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The Influence of Digital Self-Efficacy on Technology Leadership Competencies of School Principals: The Mediating Role of Work Motivation

SALIMAH H. H. OMAR, LPT, MAED
CAPITOL UNIVERSITY
GRADUATE SCHOOL

Abstract — This study explores the relationships between digital technology self-efficacy, work motivation, and technology leadership competencies among school principals in three (3) school divisions of Northern Mindanao. A descriptive-causal research design utilizing Structural Equation Modeling (SEM) was employed to examine direct and indirect effects, with work motivation serving as a mediating variable. Using convenience sampling, the study involved 321 school principals and collected data via an online survey administered via Google Forms. The research instruments included a digital technology self-efficacy survey, the School Administrators' Work Motivation Scale (SAWMS), and the Principals' Technology Leadership Assessment (PTLA). The data were analyzed using JASP v.0.19.3 and AMOS v.21, with model fit indices indicating adequate fit and validity. The results reveal that school principals exhibit high digital technology self-efficacy, with a mean score of 3.70, indicating strong confidence in their ability to use digital technologies. Work motivation was found to be high across both internal and external dimensions, with an overall score of 3.81. The principals also demonstrated significant technology leadership competencies, particularly in leadership and vision, but showed room for improvement in supporting teachers' technology use. SEM analysis showed that digital technology self-efficacy significantly affects both work motivation ($\beta = 0.756$, $p < 0.001$) and technology leadership competencies ($\beta = 0.139$, $p < 0.01$). Moreover, work motivation was found to significantly and partially mediate the relationship between self-efficacy and leadership competencies, with a substantial portion of the effect being indirect. These findings underscore the importance of enhancing both digital self-efficacy and work motivation in developing effective technology leadership among school principals.

Keywords — Digital Technology Self-Efficacy, Technology Leadership Competencies, School Principals, School Administrators' Work Motivation

I. Introduction

The rapid advancement of digital technologies has significantly transformed educational leadership, necessitating a shift in the competencies required of school principals. In today's digital age, effective school leadership extends beyond traditional managerial skills to include technology leadership. This multifaceted role requires school heads not only to adopt and manage digital innovations but to create a vision for digital transformation, foster a culture of technology use, and provide consistent support for teachers and students navigating digital environments (Chen et al., 2020; Richardson et al., 2021). As schools integrate more digital tools into instruction and

administration, principals are expected to act as instructional leaders, change agents, and system thinkers in an increasingly complex digital ecosystem (Marquez & Almario, 2023).

This evolving leadership landscape raises a critical question: What internal capacities enable a principal to lead effectively in a digital environment? Research suggests that while external factors such as access to infrastructure, technical support, and professional development are important, internal psychological attributes, such as self-beliefs, motivation, and leadership dispositions, also play a pivotal role (Ertmer & Trust, 2020; König et al., 2022). Among these, digital self-efficacy—an individual's belief in their ability to use digital technologies effectively—emerges as a foundational psychological construct that influences leadership in digital contexts.

Rooted in Bandura's (1997) social cognitive theory, digital self-efficacy refers to the confidence individuals have in their ability to perform digital tasks, overcome technological challenges, and engage in problem-solving in tech-mediated environments. High levels of self-efficacy among principals are associated with greater resilience, proactive behavior, and a willingness to experiment with new digital tools (König et al., 2022; Alghamdi & Holland, 2021). For instance, a principal with strong digital self-efficacy is more likely to lead professional learning communities centered around educational technology, integrate digital tools into strategic planning, and guide teachers in using digital platforms effectively. Conversely, low digital self-efficacy may result in resistance to change or limited engagement with innovation initiatives, regardless of external resources (Nasri et al., 2021).

However, digital self-efficacy alone does not guarantee successful technology leadership. To enact meaningful and sustained digital transformation, school principals must also demonstrate a complex set of technology leadership competencies. These include five core domains outlined by Richardson et al. (2021): (1) visionary leadership, which involves articulating and sustaining a clear vision for technology integration; (2) digital-age learning culture, which promotes innovation and creativity in pedagogy; (3) excellence in professional practice, highlighting the importance of modeling effective tech use; (4) systemic improvement, which focuses on aligning digital tools with school improvement plans; and (5) digital citizenship, which addresses ethical, safe, and responsible use of technology.

These competencies are increasingly relevant in the post-pandemic educational landscape, where digital tools are no longer optional but central to teaching, learning, and school administration (Bozkurt & Sharma, 2021; Trust & Whalen, 2020). Hybrid learning, virtual classrooms, learning management systems, and data-driven decision-making are becoming standard expectations in schools. As such, principals who possess strong technology leadership competencies are better positioned to support teacher development, reduce digital divides, and enhance student engagement and learning outcomes (Marquez & Almario, 2023; Al-Samarrai & Affandi, 2022).

Another critical dimension that connects digital self-efficacy and technology leadership is work motivation. Drawing from motivation theory, particularly self-determination theory (Ryan & Deci, 2020), work motivation refers to the internal and external drivers that influence an individual's willingness to invest effort, persist in the face of challenges, and pursue meaningful goals. In the context of educational leadership, motivated principals tend to be more adaptive, engaged, and innovative, particularly in navigating technological change (Nasri et al., 2021). When a principal believes in their digital capabilities, it can bolster their motivation to lead digital initiatives, invest time in professional development, and inspire others to embrace technological change (Al-Samarrai & Affandi, 2022).

Emerging studies suggest that motivation may mediate the relationship between beliefs (such as self-efficacy) and leadership behaviors. In this light, a principal's belief in their digital competence may lead to heightened work motivation, which in turn facilitates the development and demonstration of technology leadership competencies. However, empirical evidence exploring this pathway—particularly among school leaders—remains scarce. While teacher-centered studies have confirmed the mediating role of motivation between digital competence and professional practice (Nasri et al., 2021), there is a research gap regarding how these dynamics operate at the leadership level.

Therefore, the intersection of these three constructs—digital self-efficacy, work motivation, and technology leadership competencies—presents a timely and significant area of inquiry. This study aims to examine the influence of digital self-efficacy on technology leadership competencies among school principals, with work motivation serving as a mediating variable. Using Structural Equation Modeling (SEM), this research will assess direct and indirect relationships among the constructs, offering a nuanced understanding of how internal psychological processes influence digital leadership outcomes in education.

This investigation is especially relevant given the accelerating demand for digitally competent school leaders in the wake of ongoing educational disruptions and reforms. With increasing reliance on data analytics, cloud-based systems, online learning, and digital equity policies, principals must be equipped not only with the tools but also with the psychological readiness to lead (Chen et al., 2020; Richardson et al., 2021). The findings from this study are expected to inform leadership development programs, guide evidence-based policy decisions on digital training for principals, and contribute to the growing discourse on educational leadership in the digital era.

Theoretical Framework:

This study is anchored on two major theories that explain the relationships among digital self-efficacy, work motivation, and technology leadership competencies: Social Cognitive Theory (Bandura, 1986) and Self-Determination Theory (Deci & Ryan, 1985).

Social Cognitive Theory (SCT) posits that the reciprocal interaction of personal factors, behavioral patterns, and environmental influences influences human behavior. A central construct in this theory is self-efficacy—an individual's belief in their capacity to execute behaviors necessary to produce specific outcomes. In the context of this study, digital self-efficacy reflects school principals' confidence in their ability to use and lead the effective implementation of technology within their schools. SCT suggests that principals who perceive themselves as digitally competent are more likely to initiate and sustain technology-integration actions, thereby directly contributing to the development of their technology leadership competencies. Furthermore, this belief in one's capabilities enhances motivational processes, fostering greater persistence, effort, and engagement in professional tasks.

Complementing this, Self-Determination Theory (SDT) provides insight into the role of work motivation as a mediating factor. SDT differentiates between intrinsic motivation—driven by internal satisfaction and the desire to grow—and extrinsic motivation—driven by external rewards or pressures. It emphasizes that individuals are most motivated when their basic psychological needs for autonomy, competence, and relatedness are met. For school principals, digital self-efficacy can foster a sense of competence and autonomy in navigating digital tools and strategies. When these needs are satisfied, motivation is enhanced, potentially influencing how principals exercise and sustain technology leadership in their schools.

By integrating SCT and SDT, this study proposes a model in which digital self-efficacy directly and indirectly influences technology leadership competencies through the mediating effect of work motivation. These theories collectively support the investigation not only of the structural relationships among the variables but also of the psychological mechanisms that explain how and why school principals develop and demonstrate effective technology leadership in a digital learning environment.

Present Study

This study hypothesizes that digital technology self-efficacy exerts a direct influence on both work motivation and technology leadership competencies among school principals. Furthermore, it is posited that work motivation serves as a mediating variable in the relationship between digital technology self-efficacy and school heads' technology leadership competencies, thereby providing insight into the underlying psychological mechanism linking self-belief to effective digital leadership.

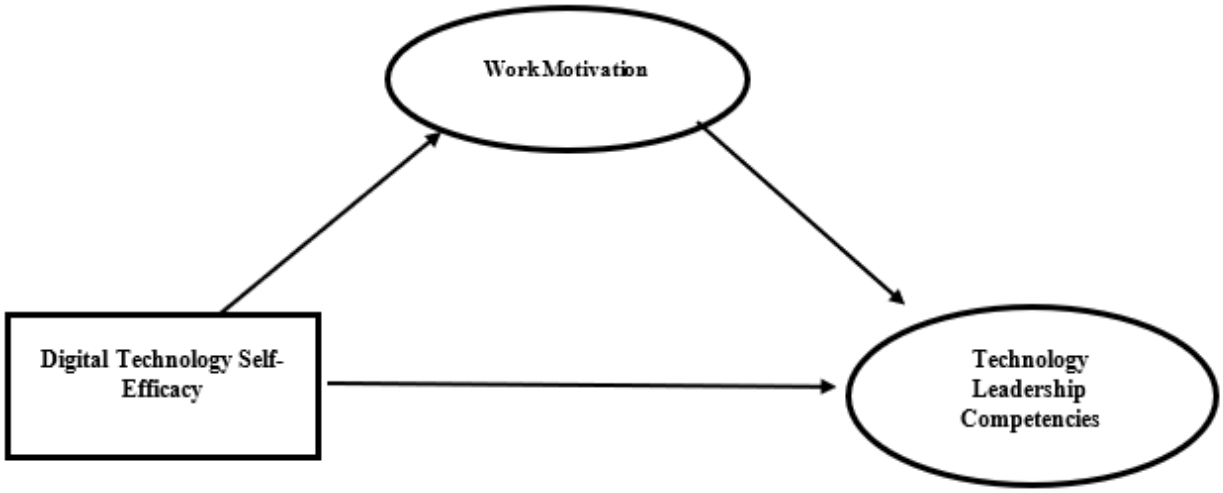

Figure 1. Hypothesized Model of the Research

Research Questions:

This study examined the influence of digital technology self-efficacy on the work motivation and technology leadership competencies of school principals using Structural Equation Modeling (SEM).

Specifically, it seeks to answer the following research questions:

1. What is the level of digital technology self-efficacy among school principals?
2. What is the level of work motivation among school principals in terms of:
    a. External motivation; and
    b. Internal motivation?
3. To what extent do school principals demonstrate technology leadership competencies across the following domains:
    a. Leadership and vision
    b. Learning and teaching
    c. Productivity and professional practice
    d. Support and management
    e. Assessment and evaluation
    f. Social, legal, and ethical issues

4. What structural model best explains the relationships among digital technology self-efficacy, work motivation, and technology leadership competencies of school principals?
5. Does digital technology self-efficacy have a significant direct effect on school principals' technology leadership competencies?
6. Does digital technology self-efficacy have a significant direct effect on school principals' work motivation?
7. Does work motivation significantly mediate the relationship between digital technology self-efficacy and school principals' technology leadership competencies?

Hypotheses:

H_1: Digital technology self-efficacy has a significant direct effect on school principals' technology leadership competencies.

H_2: Digital technology self-efficacy has a significant direct effect on school principals' work motivation.

H_3: Work motivation significantly mediates the relationship between digital technology self-efficacy and school principals' technology leadership competencies.

II. Methodology

Research Model

This study employed a descriptive-causal research design, specifically using Structural Equation Modeling (SEM) to examine the relationships among digital technology self-efficacy, work motivation, and technology leadership competencies among school principals. The design enabled the identification and analysis of both direct and indirect effects of digital technology self-efficacy on school principals' technology leadership competencies, with work motivation as a mediating variable. By adopting this approach, the study aims to provide a comprehensive understanding of how principals' self-belief in their digital technology capabilities influences their leadership behaviors and competencies in a digital context. The descriptive-causal design was chosen because it enables exploration of underlying mechanisms while establishing causal links among the variables. The SEM methodology further facilitates testing complex relationships among multiple constructs and provides strong insights into the dynamics of digital leadership in educational settings.

Research Participants and Data Gathering Procedure

This study involved 321 school principals from selected school divisions in Northern Mindanao during the School Year 2024–2025. Initially, the research focused on a single division;

however, due to the limited number of available principals in that area, the study was expanded to neighboring divisions to ensure a larger sample size for robust analysis. Given the broad geographic scope and logistical constraints, such as limited accessibility and time limitations, a convenience sampling method was employed. Participants were selected based on their availability and willingness to complete the survey. The dissemination of the survey link was facilitated by division personnel, who helped distribute it to the targeted principals. As a result, the final sample consisted of those who were able and willing to access and complete the online survey. Data collection was conducted via Google Forms, enabling broader participation while maintaining data integrity and simplifying administrative tasks.

Research Instrument

This study used an adopted survey tool comprising four key instruments to collect relevant data. These included: (1) a Demographic Information Form, (2) the Digital Technology Self-Efficacy Survey Instrument, (3) the School Administrators' Work Motivation Scale, and (4) the Principals' Technology Leadership Assessment. Each instrument was selected to align with the constructs examined in the study and to ensure validity and reliability in measuring the relevant variables. The following sections provide detailed descriptions of each instrument, including their structure, purpose, and sources of adaptation.

Digital Technology Self-Efficacy Survey Instrument. The Digital Technology Self-Efficacy Survey used in this study was adapted from the 17-item instrument developed by Holcomb et al. (2004), which was based on the 30-item self-efficacy scale by Cassidy and Eachus (2002). To align with current technological trends and ensure conceptual clarity, the term "computers" was replaced with "digital technologies." The instrument is designed to assess respondents' confidence in using a range of digital tools and technologies. This scale has demonstrated strong psychometric properties, particularly in terms of internal consistency. Holcomb et al. (2004) reported a Cronbach's alpha of .89 for the 17-item version following factor analysis. Subsequent studies provided further validation. Hughes (2013) reported Cronbach's alpha values of .960, .956, and .956 across three independent samples, while Ok, Hughes, and Lee (2017) recorded alpha values of .941 and .965 across two groups. These results confirm the instrument's high internal reliability, making it a robust measure for assessing digital self-efficacy in educational settings.

School Administrators' Work Motivation Scale (SAWMS). This study adopted the School Administrators' Work Motivation Scale (SAWMS) developed by Ata (2021), which was designed to assess the work motivation levels of school administrators. Initially composed of 32 items, the instrument underwent rigorous validation procedures, including Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA), conducted during the pilot study with 268 school administrators. The EFA results revealed a two-factor structure, accounting for 59.07% of the total variance, and led to a refined version of the scale consisting of 15 high-loading items. These factors correspond to internal and external dimensions of motivation. The scale

demonstrated strong psychometric properties, with most item loadings high. Furthermore, the instrument demonstrated excellent reliability, with a Cronbach's alpha coefficient of .87, indicating high internal consistency.

Principals Technology Leadership Assessment. The Principals Technology Leadership Assessment (PTLA) is a validated instrument that measures school leaders' competencies in technology leadership. Developed and piloted by the UCEA Center for the Advanced Study of Technology Leadership in Education (CASTLE) in 2005, the instrument was tested on a sample of 74 school principals from various regions, including both the United States and Canada. The pilot study revealed excellent psychometric properties, with an overall Cronbach's alpha of 0.95, indicating high internal reliability and consistency. Each of the six subscales also showed strong reliability: Leadership and Vision ($\alpha = 0.88$), Learning and Teaching ($\alpha = 0.84$), Support, Management, and Operations ($\alpha = 0.85$), Assessment and Evaluation ($\alpha = 0.84$), and Social, Legal, and Ethical Issues ($\alpha = 0.81$). The Productivity and Professional Practice subscale exhibited lower reliability ($\alpha = 0.65$) and should therefore be interpreted with caution as a standalone dimension. The item-test and item-rest correlations demonstrated that all items functioned well within the scale and contributed to the overall measurement of technology leadership. No item was identified for removal, reinforcing the PTLA's robustness as a tool for assessing school principals' leadership in integrating technology in educational settings.

Data Analysis

The statistical analysis for this study was conducted using JASP v.0.19.3 and AMOS v.21. Initially, descriptive statistics were computed to summarize the characteristics of the variables under investigation. Structural Equation Modeling (SEM) was then employed to examine the relationships among digital technology self-efficacy, work motivation, and technology leadership competencies of school principals, with particular emphasis on the mediating role of work motivation.

In SEM, model fit indices are critical for assessing how well the proposed model fits the observed data. These indices serve as diagnostic tools, allowing researchers to evaluate the alignment between theoretical constructs and empirical evidence. Proper interpretation of fit indices ensures the validity and reliability of SEM analyses, enhancing the robustness of the research findings.

The study reviews commonly recognized fit indices, including the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), the Standardized Root Mean Residual (SRMR), and the Chi-Square Test of Model Fit (χ^2). Each of these indices is carefully defined, with recommended threshold values to guide researchers in assessing the adequacy of their models and ensuring the quality of their SEM analyses.

Ethical Considerations

This study adhered to ethical guidelines by ensuring informed consent, where participants were fully informed of the study's purpose, their voluntary participation, and their right to withdraw at any time. Confidentiality and anonymity were strictly maintained, with no personal identifiers collected, and data were securely stored. Ethical approval was obtained from the appropriate authorities, and written permission was secured from each division, including the Department of Education, to conduct the research. Participation was voluntary, and no incentives were offered, ensuring participants could freely choose to participate or withdraw. Data were used solely for research purposes and reported in aggregate to protect participants' identities.

III. Results and Discussion

This section presents the analysis and interpretation of the collected data, organized in tables based on the research questions.

What is the level of digital technology self-efficacy among school principals?

The results from Table 1 indicate that school principals, with a mean score of 3.70 and a standard deviation of 0.64, have high digital technology self-efficacy. This suggests that the majority of school principals in the study feel confident and capable in their use of digital technologies. The relatively low standard deviation (0.64) also indicates a consistent level of high self-efficacy across respondents, with slight variation in their responses. Therefore, it can be inferred that school principals generally have strong confidence in their digital technology skills.

Table 1. Summary of the Respondents' Level of Digital Technology Self-Efficacy

	Mean	SD	Description	Interpretation
Digital Technology Self-Efficacy	3.70	.64	Agree	*High Digital Self-Efficacy*

Legend: 1.00 – 1.80: Very Low Digital Self-Efficacy, 1.81 – 2.60: Low Digital Self-Efficacy, 2.61 – 3.40: Moderately High Digital Self-Efficacy, 3.41 – 4.20: High Digital Self-Efficacy, 4:21 – 5.00: Very High Digital Self-Efficacy

What is the level of work motivation among school principals in terms of:

a. External motivation, and

b. Internal motivation?

Table 2 presents an analysis of the school principals' level of work motivation, examining both external and internal motivation dimensions. For External Motivation, the mean score of 3.98 and a standard deviation of 0.61 fall within the "High" category (3.41 – 4.20), indicating that principals are strongly motivated by external factors such as recognition, career advancement, and

the potential for power and reputation. Items such as *"Being a school administrator makes me happy"* and *"Administrative position gives me reputation and power"* contributed to this high external motivation. These results suggest that the principals derive significant satisfaction from the social and career-related benefits associated with their roles.

In terms of Internal Motivation, the mean score of 3.65 and a standard deviation of 0.71 also fall within the "High" category, suggesting that the school principals are highly motivated by intrinsic factors. Principals find fulfillment in the personal satisfaction that comes with their leadership roles, as evidenced by statements such as *"To give directions as a leader of the school makes me happy"* and *"I consider school administration as a part of my personality."* This reflects that their motivation is driven by a strong sense of purpose, pride in their work, and a desire to make a positive impact on others.

The Overall Work Motivation score of 3.81, with a standard deviation of 0.63, confirms a generally high level of work motivation across both dimensions. This indicates that school principals are motivated by both external rewards, such as recognition and career advancement, and internal rewards, such as personal satisfaction and a desire to affect their communities positively. The relatively small standard deviations across both dimensions suggest consistent responses, indicating that the majority of principals exhibit strong motivation, whether driven by external or internal factors.

Table 2. Summary of the Respondents' Level of Work Motivation

Work Motivation	Mean	SD	Description	Interpretation
External Motivation	3.98	.61	Agree	High
Internal Motivation	3.65	.71	Agree	High
Overall	**3.81**	**.63**	**Agree**	**High**

Legend: 1.00 – 1.80: Very Low, 1.81 – 2.60: Low, 2.61 – 3.40: Moderate, 3.41 – 4.20: High, 4:21 – 5.00: Very High

To what extent do school principals demonstrate technology leadership competencies across the following domains:

a. **Leadership and vision**

b. **Learning and teaching**

c. **Productivity and professional practice**

d. **Support and management**

e. **Assessment and evaluation**

f. **Social, legal, and ethical issues**

Table 3 presents an analysis of how school principals demonstrate technology leadership competencies across various subdimensions. The overall mean score of 3.52, with a standard deviation of 0.67, indicates that school principals significantly demonstrate technology leadership competencies.

For the Leadership and Vision subdimension, the mean score of 3.97 (SD = 0.77) reflects a significant level of participation and leadership in technology planning, stakeholder communication, and advocacy for research-based practices.

In contrast, the Learning and Teaching subdimension received a mean score of 2.79 (SD = 0.72), which falls within the "Neutral" category, suggesting that principals somewhat support teachers in using technology for student assessment, professional development, and the integration of best practices.

The Productivity and Professional Practice subdimension, with a mean of 3.59 (SD = 0.89), shows that principals significantly incorporate technology into their day-to-day tasks and professional development activities.

In the Support, Management, and Operations subdimension, the mean score of 3.27 (SD = 1.10) reflects a somewhat neutral level of competency in areas such as supporting faculty with technology systems and securing funding for technology needs.

The Assessment and Evaluation subdimension scored a mean of 3.75 (SD = 0.85), indicating that principals significantly promote and model the use of technology-based systems to assess student data and evaluate instructional practices.

Finally, the Social, Legal, and Ethical Issues subdimension, with a mean of 3.74 (SD = 0.79), suggests that principals work significantly to ensure equitable access to technology, enforce legal policies, and address privacy and safety issues related to technology.

Overall, while the findings suggest that school principals are generally proficient in key areas of technology leadership, there are specific areas, particularly in supporting teachers' use of technology for instruction and assessment, where further focus and development could enhance their leadership competencies.

Table 3. Summary of the Respondents' Extent of How School Principals Demonstrate Technology Leadership Competencies

Work Motivation	Mean	SD	Description	Interpretation
Leadership and Vision	3.97	.77	Agree	Significantly
Learning and Teaching	2.79	.72	Neutral	Somewhat
Productivity and Professional Practice	3.59	.89	Agree	Significant
Support, Management, and Operation	3.27	1.10	Neutral	Somewhat
Assessment and Evaluation	3.75	.85	Agree	Significantly
Social, Legal, and Ethical Issues	3.74	.79	Agree	Significantly
Overall	3.52	.67	Agree	Significantly

Legend: 1.00 – 1.80: Not At All, 1.81 – 2.60: Minimally, 2.61 – 3.40: Somewhat, 3.41 – 4.20: Significantly, 4:21 – 5.00: Fully

What structural model best explains the relationships among digital technology self-efficacy, work motivation, and technology leadership competencies of school principals?

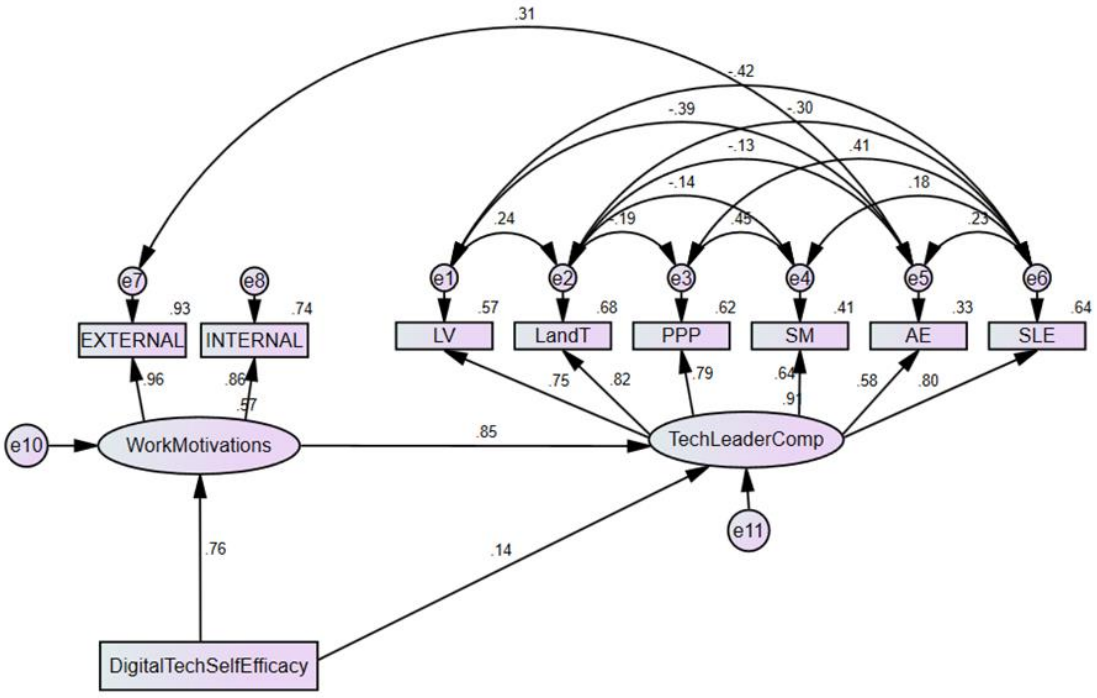

Figure 2. Structural Equation Final Model

Table 4 clearly indicates that the final model demonstrates a good fit to the observed data. The Chi-square value ($\chi^2 = 19.266$, df = 13, p = .115) is not significant (p > .05), which is desirable and suggests that there is no substantial difference between the model and the actual data. The ratio of Chi-square to degrees of freedom ($\chi^2/df = 1.482$) falls well below the critical value of 3, reinforcing the model's acceptable complexity and parsimony. Moreover, all the key fit indices exceed the recommended threshold of 0.90, including GFI (.987), AGFI (.956), NFI (.992), IFI (.997), TLI (.992), and CFI (.997), all of which strongly affirm that the model fits the data

exceptionally well. In addition, the SRMR (.0153) and RMSEA (.039) are both below the standard cutoff of .05, indicating minimal residual error and a very close fit. These results collectively confirm that the model is statistically robust and represents an excellent fit to the data.

Table 4. Goodness of Fit Measures of the Final Model

	X^2	df	X^2/df	p	GFI	AGFI	NFI	IFI	TLI	CFI	SRMR	RSMEA
Critical Value		>0	<3	>.05	>0.9	>0.9	>0.9	>0.9	>0.9	>0.9	<.05	<.05
Model	19.266	13	1.482	.115	.987	.956	.992	.997	.992	.997	.0153	.039

The covariances among the error terms of the observed variables in the model reveal important relationships between various components of school principals' technology leadership competencies and external motivation. Significant covariances ($p < .05$) suggest shared variance not explained by the latent constructs, indicating areas where constructs may influence each other or have overlapping elements in practice.

Notably, Productivity and Professional Practice (e3) shows strong, positive covariances with Support, Management and Operation (e4) ($\beta = .208$, $p < .001$) and Social, Legal, and Ethical Issues (e6) ($\beta = .106$, $p < .001$), suggesting that principals who actively use technology in their professional tasks are also more likely to engage in management and ethical technology practices. This reflects the interconnected nature of administrative technology use and broader operational competencies.

Leadership and Vision (e1), on the other hand, exhibits significant negative covariances with both Assessment and Evaluation (e5) ($\beta = -.137$, $p < .001$) and Social, Legal, and Ethical Issues (e6) ($\beta = -.101$, $p < .001$), implying that stronger emphasis on vision-driven leadership may be associated with lower direct engagement in evaluative or compliance-related activities, possibly due to role specialization or delegation.

A positive covariance between Assessment and Evaluation (e5) and Social, Legal, and Ethical Issues (e6) ($\beta = .075$, $p < .001$) indicates that school principals who are focused on evaluating technological integration also tend to ensure it complies with ethical and legal standards. Similarly, the relationship between Assessment and Evaluation (e5) and External Motivation (e7) ($\beta = .036$, $p = .003$) suggests that principals' evaluative practices may also be driven by external incentives such as recognition or advancement.

However, several negative covariances are also evident. For instance, Learning and Teaching (e2) negatively covaries with Social, Legal, and Ethical Issues (e6) ($\beta = -.058$, $p < .001$) and Support, Management, and Operation (e4) ($\beta = -.047$, $p = .042$), which may reflect competing demands between instructional leadership and operational responsibilities. Likewise, a weak negative covariance is found between Learning and Teaching (e2) and Productivity and

Professional Practice (e3) (β = -.042, p = .014), suggesting potential role strain or time allocation conflicts between these areas.

Overall, these covariances illustrate how school principals' competencies in technology leadership are interrelated, with both synergy and tension among certain domains. Understanding these dynamics can inform targeted support and training interventions to enhance balanced leadership performance.

Does digital technology self-efficacy have a significant direct effect on school principals' technology leadership competencies?

The results in Table 5 show that digital technology self-efficacy has a significant direct effect on school principals' technology leadership competencies, with a standardized β coefficient of .139 and a p-value of <.003, indicating strong statistical significance (p < .01). Although the effect size is relatively modest, it is still meaningful—suggesting that when principals believe in their ability to use digital tools effectively, they are more capable of leading and managing technology initiatives in their schools. This supports the hypothesis that "Digital technology self-efficacy has a significant direct effect on school principals' technology leadership competencies." The result has practical implications: enhancing school leaders' confidence in using digital technology can directly strengthen their performance in key leadership areas such as planning, instructional integration, and organizational management. Thus, targeted professional development efforts to improve digital self-efficacy can serve as a strategic investment in building stronger, more tech-savvy school leadership.

Table 5. Influence of Digital Technology Self-Efficacy on School Principals' Technology Leadership Competencies

Standardized Direct Effect	**β coefficient**	***p-value***
Digital Technology Self-Efficacy → School Principals' Technology Leadership Competencies	.139	.003**

* p < .05, ** p < .01, *** p < .001

Does digital technology self-efficacy have a significant direct effect on school principals' work motivation?

The findings presented in Table 6 indicate that digital technology self-efficacy has a substantial and statistically significant direct effect on school principals' work motivation, with a standardized β coefficient of .756 and a p-value of <.001, which is highly significant (p < .001). This large effect size suggests that principals who are more confident in their ability to use digital technologies are substantially more motivated in their work. The result supports the hypothesis that "Digital technology self-efficacy has a significant direct effect on school principals' work motivation." This underscores the critical role of self-efficacy not only in fostering competence but also in fueling motivation, enthusiasm, and professional engagement. When school leaders

possess strong digital skills and the confidence to use them, they are more likely to experience greater purpose, drive, and commitment in their roles. Therefore, investing in initiatives that strengthen digital self-efficacy—such as targeted training and continuous support—can significantly enhance principals' work motivation and overall leadership effectiveness.

Table 6. Influence of Digital Technology Self-Efficacy on School Principals' Work Motivation

Standardized Direct Effect	**β coefficient**	***p-value***
Digital Technology Self-Efficacy → Work Motivations	.756	<.001***

* p < .05, ** p < .01, *** p < .001

Does work motivation significantly mediate the relationship between digital technology self-efficacy and school principals' technology leadership competencies?

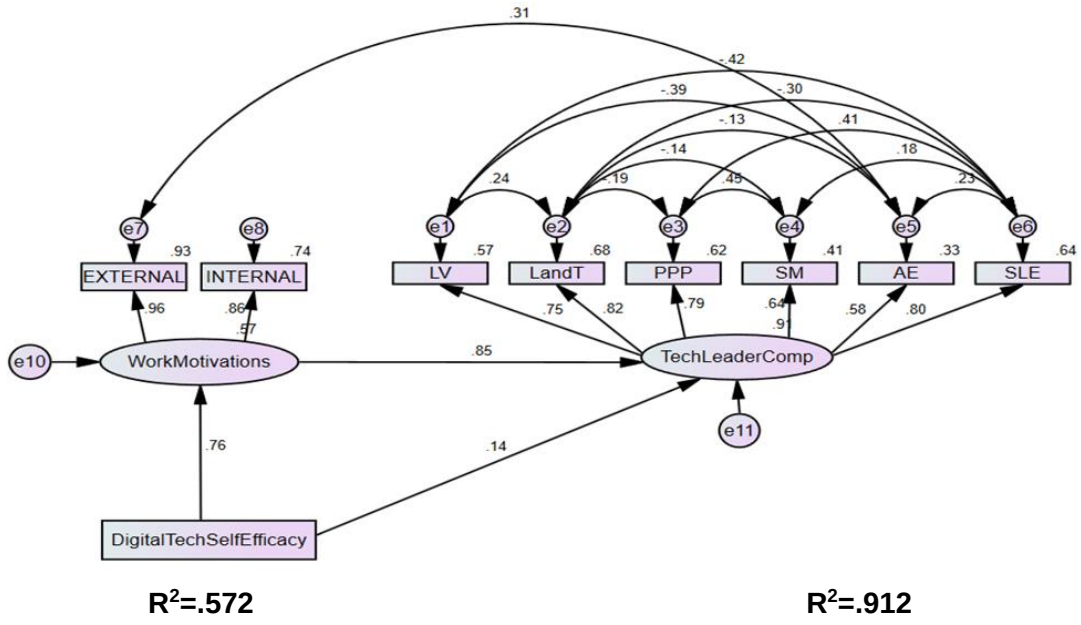

Figure 5. Mediating Effect of School Principals' Work Motivation

The results provide compelling evidence that work motivation significantly mediates the relationship between digital technology self-efficacy and school principals' technology leadership competencies. The squared multiple correlation for Technology Leadership Competencies is .912, indicating that 91.2% of the variance in principals' technology leadership competencies is explained by the model—primarily through digital technology self-efficacy and work motivation. Additionally, Work Motivation has a squared multiple correlation of .572, suggesting that 57.2% of its variance is explained by digital technology self-efficacy.

The path from Work Motivation to Technology Leadership Competencies is substantial (B = .845, p < .001), which confirms that motivated principals are much more likely to demonstrate strong technology leadership. Moreover, digital technology self-efficacy has a significant direct effect on work motivation (β = .756, p < .001) and a more minor but still significant direct effect on technology leadership competencies (β = .139, p < .01).

Given that both the direct effect of digital technology self-efficacy on technology leadership competencies and the indirect effect through work motivation are significant, the findings indicate **partial mediation**. This means that while digital self-efficacy directly enhances technology leadership competencies, a substantial portion of its influence is channeled through work motivation. In essence, digital confidence not only equips school leaders with the tools to lead but also fuels their motivation, thereby amplifying their effectiveness in technology leadership. This underscores the dual importance of both skill development and motivational support in cultivating highly competent and tech-savvy school leaders.

To further assess the significance of the indirect effects observed in the model, particularly the partial mediation, a mediation analysis was conducted using bootstrap procedures with 2,000 samples and a 95% bias-corrected bootstrap confidence interval (see Table 7). This method provides a robust estimate of indirect effects, enabling a more precise determination of the role of work motivation in mediating the relationship between digital technology self-efficacy and school principals' technology leadership competencies. By utilizing this approach, the analysis strengthens the validity of the mediation model and offers a clearer understanding of the direct and indirect pathways influencing technology leadership outcomes.

Table 7. Bootstrapping Results for Mediating Effect of Work Motivation on the Relationship between Digital Technology Self-Efficacy and Technology Leadership Competencies of School Principals

Indirect Effect	**Bootstrap Coefficient**	**SE**	**95% Confidence Interval**		**R^2**	***p***
			Lower	*Upper*		
Digital Technology Self-Efficacy →Work Motivation → Technology Leadership Competencies	.639	.043	.563	.732	.912	.001**

* p < .05, ** p < .01, *** p < .001, SE-Standard Error, p-probability level

The bootstrapping results presented in Table 7 reveal a significant indirect effect of work motivation in mediating the relationship between digital technology self-efficacy and technology leadership competencies of school principals. The bootstrap coefficient for the indirect effect is .639, with a standard error (SE) of .043. The 95% confidence interval for this effect ranges from .563 to .732, and the p-value is .001, which is highly significant (p < .01). Additionally, the R^2 value of .912 suggests a strong explanatory power of the model. These findings provide robust

evidence that work motivation significantly mediates the relationship between digital technology self-efficacy and technology leadership competencies, supporting the hypothesis that "Work motivation significantly mediates the relationship between digital technology self-efficacy and school principals' technology leadership competencies." The significance of the indirect effect further strengthens the argument that improving digital technology self-efficacy can enhance school principals' technology leadership competencies by boosting their work motivation.

IV. Conclusion

This study investigated the relationships between digital technology self-efficacy, work motivation, and technology leadership competencies among school principals. The findings consistently demonstrate the importance of digital self-efficacy in enhancing leadership effectiveness, work motivation, and technology leadership competencies.

The results suggest that school principals generally possess a high level of digital technology self-efficacy, indicating that they feel confident in their ability to use digital tools effectively. This is supported by the high mean self-efficacy score, which was consistent across respondents, suggesting that most principals share a strong sense of digital competence. This aligns with Qadach (2024), who found that principals' self-efficacy significantly contributes to effective school functioning, especially during crises like the COVID-19 pandemic. Such confidence is crucial for leading digital transformation initiatives within schools.

Work motivation also emerged as a key factor in shaping school principals' leadership competencies. Principals demonstrated high levels of motivation, both intrinsic (driven by personal satisfaction and purpose) and extrinsic (driven by recognition and career advancement). The high overall motivation score reflects that a combination of personal fulfillment and external rewards drives these leaders. This was confirmed by findings showing a significant relationship between digital technology self-efficacy and work motivation. Principals with higher self-efficacy in digital technology were found to be more motivated, underscoring the role of self-belief in fostering professional enthusiasm and engagement. This finding is supported by Gümüş and Bellibaş (2020), who emphasized that professional development enhances principals' self-efficacy, which in turn boosts their motivation and leadership practices.

The analysis of technology leadership competencies revealed that while school principals demonstrate strong leadership in areas like vision, planning, and assessment, there are areas where further development is needed. Specifically, the use of technology to support teaching and learning was identified as an area requiring more focus. This suggests that while principals are confident in using technology for administrative and operational tasks, they may have gaps in their ability to fully integrate it into instructional practices, which is critical for fostering a technology-driven educational environment. This observation is consistent with Alqudah's (2023) findings, which

reported that while principals demonstrate advanced digital leadership practices, there are areas requiring improvement, particularly in instructional technology integration.

The mediation analysis revealed that work motivation plays a significant role in mediating the relationship between digital technology self-efficacy and technology leadership competencies. This indicates that work motivation not only directly influences leadership competencies but also strengthens the impact of digital self-efficacy on technology leadership. The findings point to a partial mediation model in which both the direct and indirect effects of digital technology self-efficacy contribute to enhanced leadership competencies. This underscores the importance of not only improving digital skills but also nurturing school leaders' motivation to translate those skills into effective leadership. This finding resonates with the study by Gümüş and Bellibaş (2020), which highlighted the mediating role of self-efficacy in the relationship between professional development and leadership practices.

The study provides strong evidence that digital technology self-efficacy is crucial for enhancing school principals' technology leadership competencies. Furthermore, the study shows that work motivation significantly mediates this relationship, indicating that motivated principals are more likely to apply their digital competencies effectively in their leadership roles. These findings have important implications for educational leadership and professional development. Schools should focus on both improving digital technology self-efficacy and fostering work motivation through targeted training and support to enhance leadership effectiveness.

Theoretical frameworks such as Social Cognitive Theory (Bandura, 1986) and Self-Determination Theory (Deci & Ryan, 1985) support these findings by emphasizing the role of self-efficacy and intrinsic motivation in shaping behavior and competence. According to Social Cognitive Theory, individuals' beliefs in their capabilities (self-efficacy) directly influence their actions and performance. Similarly, Self-Determination Theory suggests that when individuals feel intrinsically motivated, they are more likely to engage in behaviors that lead to competence and satisfaction. These theories highlight the dynamic interaction among self-belief, motivation, and performance, as evidenced by the results of this study.

In practice, educational administrators should focus on both enhancing principals' digital self-efficacy through professional development programs and strengthening their intrinsic motivation by creating an environment that values their contributions and fosters a sense of purpose. This holistic approach will ensure that school principals are not only technically capable but also motivated to apply their skills effectively in their leadership roles.

LIMITATIONS OF THE STUDY

This study was conducted among 321 school principals from three school divisions in Northern Mindanao, limiting the generalizability of the findings to other regions or educational contexts. Data were collected using convenience sampling through a Google Form, which may have introduced biases and did not fully represent the broader population of school principals.

While Structural Equation Modeling (SEM) was used to analyze the relationships between variables, alternative statistical models or the inclusion of additional factors could provide deeper insights. The study also did not consider other potential influences on work motivation and technology leadership, such as personal characteristics or external factors, such as school culture or policies. Future research could address these limitations to offer a more comprehensive understanding.

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