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The Influence of Principals' E-Leadership and Digital Competence on Teacher Performance at SMKS Kristen 1 Tomohon, Indonesia

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ABSTRACT

Digital transformation has altered the expectations placed on school leadership, instructional practice, and professional performance in vocational education. In this context, schools are increasingly required to integrate information and communication technology into management, communication, supervision, and classroom learning. This article develops a journal version of Jevie Jane Maliangkay's master's thesis on the influence of principals' e-leadership and digital competence on teacher performance at SMKS Kristen 1 Tomohon, North Sulawesi, Indonesia. The purpose of the study was to examine: (1) the effect of principals' e-leadership on teacher performance, (2) the effect of digital competence on teacher performance, and (3) the simultaneous effect of both variables on teacher performance. A quantitative explanatory design with a causal associative approach was employed. The study was conducted at SMKS Kristen 1 Tomohon from December 2025 to February 2026. Based on the detailed methodology and results sections of the thesis, the respondents comprised 30 teachers and the study used total sampling. Data were collected through structured questionnaires and analyzed using simple and multiple linear regression supported by SPSS. The data met the main analytical assumptions, including normality, linearity, and absence of multicollinearity. The results show that principals' e-leadership had a positive and significant effect on teacher performance, with an effective contribution of about 14.3%. Digital competence also had a positive and significant effect and emerged as the dominant predictor. Simultaneously, the two independent variables significantly influenced teacher performance, with a coefficient of determination of about 59.6%, indicating that more than half of the variance in teacher performance could be explained by the model. The findings affirm that

school digital leadership and digital competence are not merely technical matters; they are strategic determinants of instructional quality, work effectiveness, and professional accountability. The article argues that strengthening digital leadership, building teacher capacity, and embedding technology into organizational culture are central to improving performance in vocational secondary schools.

Keywords: digital competence, educational management, e-leadership, school leadership, teacher performance, vocational education.

INTRODUCTION

The rapid expansion of information and communication technology has fundamentally changed the way educational institutions are managed and the way teaching is delivered. Schools are no longer expected to function only through conventional administrative routines, face-to-face supervision, and manual instructional systems. Instead, they are expected to integrate digital technology into institutional communication, organizational decision-making, teacher development, classroom learning, student assessment, and professional collaboration. In vocational education, this transformation is even more urgent because vocational schools prepare students for a labor market shaped by industry digitalization, technological innovation, and evolving technical competencies.

Within this changing environment, the role of the principal has become more complex. The principal is no longer only an administrative manager or instructional supervisor in the traditional sense. The principal is increasingly expected to become a digital leader who can guide organizational change, mobilize teachers, model the use of technology, and create a professional climate that encourages adaptation, innovation, and performance improvement. The concept of e-leadership emerged in response to this shift. Avolio, Kahai, and Dodge (2000) introduced e-leadership as a social influence process mediated by advanced information technology that can shape attitudes, thinking, behavior, and performance at individual, group, and organizational levels. Their formulation emphasizes that technology does not merely support leadership; technology becomes part of the medium through which leadership is practiced.

Subsequent scholarship strengthened this perspective. Kahai, Sosik, and Avolio (2003) described e-leadership as a process of social influence occurring in contexts where a substantial portion of work and communication is supported by digital systems. Van Wart (2019) later broadened the concept by showing that e-leadership involves not only digital communication but also the strategic use of technology for coordination, data-informed decision-making, change management, and innovation. In schools, this implies that principals must be capable of using digital tools not only to disseminate information but also to sustain academic supervision, encourage collaboration, monitor outcomes, and support teacher growth.

The need for such leadership is especially visible in Indonesian vocational schools. The transition toward digital education has made teachers responsible for more than mastering subject matter and classroom pedagogy. Teachers are increasingly expected to use digital learning platforms, produce digital teaching materials, communicate with students through virtual channels, administer assessments electronically, and respond to changing curriculum demands. However, the distribution of these capabilities is rarely even. Some teachers are able to adapt quickly, while others still struggle

with fundamental aspects of digital teaching practice such as using learning management systems, creating digital content, managing online assignments, or employing technology for feedback and evaluation.

At the same time, digital competence cannot be understood only as an individual attribute detached from organizational context. Teacher capability develops within a school environment shaped by leadership, resources, expectations, and culture. When principals demonstrate strong e-leadership, teachers are more likely to encounter clear direction, supportive supervision, and structured opportunities for innovation. Conversely, when digital leadership is weak, technology use often remains fragmented, inconsistent, or symbolic. For this reason, the relationship between principal leadership and teacher competence is theoretically and practically significant.

Teacher performance remains one of the most important indicators of educational quality. Performance includes the teacher's ability to plan lessons, implement instruction, manage classrooms, assess student learning, complete professional tasks, and engage in continuing development. In practice, teacher performance is shaped by both internal and external factors. Internal factors include competence, motivation, experience, and attitudes. External factors include organizational leadership, facilities, collegial support, and institutional climate. In the digital era, these external and internal dimensions increasingly intersect. A teacher's professional performance may depend not only on subject knowledge and pedagogical skill but also on the teacher's capacity to use digital tools meaningfully and on the principal's ability to lead digital change coherently.

The case of SMKS Kristen 1 Tomohon is important because it reflects many of the tensions faced by vocational schools during digital transformation. The school has a long institutional history, multiple vocational specializations, and a mandate to provide relevant education in a rapidly changing technological environment. It also possesses some enabling conditions for digital advancement, including an established organizational structure, teaching staff, and school facilities. Yet, like many schools in transition, it also faces a gap between expected and actual digital practice. According to the thesis, not all teachers demonstrated equal digital competence, and the implementation of principal e-leadership had not yet become fully optimal across communication, supervision, and decision-making processes. This gap between aspiration and implementation created the context for the research.

The thesis from which this article is derived therefore addressed a relevant and timely problem in educational management: how far do principals' e-leadership and digital competence influence teacher performance in a vocational school context? The study was organized around three research questions. First, does principal e-leadership affect teacher performance at SMKS Kristen 1 Tomohon? Second, does digital competence affect teacher performance at the same school? Third, do principal e-leadership and digital competence simultaneously affect teacher performance? These questions are not merely statistical. They are closely related to broader issues of school transformation, teacher professionalism, and organizational adaptation in the digital era.

This journal article expands the thesis into a fuller scholarly narrative following the structure used in the IJITE Grace example. It presents the study's conceptual rationale, theoretical framework, method, findings, and discussion in an integrated form. In doing so, the article contributes to the field of educational management by clarifying how digital leadership and digital competence interact as predictors of professional performance in vocational secondary education. It also offers practical

implications for school principals, teachers, and policy makers seeking to strengthen school capacity in the context of continuing technological change.

The significance of the study lies in at least three dimensions. First, it contributes theoretically by linking e-leadership, digital competence, and teacher performance in a single model rather than treating them as isolated constructs. Second, it contributes empirically by examining the relationship in an Indonesian vocational school, whereas much of the earlier literature cited in the thesis came from contexts outside Indonesia. Third, it contributes practically by showing that digital transformation in schools depends not only on equipment or infrastructure but also on leadership quality and professional capability. In short, the study highlights that technology becomes educationally meaningful only when it is embedded in leadership practice, organizational culture, and teacher performance systems.

For these reasons, the article argues that the problem is not simply whether schools use technology, but whether technology is led, understood, and translated into improved professional practice. This distinction is critical. Schools may possess digital tools and still fail to improve teacher performance if principals do not lead effectively and if teachers do not possess the competence required to use those tools pedagogically and professionally. The study thus offers an important perspective on how vocational schools can respond more strategically to the demands of the digital age.

THEORETICAL FRAMEWORK

E-Leadership

E-leadership is one of the most important conceptual anchors of this study. The term reflects the adaptation of leadership theory to organizational environments where communication, coordination, and decision-making are increasingly mediated by digital technology. Avolio, Kahai, and Dodge (2000) defined e-leadership as a social influence process mediated by advanced information technology in order to produce changes in attitudes, feelings, thinking, behavior, and performance. This definition is foundational because it positions technology not as a passive support mechanism but as an integral medium through which leadership is exercised. Hinds and Kiesler (2002) similarly emphasized the role of computer-mediated interaction in supporting task-oriented leadership, problem solving, and decision-making. Kahai, Sosik, and Avolio (2003) extended the concept by stressing that e-leadership unfolds in organizational settings where a substantial amount of work is digitally mediated.

These perspectives suggest that e-leadership is best understood not as a separate leadership type detached from conventional leadership theory, but as a technologically mediated form of leadership practice. In school settings, this mediation can appear in electronic communication, digital monitoring, virtual meetings, online supervision, data-based planning, and platform-supported collaboration. Van Wart (2019) reinforced this view by arguing that e-leadership requires leaders to use digital systems for communication, innovation, change management, transparency, and timely response. For schools, this means that the principal's digital posture influences whether technology becomes fragmented administrative hardware or a coherent organizational system.

The thesis also drew on the distinction between traditional leadership and e-leadership identified by Renu (2014). Traditional leadership relies largely on direct face-to-face interaction, whereas e-leadership involves mediated communication across space and time. Members in e-leadership settings

are often required to possess more current digital knowledge than members in traditional systems. E-leadership also reduces dependency on a single physical office space and allows organizational communication beyond fixed working hours. In the context of schools, these differences matter because principals increasingly communicate with teachers, students, and other stakeholders through messaging platforms, online documents, shared data environments, and virtual meetings.

The literature further identifies important challenges associated with e-leadership. Renu (2014) described challenges such as creating a collaborative virtual culture, sustaining a social climate through digital communication, building trust without constant physical presence, inspiring staff from a distance, monitoring work in virtual environments, and supporting technical competence development. Each of these challenges is relevant to schools. For instance, a principal may distribute information digitally, but without trust, clarity, and collegial follow-up, communication alone may not influence performance. Likewise, digital supervision can increase access and speed, but if it is not combined with coaching and instructional sensitivity, it may not improve teacher practice.

The thesis also summarized several qualities of effective e-leadership. These include communication skills, social networking skills, sensitivity to follower perspectives, flexibility, technological proficiency, innovation, and the ability to encourage others to use modern technology. From an educational management standpoint, these qualities can be translated into school leadership behaviors such as using school information systems consistently, sharing pedagogical resources digitally, facilitating online collaboration among teachers, and using digital tools to support performance feedback. In vocational schools, where technological change is tied closely to curriculum relevance, these leadership qualities are particularly consequential.

A broader theoretical connection can also be made to transformational leadership. Bass (1985) described transformational leaders as those who build vision, inspire followers, stimulate intellectual growth, and motivate organizational change. In digital school environments, e-leadership can be interpreted as a contemporary operationalization of transformational leadership. A principal who practices e-leadership effectively does more than send instructions through digital channels; such a principal shapes a vision for digital learning, motivates teachers to experiment with instructional technology, and reinforces a culture of adaptability. This is why the thesis treated e-leadership as a strategic rather than merely technical construct.

The study also resonates with Kotter's (1996) theory of change management. Kotter argued that organizational change depends on urgency, vision, coalition building, communication, empowerment, and consolidation. School digitalization is precisely such a change process. The use of technology in management and learning will not become routine unless principals can mobilize teachers around a shared purpose, communicate expectations clearly, and support implementation systematically. E-leadership thus serves as both a leadership practice and a change mechanism within the school organization.

Digital Competence

Digital CompetenceThe second key construct in the study is digital competence. Although the thesis uses the phrase "Kompetensi Digital Kepala Sekolah" in some places, the operational descriptions and problem framing clearly relate the construct to teacher capability in using technology for learning and professional work. In the article, digital competence is therefore interpreted in line with the study's

substantive focus on teacher performance. Digital competence refers to the knowledge, skills, attitudes, and dispositions needed to use digital technology effectively, critically, creatively, and responsibly in professional educational contexts.

UNESCO (2013) emphasized that digital competence includes digital literacy, use of technology in teaching, and development of digital instructional materials. Redecker and Punie (2017) framed digital competence more comprehensively as a combination of knowledge, skill, and attitude in using technology to support learning processes, assessment, and learner interaction. Their approach is influential because it moves the concept beyond technical operation and toward pedagogical application. European Commission (2018), through the DigCompEdu framework, further elaborated professional engagement, digital resources, teaching and learning, assessment, empowering learners, and facilitating learner digital competence as major dimensions of educator digital competence.

Other scholars strengthen the same conceptual direction. Ertmer and Ottenbreit-Leftwich (2010) argued that digital competence is not only technical skill but pedagogical readiness to integrate technology meaningfully into instruction. Koehler and Mishra (2009), through the TPACK framework, showed that effective digital teaching depends on the integration of technological knowledge, pedagogical knowledge, and content knowledge. This is highly relevant to vocational teachers, who are expected to master not only digital tools but also the correct ways to embed those tools into industry-related learning experiences. Falloon (2020) added further dimensions such as information literacy, media literacy, digital safety, problem solving, and the capacity to design meaningful digital learning experiences.

The thesis organized digital competence into several practical dimensions. These include mastery of digital devices, use of learning applications and learning management systems, creativity in digital learning, and digital evaluation and communication. These dimensions are educationally sensible. Mastery of devices and basic software remains foundational, especially in schools where the range of teacher digital readiness is uneven. The ability to use applications and LMS platforms is vital for organizing learning materials, assignments, interaction, and feedback. Creativity in digital learning reflects the move from simple usage to pedagogical adaptation, where teachers develop interactive materials and select technological strategies appropriate to learner needs. Digital evaluation and communication address another key aspect of performance, namely the teacher's ability to monitor student progress and maintain timely communication with students, colleagues, and parents.

Digital competence is especially relevant in vocational secondary education. Vocational schools are expected to align teaching with the needs of a changing labor market. This requires not only equipment but also teachers who can connect subject knowledge with digital methods, simulation tools, multimedia instruction, and industry-oriented learning practices. Teachers with stronger digital competence are better positioned to design efficient learning processes, access updated resources, personalize instruction, and manage assessment more effectively. Therefore, digital competence is not only a supplement to teacher professionalism; it has become one of its central expressions in contemporary schooling.

Teacher Performance

Teacher PerformanceTeacher performance is the dependent variable in the study. In general organizational terms, Robbins and Judge (2015) defined performance as the outcomes achieved by

individuals according to duties, responsibilities, and established standards. Bernardin and Russell (1993) similarly described performance as the work result achieved by a person in carrying out tasks and responsibilities. In education, these formulations translate into the extent to which teachers successfully fulfill their professional obligations through instructional planning, classroom implementation, assessment, administration, collaboration, and continuing professional development.

Mangkunegara (2005; 2017) described teacher performance as the teacher's ability to carry out professional duties effectively and efficiently in order to achieve educational goals. Gibson et al. (2012) emphasized observable work behaviors such as productivity, work quality, and adaptability. Sudjana (2009) pointed to seriousness and activeness in administrative and pedagogical tasks, while Hasibuan (2007) linked teacher performance to the execution of core duties such as teaching, assessing, guiding students, and developing oneself professionally. Taken together, these perspectives support a multidimensional view of teacher performance rather than a narrow output-based view.

The thesis also connected teacher performance to behaviorist theory by referring to Skinner's emphasis on observable behavior and repeated practice. Although behaviorism alone cannot capture the full complexity of teacher professionalism, it offers one useful lens: performance can be observed in consistent task execution, disciplined routines, and measurable work outcomes. In practice, this means teacher performance becomes visible in lesson preparation, punctuality, instructional delivery, evaluation procedures, communication, and responsibility. Such behaviors are affected by competence and organizational conditions, which explains why leadership and digital competence were positioned as predictors in the study.

The thesis adopted performance indicators that include quality of work, quantity of work, task implementation, and responsibility. It also discussed related indicators such as timeliness, initiative, capability, and communication. These indicators align well with school realities. A teacher may possess professional knowledge but still show weak performance if responsibilities are not completed on time or if communication and classroom management are ineffective. In digital education contexts, these indicators gain new forms. Quality of work may involve the clarity and interactivity of digital materials; timeliness may involve feedback through digital platforms; communication may include online interaction; and capability may involve the competent use of learning software and digital assessment systems.

Determinants of Teacher Performance

Determinants of Teacher PerformanceThe theoretical logic of the study depends on the assumption that teacher performance is influenced by multiple factors. Wirawan (2009) argued that performance is shaped by internal individual factors, internal organizational factors, and external environmental factors. Sedarmayanti (2012) identified dimensions such as quality, promptness, initiative, capability, and communication. The thesis also referred to qualifications, training, experience, career development, and welfare as factors influencing teacher performance. These various formulations suggest that teacher performance should not be reduced to a personal trait. It emerges from the interaction between individual competence and organizational leadership.

This interaction is precisely why the relationship between e-leadership and digital competence is theoretically meaningful. Strong principal e-leadership can create an enabling organizational climate by clarifying expectations, facilitating communication, encouraging innovation, and supporting the use

of technology. At the same time, digital competence equips teachers to act effectively within that climate. The two variables may therefore operate both independently and jointly. A school could have digitally competent teachers but weak digital leadership, in which case the organizational use of technology may remain scattered. Conversely, a principal could articulate strong digital leadership but still fail to improve performance if teachers lack the competence to translate direction into classroom practice.

Prior Studies and Research Gap

Prior Studies and Research GapThe thesis reviewed several prior studies to justify the novelty of the research. Fan (2013) examined students' perceptions of changes in e-leadership style in virtual contexts. Blau and Presser (2013) analyzed principal e-leadership through the Mashov system in Israeli secondary schools and found that e-leadership could improve school effectiveness, data-based decision-making, and interaction. Mishra and colleagues (2016) discussed e-leadership in education more conceptually and emphasized the role of organizational culture and stakeholder readiness. Khawaj (2009) concluded from the literature that no universal e-leadership model exists because context matters.

The thesis argued that its novelty lies in three respects. First, much of the previous research was conducted outside Indonesia, while this study focused on a specific Indonesian vocational school context. Second, many earlier studies centered on perceptions, policy, or conceptual discussion rather than directly on teacher performance. Third, the present study combined e-leadership and digital competence in a single explanatory model. This combination is important because digital school transformation is rarely driven by one variable alone. The school principal's digital leadership and the teacher's digital competence are analytically distinct but practically intertwined.

Conceptual Relationship among Variables

Conceptual Relationship among VariablesThe conceptual framework of the study can therefore be summarized as follows. E-leadership contributes to teacher performance because digital leadership supports communication, supervision, coordination, motivation, and innovation. Digital competence contributes to teacher performance because it equips teachers to use technology effectively in lesson planning, implementation, evaluation, and interaction. When both variables are present at higher levels, teacher performance is expected to improve because teachers experience both capability and leadership support within a digitalized school environment.

This framework fits the realities of school transformation in the twenty-first century. Technology alone does not improve educational performance. Improvement depends on how technology is led, interpreted, integrated, and sustained through human competence and organizational practice. For this reason, the thesis hypothesized positive effects of principal e-leadership on teacher performance, digital competence on teacher performance, and the simultaneous influence of both variables on teacher performance. The empirical testing of these hypotheses at SMKS Kristen 1 Tomohon forms the central contribution of the study.

METHOD

Design and Research Setting

The study employed a quantitative approach with an explanatory or causal associative design. This design was chosen because the research aimed to test the influence of two independent variables, namely principal e-leadership (X1) and digital competence (X2), on teacher performance (Y). The explanatory orientation is appropriate when the researcher intends not merely to describe a condition but to analyze statistically whether one variable contributes to variation in another. In this case, the study sought empirical evidence regarding both partial and simultaneous effects.

The research was conducted at SMKS Kristen 1 Tomohon, a vocational secondary school located on Jl. Tomohon-Tondano, Matani 1 (Kaaten), Central Tomohon, Tomohon City, North Sulawesi. According to the thesis, the school has a long institutional history beginning on 9 September 1965 and developed from a technical secondary school into SMKS Kristen 1 Tomohon with multiple vocational fields. The current principal identified in the thesis was Altje Santje Liuw, S.Pd., M.Pd. The selection of this school was relevant because vocational education is highly exposed to digital and industrial change, making it a meaningful setting for studying e-leadership, digital competence, and performance.

The research was carried out from December 2025 to February 2026. The thesis describes three stages of implementation. The first month focused on preparation, including instrument development, expert validation, permission procedures, and instrument try-out if needed. The second month focused on data collection through questionnaire distribution to teachers and checking response completeness. The third month focused on statistical analysis, interpretation, and report preparation. This schedule reflects a typical quantitative field process in school-based educational research.

Population and Sample

The thesis contains some internal inconsistency between the abstract and later methodology sections regarding the number of respondents. The abstract refers to 35 teachers, while the detailed method and findings sections indicate that the study involved 30 teachers and that total sampling was used. Because the detailed methodology and results sections are more specific and are internally aligned with the normality table, respondent description, and regression analysis, this article follows the sample size of 30 teachers as the more defensible basis for the journal version.

The population was therefore all teachers teaching at SMKS Kristen 1 Tomohon in the 2025/2026 academic year. Because the population was below 100, the study used total sampling or saturated sampling, consistent with the view cited in the thesis from Arikunto (2013). This means every member of the population was included as a respondent. Such a sampling strategy is appropriate in school-level studies where the target population is limited and where the researcher seeks to capture the whole institutional picture rather than estimate from a subset.

Variables and Measurement

The research involved three variables. The first independent variable was principal e-leadership. The second independent variable was digital competence. The dependent variable was teacher performance. Although the thesis occasionally used inconsistent wording in naming the second variable, its operational description and contextual explanation indicate that the construct referred to

teachers' competence in using digital technology within educational work.

The thesis presented grids and indicators for each variable. E-leadership referred to the principal's leadership behavior in relation to digital communication, support, direction, coordination, and technology use within school management. Digital competence referred to teachers' mastery of digital devices, use of learning applications and LMS platforms, creativity in digital teaching, and digital evaluation and communication. Teacher performance referred to the quality, quantity, implementation, and responsibility of teachers' professional tasks. Data were collected through structured questionnaires using a Likert-type scale. The thesis also notes that instrument preparation included grids, indicators, and expert validation.

Instrument Development and Data Collection

Data collection relied on questionnaires distributed to the teacher respondents. In quantitative research of this type, questionnaires provide a practical way to gather comparable responses about perceptions, behavior, and professional practice across multiple indicators. The thesis indicates that the instruments were structured and prepared in advance based on theoretical constructs. Instrument validation by experts was part of the preparation stage, which increases content relevance and construct alignment, even though the visible file excerpts do not provide a full table of validation coefficients.

The questionnaire distribution process was conducted directly within the school during the data collection phase. Teachers filled out the instruments, and the researcher checked the completeness of the returned responses before analysis. Because the study used total sampling, all usable responses represented the entire target population of the school. This strengthens the internal descriptive relevance of the study, even though the findings remain context-specific to the school rather than statistically generalizable to all vocational schools.

Data Analysis Procedures

The thesis used SPSS for statistical analysis. The analysis was organized in several stages. First, descriptive analysis was used to summarize the data. Second, prerequisite tests were conducted to ensure that the assumptions for regression analysis were sufficiently met. Third, simple and multiple regression were used to test the hypotheses.

The prerequisite tests included normality, linearity, and multicollinearity. The normality test used the Kolmogorov-Smirnov approach. The available excerpt shows a significance value above 0.05, indicating that the residuals were normally distributed. The linearity test used F values for the relationship between each independent variable and the dependent variable. The thesis concluded that both X1-Y and X2-Y relationships were linear because the calculated F values were lower than the critical values. The multicollinearity test used VIF and tolerance logic. The VIF values for both independent variables were reported as 1.551, which is far below the conventional threshold of 10.00. This indicates that the two independent variables did not pose a serious multicollinearity problem and could be included together in the multiple regression model.

For hypothesis testing, the study used simple regression to examine the individual effect of e-leadership on teacher performance and the individual effect of digital competence on teacher performance. It then used multiple linear regression to assess the simultaneous effect of both predictors. In statistical form, the multiple regression model was written as $Y = beta0 + beta1X1 + beta2X2 +$

epsilon. The analysis included t tests for partial effects, an F test for simultaneous effects, and the coefficient of determination to estimate the proportion of variance in teacher performance explained by the independent variables.

Criteria for decision-making followed the common significance threshold of $p < 0.05$. Positive coefficients indicated a positive directional influence, meaning that higher values in the independent variables were associated with higher teacher performance. The study also reported effective contributions for each independent variable in order to clarify which predictor made the stronger contribution within the joint model.

Methodological Strengths and Limits

The research design has several strengths. First, it was directly grounded in a clearly specified organizational setting. Second, it used total sampling, which allowed the researcher to include all teachers within the defined school population. Third, the use of prerequisite tests before regression analysis increased the procedural rigor of the statistical testing. Fourth, the choice of multiple regression was suitable because the study aimed to estimate both individual and joint effects of two predictors on one dependent variable.

At the same time, several limitations should be acknowledged in transforming the thesis into a journal article. The sample was institution-specific and relatively small, meaning the findings are most appropriately interpreted as evidence for this school context rather than as broad generalizations. In addition, the thesis file displays some inconsistencies between abstract-level summary numbers and detailed chapter-level statistics. For the purpose of this journal article, greater weight has been given to the more detailed methods and findings sections rather than the brief abstract statements. This is a prudent editorial choice when revising a thesis into an article, because detailed tables and analytic narratives are usually closer to the original calculation process than compressed summary text.

RESULTS AND DISCUSSION

School Context

The study was conducted at SMKS Kristen 1 Tomohon, a vocational school with a long history and several technical and vocational specialization areas. The thesis describes the school as one that evolved over decades from STM Kristen Tomohon to SMK Kristen 1 Tomohon. Its curricular structure and student distribution across specializations demonstrate that it is not a small or marginal educational unit but a substantial vocational institution with an established organizational profile. This context matters because the demands of digital transformation in such a school are multidimensional: they involve administrative coordination, curriculum delivery, technical specialization, and professional adaptation among teachers.

The school context also helps explain why digital leadership and digital competence were selected as the focal variables. Vocational schools are expected to align learning with technological developments in the workplace. As a result, principal leadership in technology use and teacher competence in digital practice are not peripheral concerns. They are directly linked to how well the

school can maintain instructional relevance, professional accountability, and effective teaching performance.

Description of Respondents and Data Readiness

The findings section of the thesis states that the study involved 30 teacher respondents from SMKS Kristen 1 Tomohon. Before hypothesis testing, the data were subjected to prerequisite analyses. The normality test showed that the data were normally distributed, with a significance value above 0.05. The linearity test showed that the relationship between e-leadership and teacher performance was linear and that the relationship between digital competence and teacher performance was also linear. In addition, the multicollinearity test showed VIF values of 1.551 for both independent variables, indicating that no serious multicollinearity existed. These results mean that the data were suitable for subsequent regression analysis.

The importance of these prerequisite results should not be underestimated. In educational management research, statistical significance is only meaningful when the data satisfy the assumptions required by the chosen model. By establishing normality, linearity, and absence of multicollinearity, the thesis strengthened the credibility of its regression findings and allowed more confident interpretation of the estimated effects.

Effect of Principal E-Leadership on Teacher Performance

The first hypothesis concerned the effect of principal e-leadership on teacher performance. The thesis reports that principal e-leadership had a positive and significant effect on teacher performance at SMKS Kristen 1 Tomohon. The coefficient of determination for this relationship was about 14.3%, meaning that e-leadership explained a modest but meaningful portion of the variation in teacher performance. The reported t value for this effect was 3.993, which was greater than the critical t table value used by the researcher. Therefore, the effect was judged statistically significant.

Substantively, this result indicates that teacher performance improved when the principal's digital leadership practices were stronger. Although e-leadership was not the strongest predictor in the study, the finding remains important because it confirms that leadership behavior mediated through technology contributes to the professional effectiveness of teachers. When principals use digital communication efficiently, provide clear directions, support technology integration, and create a responsive digital work environment, teachers are better positioned to carry out their professional responsibilities.

The effective contribution of e-leadership was reported at about 14.32%. This suggests that leadership matters, but it is only one part of the broader explanation of teacher performance. In practical terms, teacher performance at the school could not be understood as the product of leadership alone. Nevertheless, the finding demonstrates that principals have a measurable role in shaping teacher effectiveness through their digital leadership style.

Effect of Digital Competence on Teacher Performance

The second hypothesis concerned the effect of digital competence on teacher performance. The thesis concluded that digital competence also had a positive and significant effect and that it was the more dominant predictor when compared with e-leadership. While the exact simple-regression

coefficient for this variable is not fully visible in the excerpted file, the later results and effective contribution table make clear that digital competence accounted for a much larger share of the explained variance than e-leadership.

The reported effective contribution of digital competence was 45.25%. This is a substantial proportion and indicates that digital competence was the strongest contributor in the model. The implication is straightforward: teachers who are more capable in using digital devices, instructional applications, online platforms, digital materials, and digital communication are more likely to demonstrate stronger professional performance. Their work quality, adaptability, instructional effectiveness, and responsibility are strengthened by their ability to use technology as part of everyday educational practice.

This result is especially meaningful in a vocational school context. Vocational teaching often requires visualization, procedural explanation, multimedia demonstration, and industry-related learning methods. Teachers with strong digital competence are more capable of designing lessons, presenting content, organizing assessment, and interacting with students in ways that align with contemporary educational and technological expectations. The dominance of this variable suggests that teacher capability in digital practice is one of the most immediate levers for improving performance.

Simultaneous Effect of E-Leadership and Digital Competence on Teacher Performance

The third hypothesis examined the simultaneous influence of principal e-leadership and digital competence on teacher performance. The thesis reports a multiple regression equation of:

$Y = 8.000 + 0.154X1 + 0.470X2$

This equation indicates that both predictors had positive coefficients. In other words, increases in principal e-leadership and increases in digital competence were both associated with increases in teacher performance, holding the other variable constant. The coefficient for digital competence was larger than the coefficient for e-leadership, again confirming that digital competence was the more dominant predictor in the combined model.

The multiple correlation coefficient reported in the thesis was 0.772, indicating a strong positive relationship between the two predictors taken together and teacher performance. The coefficient of determination was reported as 0.596, which means that approximately 59.6% of the variance in teacher performance could be explained jointly by principal e-leadership and digital competence. The F test result was also significant, with Fcount greater than Ftable and a significance level below 0.05. Therefore, the joint effect of the two predictors was statistically significant.

This is one of the most important findings of the study. It indicates that more than half of teacher performance variation in the school could be accounted for by the combination of school digital leadership and teacher digital competence. The remaining 40.4% was attributed to other factors outside the model, such as motivation, experience, infrastructure quality, work climate, training history, or personal characteristics not measured in the study. Still, explaining nearly sixty percent of performance variance is a strong result in school-based social research and suggests that the chosen variables were highly relevant.

Relative Contribution of the Predictors

The thesis also reported effective contribution values for each independent variable. Principal e-leadership contributed about 14.32%, while digital competence contributed 45.25%, for a total effective

contribution of 59.6%. This pattern is analytically useful because it shows not only that both variables mattered, but also how they mattered differently. E-leadership served as an enabling organizational factor, while digital competence functioned as the more direct operational driver of teacher performance.

This relative pattern supports an interpretation in which digital leadership creates the conditions for performance, but digital competence more directly shapes how teachers carry out tasks in a technology-rich environment. The principal may set the tone, provide direction, and encourage digital adaptation, but the teacher still needs the competence to translate those conditions into actual planning, teaching, assessment, and communication. The results therefore suggest complementarity rather than competition between the variables.

Overall Pattern of Findings

Taken together, the results reveal a coherent pattern. First, the data met the assumptions necessary for regression testing. Second, e-leadership had a positive and significant but comparatively smaller effect on teacher performance. Third, digital competence had a stronger and significant effect. Fourth, when combined, the two variables explained a substantial proportion of teacher performance. This pattern supports the central thesis that professional performance in vocational schools is shaped by both organizational leadership and teacher technological capability.

The findings also support the practical claim that technology in schools should not be approached narrowly as a matter of equipment provision. A school can have devices and platforms, but performance gains depend on whether the principal leads digital practices effectively and whether teachers possess the competence to use technology meaningfully. The statistical evidence from the study therefore carries clear organizational meaning: teacher performance improves in a digitally transforming school when leadership and competence develop together rather than separately. See table 1.

Table 1. Summary of Key Statistical Findings.

Analysis	Key Result	Interpretation
Normality test	Asymp. Sig. > 0.05	Residuals were normally distributed
Linearity	X1-Y and X2-Y linear	Both predictors had linear relationships with teacher performance
Multicollinearity	VIF = 1.551	No serious multicollinearity
Simple regression: X1 -> Y	Effective contribution about 14.32%; t = 3.993	Principal e-leadership had a positive and significant effect
Simple regression: X2 -> Y	Effective contribution about 45.25%	Digital competence had the stronger effect
Multiple regression	Y = 8.000 + 0.154X1 + 0.470X2	Both predictors positively contributed to teacher performance
Simultaneous effect	R = 0.772; R^2 about 0.596; F significant	Joint influence of e-leadership and digital competence was significant

The findings of the study offer several important implications for theory, educational management, and vocational school practice. Most importantly, they show that digital transformation in schools is not simply a technical process. It is a leadership process, a competence process, and an

organizational process at the same time. The positive and significant effects of principal e-leadership and digital competence confirm that teacher performance in contemporary schools must be understood through this more integrated lens.

E-Leadership as an Organizational Performance Enabler

The finding that principal e-leadership had a positive and significant effect on teacher performance supports the view that leadership practices mediated by technology can shape the school's professional environment. This is consistent with the foundational formulation of Avolio, Kahai, and Dodge (2000), who argued that e-leadership changes organizational attitudes, behaviors, and performance through technology-mediated influence. It is also in line with Van Wart's (2019) argument that digital leadership supports communication, innovation, and management effectiveness.

In the school context, the significance of e-leadership lies not only in the use of devices or software by the principal. Rather, it lies in how digital tools are used to make leadership more responsive, better coordinated, and more supportive of professional work. The study suggests that when principals use technology to communicate, supervise, and organize school work, teachers experience a more coherent professional structure. This structure likely improves expectations, access to information, and timeliness of organizational processes, all of which can positively influence performance.

At the same time, the contribution of e-leadership was smaller than that of digital competence. This does not make the variable unimportant. Instead, it indicates that leadership works partly as an enabling condition. A principal can support, direct, and model digital practice, but leadership alone may not guarantee high performance if teachers do not possess the competence required to act effectively. This result is theoretically consistent with organizational change perspectives such as Kotter (1996), where leadership is essential for change but must be followed by actual implementation capability across members of the organization.

Digital Competence as the Dominant Predictor

The stronger contribution of digital competence is perhaps the most practically significant finding of the study. It indicates that teacher performance in the school was more directly shaped by what teachers could do with technology than by leadership alone. This aligns with UNESCO (2013), Redecker and Punie (2017), European Commission (2018), and Falloon (2020), all of whom emphasize that digital competence is multidimensional and central to effective educational practice. The result also fits TPACK theory (Koehler & Mishra, 2009), which holds that effective digital teaching depends on the integration of technological, pedagogical, and content knowledge.

Why might digital competence be the dominant predictor? One reason is that many observable dimensions of teacher performance now involve digital action. Lesson preparation may require digital documents, media, and online resources. Instruction may require presentation tools, simulations, or blended learning strategies. Assessment may involve digital submission systems, online quizzes, or technology-supported feedback. Communication with students and sometimes parents increasingly takes place through digital channels. In such conditions, digital competence becomes embedded in daily performance itself.

Another reason is the vocational school context. Vocational education often requires demonstration, visualization, technical explanation, and relevance to industrial and technological developments. Teachers who are digitally competent can represent complex processes more clearly, connect students to authentic resources, and manage practical learning more effectively. Therefore, the strong effect of digital competence in this study may reflect the close relationship between technological capability and instructional relevance in vocational settings.

Complementarity of Leadership and Competence

Although digital competence was the dominant predictor, the simultaneous model is more informative than the individual effects alone. The coefficient of determination around 59.6% indicates that principal e-leadership and digital competence together explain a substantial proportion of teacher performance. This supports the idea of complementarity. Leadership and competence are not substitutes; they interact as different but related components of school functioning.

This complementarity can be understood in organizational terms. E-leadership helps shape the school's direction, expectations, and support system. Digital competence determines whether teachers can respond productively within that system. If one of these elements is weak, performance gains may be limited. A digitally strong teacher may still be constrained by unclear leadership or lack of coordinated vision. Conversely, a principal may provide excellent digital leadership, but if teachers lack the competence to implement digital teaching effectively, performance improvement will remain partial.

This interpretation also enriches the thesis's originality claim. Earlier studies cited in the thesis often examined e-leadership separately or in relation to organizational culture, virtual learning environments, or school management systems. The present study is valuable because it links leadership and competence in the same explanatory model and relates both to teacher performance. This is conceptually useful because digital transformation in schools is necessarily both organizational and individual.

Implications for Educational Management

From an educational management perspective, the findings indicate that performance improvement strategies should operate at multiple levels. First, school leadership development programs need to pay greater attention to digital leadership capacities. Principals should be trained not only in technical use of digital tools but also in how to apply them strategically for communication, supervision, data use, teacher development, and change management. The principal's role as a digital change agent needs explicit reinforcement.

Second, teacher professional development should place digital competence at the center rather than treat it as an optional supplement. Because digital competence accounted for the strongest effect in the study, systematic investment in teacher digital capability is likely to yield meaningful performance returns. Such investment should not focus solely on basic operational skill. It should also include digital pedagogy, platform use, media creation, online assessment, and responsible digital communication.

Third, schools need to cultivate a digital organizational culture. Technology integration becomes sustainable when digital systems are normalized in routines such as lesson planning, feedback,

reporting, collaborative work, and academic monitoring. This culture requires alignment between leadership, teacher development, facilities, and expectations. The findings of the study suggest that performance is strongest when digital practice is built into the way the school operates rather than added as an isolated innovation.

Implications for Policy and Practice in Vocational Schools

For vocational schools specifically, the study offers a clear policy lesson: digitalization should be viewed as part of instructional quality assurance, not simply as infrastructure modernization. School leaders and local education authorities should prioritize programs that combine principal digital leadership strengthening with teacher competence development. In practical terms, this may include workshops on e-leadership, coaching for school principals, digital mentoring for teachers, collaborative design of digital learning materials, and structured use of LMS platforms.

The study also suggests the need for school-level monitoring systems that can track not only the availability of technology but the actual use of technology in relation to teacher performance. For example, schools might evaluate how teachers use digital media, how quickly they provide digital feedback, how effectively they manage online learning resources, and how principals use digital tools for supervision and support. Such measures would translate the study's findings into manageable institutional practice.

Critical Reflection on the Thesis Data

In revising the thesis into journal form, it is necessary to acknowledge that the source thesis contains internal inconsistencies, especially between the abstract and the detailed findings sections. The abstract mentions 35 respondents and a coefficient of determination of 66.9%, while the detailed methods and results sections refer to 30 respondents and a joint contribution of 59.6%. For scholarly integrity, the present article privileges the more detailed chapter-level evidence because it is supported by the available regression narrative, normality table, respondent description, and effective contribution breakdown. This editorial decision also illustrates an important lesson for thesis-to-journal conversion: concise abstract summaries should always be checked against the full methodological and analytical record.

Despite these inconsistencies, the main analytical direction of the thesis remains stable. Across sections, the thesis consistently asserts that e-leadership and digital competence positively and significantly affect teacher performance and that digital competence is the more dominant predictor. Therefore, while some numerical precision required editorial judgment, the substantive conclusions of the study remain well supported by the detailed findings.

Contribution to Educational Research

The article contributes to educational management research in at least three ways. First, it extends the discussion of digital school transformation by demonstrating that principal e-leadership and teacher digital competence are empirically linked to teacher performance. Second, it enriches Indonesian educational research by situating the issue in a local vocational school rather than relying solely on foreign cases. Third, it shows that school digitalization must be analyzed as a performance

issue, not only as an innovation issue. This shifts the debate from "whether schools use technology" to "how leadership and competence make technology educationally productive."

Future studies could build on this work by involving larger multi-school samples, comparing different school types, or examining mediating variables such as school climate, teacher motivation, access to infrastructure, and professional development history. Qualitative follow-up studies could also explore how teachers and principals experience digital transformation in daily practice. Such work would complement the present study's quantitative evidence and provide a deeper account of the mechanisms through which e-leadership and digital competence improve performance.

CONCLUSION

This article, developed from Jevie Jane Maliangkay's thesis, examined the influence of principal e-leadership and digital competence on teacher performance at SMKS Kristen 1 Tomohon. Using a quantitative explanatory design and regression analysis, the study found that both variables had positive and significant effects on teacher performance. Principal e-leadership contributed meaningfully to performance improvement, but digital competence emerged as the dominant predictor. Simultaneously, the two variables explained approximately 59.6% of the variance in teacher performance, indicating a strong and substantively important combined effect. The findings affirm that teacher performance in contemporary vocational education cannot be separated from school digital transformation. Effective performance depends not only on teacher commitment and instructional responsibility, but also on digital capability and digitally responsive leadership. For this reason, schools should strengthen principal e-leadership, expand teacher digital competence, and embed technology into routine school management and pedagogy. In vocational schools especially, the strategic integration of leadership and competence is essential for sustaining relevant, effective, and future-oriented education.

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