics Authority (2022). However, the specific school division, verified school locations, final school count, and documented selection rationale were not provided. Consequently, the geographic scope of the findings remained limited to the reported participating schools.

2.3 Respondents of the Study

The quantitative phase involved 250 public-school teachers who evaluated their principals' ICT competence and reported their own technology integration practices. The qualitative phase reportedly included 18 participants from six schools, consisting of six principals, six ICT coordinators, and six teachers. These participants provided accounts of leadership support, technical assistance, and technology-based instructional practices. However, the available documentation did not establish complete participant-to-interview attribution or verified representation across all participant roles.

2.4 Sample and Sampling Procedure

Stratified random sampling was reported for the quantitative phase, involving 250 teachers from approximately 20 urban public schools. However, the specific strata, population distribution, sample allocation, recruitment procedures, and response rate were not documented. Teachers served as the primary survey respondents, with participants grouped within schools. For the qualitative phase, purposive sampling was reportedly employed to select 18 participants from six schools based on preliminary quantitative findings. The specific selection criteria and survey profiles used to identify these participants were not provided.

2.5 Research Instrument

The study utilized a five-point survey questionnaire measuring two principal constructs: teacher-rated principals' ICT competence and teachers' self-reported technology integration practices. Principals' ICT competence covered technology operations and technical judgment, digital communication and collaboration, data-informed decision-making, cybersecurity, privacy and digital ethics, and digital resource planning and professional learning support. Teachers' technology integration covered instructional planning and digital resource design, technology-enhanced teaching and learner engagement, digital assessment and feedback, inclusive learner support and communication, and professional collaboration and innovation. The questionnaire was described as informed by digital competence frameworks and Philippine educational standards (Department of Education, 2020; Mishra & Koehler, 2006). However, the original instrument and adaptation records were unavailable, so the specific contribution of each framework could not be independently established. Although expert review, cognitive review, pilot testing, and construct checks were mentioned, the original questionnaire, item counts, scoring procedures, validity results, and reliability estimates were unavailable for verification (DeVellis & Thorpe, 2021). A semi-structured interview guide was also reportedly used to explore leadership support, infrastructure, digital governance, privacy, and classroom technology implementation, although the complete guide was not supplied.

2.6 Data Gathering Procedure

Data collection began with the administration of the teacher survey, followed by preliminary quantitative analysis to inform the selection of schools and participants for qualitative inquiry. Semi-structured interviews and reported focus-group discussions explored participants' experiences with principals' digital leadership, technical assistance, instructional technology, and implementation challenges. The available qualitative excerpts included Cebuano statements with English translations, which were retained as provided. However, the collection dates, administration procedures, interview duration, recording arrangements, transcription methods, translation verification, and complete participant identification records were not documented. The available evidence therefore supported a limited interpretation of the reported experiences without establishing comprehensive coverage of all participants or schools.

2.7 Data Analysis Techniques

Quantitative data were analyzed using means and standard deviations to describe principals' ICT competence and teachers' technology integration practices. Pearson correlation was used to determine the relationship between the overall construct scores, while multiple regression examined the reported joint and individual contributions of five principal competence dimensions to teachers' technology integration, using a significance level of .05. However, inconsistencies among the reported sample size, regression degrees of freedom, F statistic, and model summary prevented verification of the predictive findings. Documentation of regression assumptions, missing-data handling, and adjustments for teachers grouped within schools was also unavailable. Qualitative data were interpreted through reflexive thematic analysis, focusing on leadership responsiveness, access to technical assistance, and instructional purpose (Braun & Clarke, 2022). The quantitative and qualitative findings were integrated to identify areas of convergence and unresolved explanations, although the absence of complete transcripts and coding records limited the strength of the thematic interpretations.

2.8 Ethical Considerations

Participation was reported as voluntary, and informed consent was obtained from participants. Respondent identities were coded, individual teacher ratings were withheld from school leaders, and confidentiality was maintained in accordance with the privacy principles of the Data Privacy Act of 2012 (Republic Act No. 10173, 2012). Reporting avoided identifying individual participants and assigning unverified roles or school affiliations to qualitative statements. However, the available documentation did not establish the ethics committee approval date or protocol number, and specific data-access controls, retention procedures, and focus-group confidentiality arrangements remained unverified.

3. Results and Discussion

3.1 Principals' ICT Competence

Principals' ICT competence obtained an overall mean of 4.176 (SD = 0.383), classified as High. Digital Communication and Collaboration ranked highest (M = 4.200), while Cybersecurity, Privacy, and Digital Ethics ranked lowest (M = 4.152). The difference between these ratings was minimal. The findings indicate favorable perceptions of principals' digital leadership, particularly in communication and collaboration. However, the relatively lower cybersecurity rating warrants further examination without implying inadequate practices. Zeng et al. (2025) emphasize ethical guidance and organizational support in digital leadership.

3.2 Teachers' Technology Integration Practices

Teachers' technology integration obtained an overall mean of 4.156 (SD = 0.386), classified as High. Professional Collaboration and Innovation ranked highest (M = 4.177), while Inclusive Learner Support and Communication ranked lowest (M = 4.140). These findings suggest favorable technology integration practices, particularly in professional collaboration. Schmitz et al. (2025) associate transformational leadership with technology-related collaboration, while UNESCO (2023) emphasizes accessibility and equity in digital education. The small differences among ratings do not establish significant differences in instructional practices.

3.3 Relationship Between Principals' ICT Competence and Teachers' Technology Integration

Pearson correlation analysis revealed a moderate positive relationship between principals' ICT competence and teachers' technology integration ($r = 0.482$, $p < .001$). Teachers reporting higher principal competence also tended to report greater technology integration. The findings align with research linking digital leadership and technology integration (AlAjmi, 2022; Schmitz et al., 2023). Social Cognitive Theory also recognizes environmental support as relevant to individual practices (Bandura, 1986). However, the cross-sectional, self-reported data do not establish causation.

3.4 Predictive Contributions of ICT Competence Dimensions

The reported regression coefficients were positive, with Digital Communication and Collaboration ranking highest ($\beta = 0.135$), followed by Data-Informed Decision-Making ($\beta = 0.130$), Cybersecurity, Privacy, and Digital Ethics ($\beta = 0.118$), Digital Resource Planning and Professional Learning Support ($\beta = 0.114$), and Technology

Operations and Technical Judgment (β = 0.111). The model reported $R^2 = 0.232$ and $F(5, 995) = 604.6$, but these statistics were inconsistent with the stated sample of 250 teachers. Although Yang et al. (2025) and Maala and Lagos (2022) highlight the relevance of technological leadership and capacity building, the inconsistent regression statistics prevent reliable interpretation of the predictors' individual contributions. Verification of the original statistical output is necessary before drawing predictive conclusions.

3.5 Qualitative Themes on Digital Leadership

3.5.1 Supportive Digital Leadership

Participants described principals as responsive to teachers' technology-related needs, particularly when requesting digital tools or assistance. These accounts reflected perceived leadership support and encouragement. The findings suggest that responsive leadership may help create supportive conditions for technology integration. Yang et al. (2025) emphasize leadership and capacity building, although the available accounts do not establish consistent experiences across schools.

3.5.2 Accessible Technical Guidance and Assistance

Participants reported receiving technical assistance from principals, ICT coordinators, and other school personnel when encountering difficulties with digital platforms, devices, and connectivity. These findings highlight the importance of coordinated technical support. OECD (2023) emphasizes institutional collaboration within digital education systems. However, the study did not measure the effectiveness or timeliness of the assistance provided.

3.5.3 Encouragement for Technology-Based Teaching

Participants described encouragement to use digital tools when these supported instructional objectives and learners' needs. Technology use was associated with perceived educational value rather than adoption alone. The findings reflect the importance of aligning technology with pedagogy and subject content (Mishra & Koehler, 2006). Schmitz et al. (2023) similarly emphasize meaningful instructional technology use. Nevertheless, the accounts did not establish actual improvements in teaching effectiveness or student achievement.

3.6 Integration of Quantitative and Qualitative Findings

The quantitative results indicated a moderate positive association between principals' ICT competence and teachers' technology integration ($r = 0.482$, $p < .001$). Qualitative findings identified supportive leadership, accessible technical assistance, and instructional encouragement as possible contextual explanations. However, privacy, data use, resource planning, and inclusive learner support remained insufficiently explained. The integrated findings are compatible with Social Cognitive Theory's emphasis on environmental support (Bandura, 1986) and the instructional principles of TPACK (Mishra & Koehler, 2006). Nevertheless, inconsistent regression statistics, incomplete qualitative records, and reliance on self-reported data limit the strength of the conclusions. The findings support an association between perceived digital leadership and technology integration but do not establish causation or verified predictive effects.

4. Conclusion & Recommendations

The study revealed favorable teacher perceptions of principals' ICT competence and high levels of teachers' technology integration practices in selected urban public schools in the Philippines. Digital communication and collaboration emerged as the highest-rated dimension of principals' competence, while professional collaboration and innovation ranked highest among teachers' integration practices. A statistically significant moderate positive relationship was established between the two variables, indicating that teachers who perceived stronger principal ICT competence also tended to report greater technology integration. Qualitative findings further identified supportive digital leadership, accessible technical assistance, and encouragement for technology-based teaching as important experiences within the school environment. However, inconsistencies in the regression results prevented reliable conclusions regarding the predictive contributions of individual ICT competence dimensions. Overall, the study highlights the relationship between perceived digital leadership and instructional technology practices without establishing causation, providing context-specific evidence for strengthening digital school governance and professional collaboration.

School administrators should maintain effective digital communication, strengthen collaborative planning, and provide accessible technical assistance to support teachers' technology integration. Principals and ICT coordinators should prioritize professional development activities addressing cybersecurity, data privacy, digital ethics, and inclusive technology-supported instruction, as these dimensions received comparatively lower ratings. Schools should also establish clear procedures for responding to technical concerns, supporting instructional innovation, and evaluating whether digital resources meet teachers' and learners' needs. Educational administrators may use the findings to review existing digital leadership practices and identify areas requiring additional guidance or institutional support. Before using the regression findings to prioritize specific competencies, researchers should verify the original dataset and statistical outputs. Future investigations should incorporate broader school samples, validated instruments, classroom observations, and longitudinal approaches

to examine whether the observed relationships remain consistent across different educational settings and to better understand the contribution of digital leadership to instructional technology practices.

The study was limited by its cross-sectional design, reliance on teacher-reported measures, and participation from selected urban public schools, restricting causal interpretation and broader generalizability. Incomplete documentation of sampling procedures, instrument validity and reliability, and school-level clustering further affected methodological verification. Inconsistencies in the reported regression statistics prevented reliable interpretation of predictive effects. Additionally, incomplete qualitative transcripts, participant attribution, and coding records limited verification of the identified themes. Future studies should strengthen sampling documentation, instrument validation, statistical consistency, and qualitative transparency while considering longitudinal and multisource approaches to improve the reliability and transferability of findings.

5. Compliance with ethical standards

The authors affirm that no conflicts of interest exist in relation to this study, which received no external funding. The study involved 250 teachers from selected urban public schools in the Philippines and 18 qualitative participants comprising principals, ICT coordinators, and teachers. Participation was voluntary, informed consent was obtained, and data were collected through non-invasive surveys and interviews. Participant confidentiality and privacy were maintained through coded identities and restricted disclosure of individual responses, consistent with the Data Privacy Act of 2012 (Republic Act No. 10173, 2012).

REFERENCES

AlAjmi, M. K. (2022). The impact of digital leadership on teachers' technology integration during the COVID-19 pandemic in Kuwait. International Journal of Educational Research, 112, Article 101928. https://doi.org/10.1016/j.ijer.2022.101928

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Prentice-Hall. https://books.google.com/books?id=HJhqAAAAMAAJ

Braun, V., & Clarke, V. (2022). Thematic analysis: A practical guide. SAGE. https://www.sagepub.com/shop/buy-a-book/thematic-analysis-1-248481

Creswell, J. W., & Creswell, J. D. (2022). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE. https://www.sagepub.com/shop/buy-a-book/research-design-6-270550

Department of Education. (2020). National adoption and implementation of the Philippine Professional Standards for School Heads (DepEd Order No. 024, s. 2020). https://www.deped.gov.ph/2020/09/07/september-7-2020-do-024-s-2020-national-adoption-and-implementation-of-the-philippine-professional-standards-for-school-heads/

Department of Education. (2022, May 10). DepEd highlights Digital Rise Program as key player in addressing challenges in education quality. https://www.deped.gov.ph/2022/05/10/deped-highlights-digital-rise-program-as-key-player-in-addressing-challenges-in-education-quality/

DeVellis, R. F., & Thorpe, C. T. (2021). Scale development: Theory and applications (5th ed.). SAGE. https://www.sagepub.com/shop/buy-a-book/scale-development-5-269114

Kaya-Kasikci, S., Zayim-Kurtay, M., & Kondakci, Y. (2023). The role of leadership in developing a climate of technology integration in public schools. Teaching and Teacher Education, 132, Article 104234. https://doi.org/10.1016/j.tate.2023.104234

Larawan, J. M. D., Nalzaro, O. G., & Perez, D. R. (2023). School heads' and teachers' competencies in the utilization of information and communication technology (ICT) in public elementary schools in the Division of Palawan, Philippines. Psychology and Education: A Multidisciplinary Journal, 11(10), 927–939. https://doi.org/10.5281/zenodo.8226524 https://scimatic.org/index.php/show_manuscript/1761

Maala, E. B., & Lagos, F. D. (2022). Technological leadership of school heads and teachers' technology integration: Basis for the development of a training program. International Journal of Multidisciplinary: Applied Business and Education Research, 3(10), 2074–2089. https://doi.org/10.11594/ijmaber.03.10.19

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. Teachers College Record, 108(6), 1017–1054. https://doi.org/10.1111/j.1467-9620.2006.00684.x

Organisation for Economic Co-operation and Development. (2023). OECD digital education outlook 2023: Towards an effective digital education ecosystem. OECD Publishing. https://doi.org/10.1787/c74f03de-en

Philippine Statistics Authority. (2022, July 5). Urban population of the Philippines (2020 Census of Population and Housing). https://psa.gov.ph/content/urban-population-philippines-2020-census-population-and-housing

Rayray, M. R. (2023). Technology leadership competence of public school heads. Psychology and Education: A Multidisciplinary Journal, 9(9), 1108–1123. https://doi.org/10.5281/zenodo.8053128 https://scimatic.org/index.php/show_manuscript/1498

Republic Act No. 10173. (2012). Data Privacy Act of 2012. https://www.officialgazette.gov.ph/2012/08/15/republic-act-no-10173/

Schmitz, M.-L., Antonietti, C., Consoli, T., Cattaneo, A., Gonon, P., & Petko, D. (2023). Transformational leadership for technology integration in schools: Empowering teachers to use technology in a more demanding way. Computers & Education, 204, Article 104880. https://doi.org/10.1016/j.compedu.2023.104880

Schmitz, M.-L., Antonietti, C., Consoli, T., Gonon, P., Cattaneo, A., & Petko, D. (2025). Enhancing teacher collaboration for technology integration: The impact of transformational leadership. Computers & Education, 234, Article 105331. https://doi.org/10.1016/j.compedu.2025.105331

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

Yang, Q., Alias, B. S., & Mohd Nor, M. Y. (2025). Principals' technology leadership and teachers' ICT integration: A systematic review on capacity building for quality improvement and sustainable education. International Journal of Learning, Teaching and Educational Research, 24(9), 211–234. https://doi.org/10.26803/ijlter.24.9.11

Zeng, M., Cheah, K. S. L., & Abdullah, Z. (2025). The influence of school principals' digital leadership on teachers' competency in integrating artificial intelligence: A systematic thematic review. Frontiers in Education, 10, Article 1655967. https://doi.org/10.3389/feduc.2025.1655967