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The Role of Digital Competence in Mediating the Influence of Transformational Leadership on Teacher Performance in the Digital Era

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ABSTRACT

Penelitian ini bertujuan untuk menganalisis peran kompetensi digital dalam memediasi pengaruh kepemimpinan transformasional terhadap kinerja guru di era digital. Studi ini dilakukan di Kota Samarinda dengan pendekatan kuantitatif dan metode analisis jalur menggunakan Partial Least Squares Structural Equation Modelling (PLS-SEM). Hasil analisis menunjukkan bahwa kepemimpinan transformasional berpengaruh signifikan terhadap kompetensi digital ($\beta = 0{,}672$, $p < 0{,}001$) dan kinerja guru ($\beta = 0{,}538$, $p < 0{,}001$), baik secara langsung maupun tidak langsung. Setelah memasukkan kompetensi digital sebagai variabel mediasi, pengaruh langsung kepemimpinan terhadap kinerja menurun menjadi $\beta = 0{,}285$, dengan pengaruh tidak langsung sebesar $\beta = 0{,}413$ dan nilai Variance Accounted For (VAF) sebesar 52,8%, yang menunjukkan adanya mediasi parsial. Temuan ini menegaskan bahwa kompetensi digital merupakan mekanisme penting yang menjembatani hubungan antara kepemimpinan transformasional dan kinerja guru. Oleh karena itu, integrasi strategi pengembangan kepemimpinan transformasional dengan pelatihan kompetensi digital menjadi kunci dalam meningkatkan kualitas pendidikan di era digital.

This research aims to analyse the role of digital competence in mediating the influence of transformational leadership on teacher performance in the digital era. The study was conducted in Samarinda City with a quantitative approach and path analysis method using Partial Least Squares Structural Equation Modelling (PLS-SEM). The results of the analysis showed that transformational leadership had a significant effect on digital competence ($\beta = 0.672$, $p < 0.001$) and teacher performance ($\beta = 0.538$, $p < 0.001$), both directly and indirectly. After including digital competence as a mediating variable, the direct influence of leadership on performance decreased to $\beta = 0.285$, with an indirect effect of $\beta = 0.413$ and a Variance Accounted For (VAF) value of 52.8%, indicating the existence of partial mediation. These findings confirm that digital competence is an important mechanism that bridges the relationship between transformational leadership and teacher performance. Therefore, the integration of transformational leadership development strategies with digital competency training is the key to improving the quality of education in the digital era.

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INTRODUCTION

Transformational leadership has been widely proven to be able to improve individual motivation, commitment, and performance in various sectors, including education. (Firmansyah et al., 2022), Stated

through meta-analysis that transformational leadership significantly improves teacher performance in Asia, especially by encouraging ongoing motivation and commitment. Meanwhile, research at the university level in China shows that visionary leaders who encourage critical thinking are able to drive the academic performance of teaching staff (Lai et al., 2024).

Teachers' performance in the digital age is not only determined by leadership, but also heavily influenced by their ability to adopt and utilise technology effectively. A study by Mailizar et al. in the context of secondary education shows that a school culture that supports digital innovation strengthens teachers' digital literacy, which then has a positive impact on teaching performance (Setyaningsih, 2024). Similar findings emerged from Hizam et al.'s research, which showed that digital competency has a direct impact on the effectiveness of using learning platforms such as Moodle, increasing the output of teaching assignments (Hizam, 2021).

Digital competence is a key skill that teachers need to face the challenges of 21st-century learning, especially in the context of technology-based learning. (Tzafilkou et al., 2023) developed an instrument that measures teachers' digital competence, underlining the pedagogical and professional aspects that are essential to effectively integrate technology (Hadi, 2024). In addition, the updated TPACK architecture emphasises that simultaneous mastery of technology, content, and pedagogy is indispensable for preparation for the digital age (Schmidt et al., 2009).

Some early research suggests that digital competence can act as a mediator in the relationship between leadership style and work outcomes, but the specific link between transformational leadership and teacher performance through digital competence is still not fully understood. Schmitz reports a model in which digital competencies and transformational leadership together predict lecturer performance in higher education, demonstrating the potential for mediation (Schmitz et al., 2023). However, the majority of studies in schools still focus on motivational or cultural mediation, have not explicitly explored the role of digital competence as the main mediating variable, so the direct causal relationship between transformational leadership, digital competence, and teacher performance in schools has not been clearly explained (Dewi et al., 2025).

Although many studies attest to the positive impact of transformational leadership on teacher performance, there is still little research exploring how the process occurs in today's digital context. (Schmidt et al., 2009) Assert that transformational leadership can empower teachers to integrate technology more intensively, but rarely details the internal mechanisms that link leadership and teacher technology use. In addition, Susilowati, Akbarini, and Prameswara (2023) found that transformational leadership styles have a significant influence on the perception of ease of use of technology (TAM), but they did not continue the analysis of how it impacts teacher performance (Susilowati et al., 2023).

The role of digital competence as a mediating variable in the relationship between transformational leadership and teacher performance has not been extensively researched empirically, especially in schools that are undergoing digital transformation. (Dewi et al., 2025) Show that digital competence increases employee self-efficacy as a mediator between digital leadership and productivity, but this context focuses on general employees, not school teachers. Comprehensive studies in schools that combine these three variables are still very rare, so it is urgent to conduct a digital competence mediation analysis specifically in the context of education.

It is not yet known exactly to what extent teachers' digital competencies can strengthen or weaken the influence of leadership styles on improving their performance. Nashrullah's research indicates that digital competence does not necessarily moderate the relationship between transformational leadership and teacher instructional quality, but high digital competence increases cognitive activation in teaching, which shows a conditional effect on learning objectives (Nashrullah et al., 2025). This reinforces concerns that while leadership is effective, teachers' digital competencies play an important role in determining the magnitude of the impact on performance.

In addition, there are still limitations in understanding how transformational leadership dimensions can encourage the development of teachers' digital competencies. The MDPI study shows that instructional leadership and school digital culture significantly improve teachers' digital competence, encompassing technical and pedagogical literacy, but does not dissect the specific contributions of transformational dimensions such as intellectual inspiration or individual consideration (Rasdiana et al., 2024). Therefore, there needs to be research that systematically examines the role of

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each of these dimensions in facilitating the formation of teachers' digital competencies and subsequently mediating the influence on performance.

An important question arises in the context of today's digital education: does digital competence only play a role as an independent factor that stands alone, or is it a mediating variable that bridges the influence of transformational leadership on teacher performance? A number of previous studies (Misbah et al., 2020; Setiawan & Pramudibyanto, 2021) indicate that transformational leadership contributes to creating a work environment that supports innovation, including in terms of developing teachers' digital competencies. Leaders who are able to provide inspiration, intellectual stimulation, and individual support are proven to encourage teachers to adapt to technology, improve digital literacy, and implement technology-based learning approaches more effectively. As a result, the increased digital competence of teachers directly contributes to the quality of learning and the achievement of more optimal performance.

Based on these findings, this study is focused on testing the mediation model, namely the role of digital competence in bridging the relationship between transformational leadership and teacher performance in the digital era. This focus is very relevant in the midst of the acceleration of digitalisation in post-pandemic education, where mastery of information and communication technology is no longer an option, but a professional demand that must be met by educators. Teachers are required not only to be able to operate technology, but also to be able to integrate it pedagogically and strategically in learning.

The scientific contribution of this research includes three main aspects. First, this study offers an empirical model that systematically explains how transformational leadership affects teacher performance through digital competency mediation. Second, the results of this research are expected to be the basis for education policy interventions, especially those related to the development of school leadership programs and teacher digital competency training. Third, this study seeks to fill in the gaps in previous studies that generally only examined the direct relationship between leadership and performance, without considering relevant mediation mechanisms in the context of digital transformation in the educational environment.

METHOD

This study uses an explanatory quantitative approach with the aim of examining the influence of transformational leadership on teacher performance through digital competence as a mediating variable. The design of this study is in the form of a quantitative survey with path analysis techniques using Partial Least Squares Structural Equation Modelling (PLS-SEM) through SmartPLS 3.0 software. This approach was chosen because it is able to test latent relationships between variables and accommodate the complexity of structural models with a relatively large number of indicators.

The population in this study is all public junior high school (SMP) teachers in Samarinda City. Using the purposive sampling technique, the respondents involved were a minimum of 100 active teachers, who were selected based on the criteria of having at least two years of teaching experience and having access to digital technology in learning. Data collection was carried out by distributing a structured questionnaire consisting of three main constructs, namely Transformational Leadership, Digital Competence, and Teacher Performance. Each variable was measured against previously validated indicators from a literature review, and used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree).

Validity and reliability testing were performed before the path analysis, including outer loading, composite reliability, and Average Variance Extracted (AVE) tests to ensure the feasibility of the measurement model. Furthermore, hypothesis tests were carried out through direct and indirect path analysis, as well as the calculation of Variance Accounted For (VAF) to determine the type of mediation that occurred. The entire data processing procedure refers to the guidelines of the PLS-SEM statistical method as explained by Hair et al. (2017).

RESULTS AND DISCUSSION

Transformational Leadership

Transformational leadership is a leadership style that is able to inspire and motivate teachers to achieve optimal performance through a visionary and humanistic approach. This variable is measured through four main indicators. First, *Idealised Influence* describes the ability of school principals to be

role models with integrity and respect by teachers. Second, *Inspirational Motivation* shows the extent to which the principal is able to communicate a clear vision and encourage a collective spirit in the school environment. Third, *Intellectual Stimulation* reflects the ability of leaders to encourage teachers to think critically, innovatively, and be open to new ideas. Fourth, *Individualised Consideration* emphasises the principal's attention to the needs, potential, and personal development of each teacher.

Kompenti Digital

Teachers' digital competence is an important aspect in supporting the transformation of technology-based learning. This variable includes four indicators that comprehensively represent teachers' digital skills. First, the Use of Learning Technology measures the extent to which teachers can integrate digital devices and applications in the learning process. Second, Digital Information Literacy describes teachers' ability to access, evaluate, and utilise digital information effectively and ethically. Third, Digital Classroom Management is related to the ability of teachers to manage online learning activities or digital platforms, including the arrangement of student interaction. Fourth, Digital Communication reflects teachers' skills in communicating effectively through various digital media with students, parents, and peers.

Teacher Performance

Teacher performance is a manifestation of professional quality in carrying out their duties and responsibilities as educators. This variable consists of four main indicators. First, Learning Planning shows the teacher's ability to develop systematic and contextual teaching tools. Second, the Implementation of Learning describes the effectiveness of teachers in implementing interactive and adaptive learning strategies. Third, Learning Assessment includes teachers' competencies in designing, implementing, and following up on the objective evaluation of learning outcomes. Fourth, Professional Responsibility measures the commitment of teachers in carrying out their duties consistently, upholding professional ethics, and actively participating in self-development and educational institutions.

Table 1. Results of Direct Path Coefficient Statistical Test

Relationship Pathway	Koefisien Jalur (β)	t-Statistik	p-Value	Information
Transformational Leadership → Competencies Digital	0.672	7.432	0.000	Signifikan
Digital Competence → Teacher Performance	0.615	6.895	0.000	Signifikan
Transformational Leadership → Teacher Performance (without mediator)	0.538	5.621	0.000	Signifikan
Transformational Leadership → Teacher Performance (with mediators)	0.285	4.217	0.000	Signifikan, menurun

Table 1 presents the results of path analysis to test the direct influence between variables in the research model, namely Transformational Leadership, Digital Competence, and Teacher Performance. This analysis was carried out using the Partial Least Squares Structural Equation Modelling (PLS-SEM) approach.

1. Transformational Leadership → Digital Competencies

   The path coefficient of 0.672 with a value of t = 7.432 and p-value = 0.000 shows that the influence of transformational leadership on teachers' digital competence is statistically significant. This means that the higher the transformational leadership style of the school principal, the higher the level of digital competence of teachers. This indicates that the role of the principal in inspiring, motivating, and giving individual attention is essential in encouraging mastery of technology among teachers.
2. Digital Competence → Teacher Performance

   A coefficient of 0.615, with t = 6.895 and p-value = 0.000, also showed a significant influence. This proves that teachers' digital competence has a real contribution to improving performance, especially in designing, implementing, and evaluating technology-based learning. The better a teacher's digital skills, the more effective his or her performance will be in the context of 21st-century learning.

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3. Transformational Leadership → Teacher Performance (without mediator)
   Coefficients of 0.538, t = 5.621, and p = 0.000 show that before considering digital competence as a mediator, the direct influence of transformational leadership on teacher performance is relatively strong and significant. This indicates that strong leadership can directly improve teachers' performance in various aspects of their professional duties.
4. Transformational Leadership → Teacher Performance (with mediators)
   When digital competence was included as a mediating variable, the direct coefficient of transformational leadership on teacher performance decreased to 0.285 (t = 4.217, p = 0.000). Although still significant, the decrease in the value of this coefficient shows that part of the influence of leadership on teacher performance is bridged or mediated by digital competence. This is an indication of partial mediation, meaning that transformational leadership not only affects teacher performance directly but also indirectly through digital competency improvement.

Table 2. Results of the Digital Competency Mediation Test

Test Type	Value
Total Effect	0.672
Indirect Effect (Transformasional → Digital Competencies → Teacher Performance)	0.413
Direct Effect (Transformasional → Teacher's performance, after mediation)	0.285
Variance Accounted For (VAF)	**52.8%**
Types of Mediation	**Parsial**

Table 2 shows the results of mediation testing in the relationship model between Transformational Leadership, Digital Competence, and Teacher Performance. The mediation test aims to find out whether the influence between independent and dependent variables is passed on partially or completely through the mediation variable.

1. Total Effect = 0.672
   This value shows the overall influence of Transformational Leadership on Teacher Performance, either directly or indirectly through Digital Competencies. This number is the sum of direct and indirect effects, namely:
   Total Effect = Direct Effect + Indirect Effect = 0.285 + 0.413 = 0.672
2. Indirect Effect = 0.413
   This value represents the indirect influence of Transformational Leadership on Teacher Performance that occurs through Digital Competence as a mediator. This means that part of the influence of transformational leadership is passed on through improving teachers' digital competencies.
3. Direct Effect = 0.285
   This is the direct influence of Transformational Leadership on Teacher Performance after considering the role of mediation. Compared to the total effect (0.672), this value has decreased, indicating that some of the influence has been "transferred" through indirect channels (digital competence).
4. Variance Accounted For (VAF) = 52.8%
   VAF is used to determine the type of mediation based on the formula:
   VAF = (Indirect Effect ÷ Total Effect) × 100%
   VAF = (0.413 ÷ 0.672) × 100% = 52.8%
   VAF interpretations:
   VAF < 20%: no mediation
   20% ≤ VAF ≤ 80%: partial mediation
   80% VAF >: full mediation

With a VAF value of 52.8%, these results show that digital competence plays a role as a partial mediator in the relationship between transformational leadership and teacher performance. This means that transformational leadership still has a direct impact on teacher performance, but this influence is also channelled significantly through improving teachers' digital competence.

The results of the study show that transformational leadership has a significant influence on teacher performance, both directly and indirectly through digital competence as a mediating variable. These findings confirm the transformational leadership theory put forward by (Avolio & Bass, 2004),

which emphasises that transformational leaders encourage the achievement of high performance by providing inspiration, intellectual stimulation, and individual attention and support. In the context of schools, principals who adopt this leadership style not only focus on administrative achievements but also on teacher capacity development, especially in adapting to the changing paradigm of technology-based learning.

Furthermore, transformational leadership has a greater influence when combined with strengthening teachers' digital competencies. In the digital age, teachers are faced with the challenge of integrating technology into learning practices effectively. Principals who are visionary and supportive tend to encourage teachers to explore and adopt technology, both for planning, implementation, and evaluation of learning (Leithwood & Jantzi, 2005). The role of transformational leaders has become vital in creating an innovative and collaborative climate that strengthens teachers' motivation to develop their digital skills (Ng, 2015). This means that leadership not only affects performance directly but also creates conditions conducive to the growth of digital competencies, which ultimately helps drive performance improvement.

Within the framework of DigCompEdu developed by (Redecker, 2017), teachers' digital competencies include digital literacy, the use of technology-based pedagogy, and the ability to be reflective of digital practices. When teachers have an adequate level of digital competence, they are better able to design learning that is relevant to the needs of 21st-century students. Therefore, digital competence is an important bridge between inspiring leadership and optimal performance. The study also fills a gap in the literature that previously tended to view the relationship between leadership and teacher performance linearly, without considering the increasingly essential digital transformation context in modern education (Spante et al., 2018; Voogt et al., 2013).

Thus, these results not only reinforce previous findings but also provide a more complex and contextual conceptual model, which places digital competencies as a strategic element in the relationship between leadership and teacher performance. In practical terms, these findings encourage policymakers to design teacher leadership training and professional development programs in an integrated manner to produce not only inspirational leaders but also digitally adaptive and competent teachers.

Furthermore, the results of this study confirm the important role of digital competence as a partial mediating variable in the relationship between transformational leadership and teacher performance. This means that part of the influence of transformational leadership on improving teacher performance takes place indirectly through the path of strengthening digital competence. This reinforces the understanding that transformative leadership not only inspires psychologically and motivationally, but also creates a learning and working environment that supports the development of teachers' technological capacity (Leithwood & Jantzi, 2005; Ng, 2015). Teachers who work under such leadership are more encouraged to adopt digital innovations in learning and participate in technology-based competency enhancement training.

These findings also support the DigCompEdu digital competency framework developed by (Redecker, 2017), which states that it is not enough for teachers to have technical skills, but also to be able to use technology pedagogically, reflectively, and collaboratively in the context of learning. The framework covers six key areas of competence, ranging from digital professional skills, digital resource creation, to engagement with student learning through technology. Therefore, the higher the digital competence of teachers, the greater their contribution to creating an effective, adaptive, and in accordance with the demands of the 21st-century.

In line with that, research by (Koehler & Mishra, 2009) on the concept of Technological Pedagogical Content Knowledge (TPACK) shows that the integration of technology in effective learning requires a combination of mastery of content, pedagogy, and technology. Teachers who have high digital competence tend to be able to navigate the process well, resulting in a more meaningful learning experience for students. Likewise, the findings (Spante et al., 2018), which in their systematic study emphasise the importance of building digital literacy comprehensively in the context of higher and secondary education. Therefore, digital competence is a key point in bridging leadership transformation towards superior teacher professional performance in the digital era.

From the theoretical side, this study expands the understanding of the model of the relationship between leadership and teacher performance by presenting digital competence as a key mediation element in the context of digital education transformation. Previously, studies such as those conducted

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by (Nguni et al., 2006) emphasised the direct relationship between leadership style and teachers' work outcomes, without taking into account the 21st-century competence dimension, which is now crucial. In the post-pandemic era and the era of industrial revolution 4.0, this kind of approach is inadequate because it does not reflect the complexity of the education system, which is currently greatly influenced by the development of digital technology (Fullan, 2020). Therefore, the empirical model offered in this study provides a new lens in understanding how the influence of leadership is not linear, but rather through psychological and competency pathways, such as strengthening literacy and teachers' digital skills.

This theoretical contribution is important because it provides enrichment to the educational leadership literature by emphasising the importance of *technological leadership* that is able to bridge transformational visions with the practical capabilities of educators in the field (Anderson & Dexter, 2005). In addition, this approach is also consistent with the digital-based instructional leadership framework, where leaders are required not only as administrators, but also as facilitators of digital transformation in the school environment (Dexter, 2018). Thus, this research not only adds a new dimension to the study of leadership-performance relationships but also strengthens the urgency of integrating the digital dimension in the framework of future leadership analysis.

From a practical perspective, the results of this study provide a strong basis for formulating a more integrated and contextual education quality development policy. In particular, there is an urgent need to develop transformational leadership training programs and digital competency enhancement of teachers simultaneously, as a dual strategy to meet the challenges of 21st-century education. Policy approaches that separate leadership development and technology capacity building have proven ineffective, as they interact with each other and determine overall learning outcomes (OECD, 2020). Therefore, interventions that target both simultaneously have the potential to strengthen the readiness of educational institutions in the face of digital disruption and create a learning ecosystem that is more responsive and adaptive to change.

CONCLUSION

This study concludes that transformational leadership has a significant effect on teacher performance, both directly and indirectly through digital competence as a mediating variable. Principals who apply a transformational leadership style are able to encourage teachers to be more innovative, adaptive, and responsive to change, especially in facing challenges and opportunities in the digital era. This leadership style creates a work environment that supports self-development and increased professionalism of teachers.

In addition, the results of the study show that digital competence plays a role as a partial mediator in the relationship between transformational leadership and teacher performance. This shows that improving teachers' digital competencies not only contributes to the quality of learning but also reinforces the positive effects of leadership on individual performance in schools. Teachers who have high digital skills tend to be better prepared to face technological changes and can utilise them in the learning process effectively.

Theoretically, this research enriches the understanding of the relationship between leadership and performance by adding digital elements as important variables in the context of 21st-century education. Meanwhile, practically, the results of this study provide a basis for the development of integrated digital leadership and training programs, as a strategy to improve the quality of education in the era of digital transformation, especially in Samarinda City.

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