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Digital-Based Principal Leadership Transformation in Enhancing Teacher Performance in the Society 5.0 Era

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A B S T R A C T

This study aims to examine the contribution of digital-based principal leadership transformation in enhancing teacher performance in the Society 5.0 era. The process involved distributing structured questionnaires to 72 teachers from three public junior high schools in South Jakarta using a saturated sampling technique. The implementation was conducted over a three-month period. Data were analyzed using descriptive statistics and simple linear regression. The results indicate that digital leadership transformation significantly improves teacher performance, particularly in technology integration and instructional innovation. The findings imply that adaptive digital leadership plays a strategic role in strengthening teacher professionalism and advancing education management practices in the digital era.

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INTRODUCTION

Digital transformation has become a major driving force in the global education system, particularly in responding to the Society 5.0 era, which emphasizes the integration of advanced technology and human-centered values. In this context, school principals are required not only to be adaptive but also transformative in leveraging digital technology to enhance the quality of learning. This phenomenon indicates that educational leadership is no longer merely administrative but has become strategic and innovation-driven (Harris & Jones, 2020). In Indonesia, however, this transformation still faces structural and cultural challenges that affect the effectiveness of digital leadership implementation in schools.

Digital-based leadership refers to a leader's ability to integrate technology to improve organizational performance and human resource quality. In the educational context, this is reflected in principals' abilities to manage information systems, facilitate digital communication, and make data-driven decisions. Research by Sheninger (2021) demonstrates that digital leadership has a significant impact on improving school organizational effectiveness. Furthermore, the concept of digital leadership is closely associated with pedagogical innovation and the transformation of workplace culture in educational settings.

Teacher performance, as a key indicator of educational success, has also undergone a paradigm shift in the digital era. Teachers are no longer only expected to master subject content but also to effectively integrate technology into their instructional practices. Research by Trust and Whalen (2020) highlights that teachers' ability to utilize technology is strongly influenced by leadership support within schools. However, empirical realities indicate that many teachers, particularly in developing countries including Indonesia, have not yet optimally adopted technology in their teaching practices.

At the national level, these challenges are further compounded by low levels of digital literacy and limited access to continuous professional development for teachers. A study by Purnomo et al. (2021) reveals that school leadership plays a crucial role in encouraging technological adaptation in educational environments. Additionally, research by Rahmawati and Suyanto (2022) indicates that principals' support for digital innovation has a direct impact on improving teacher performance. These findings suggest that digital leadership is a critical factor in driving educational transformation in Indonesia.

Despite these developments, there remains a significant research gap in the field of educational leadership. Most previous studies have focused on transformational leadership in general without specifically integrating digital dimensions as a primary variable (Leithwood et al., 2020). Moreover, studies that explicitly examine the relationship between digital leadership transformation and teacher performance within the context of Society 5.0 are still limited. Dexter et al. (2021) also emphasize the need for stronger empirical approaches to measure the impact of digital leadership quantitatively.

Furthermore, prior research has predominantly employed qualitative approaches that focus on exploring phenomena, thereby lacking quantitative

evidence to explain the strength of relationships between variables. This creates a need for data-driven research capable of explaining the causal relationship between digital leadership and teacher performance more objectively. UNESCO (2021) emphasizes the importance of strengthening digital leadership as a key strategy for improving global education quality. Therefore, a quantitative approach is considered relevant to address this research gap.

Based on the background and identified research gaps, this study aims to analyze the effect of digital-based principal leadership transformation on teacher performance in the Society 5.0 era. This research is expected to contribute theoretically to the development of digital leadership concepts in educational management. Practically, the findings are anticipated to serve as a reference for school principals and policymakers in designing technology-based leadership strategies. Thus, this study contributes to strengthening educational transformation that is adaptive to global technological advancements.

LITERATURE REVIEW

Digital Leadership in Educational Management

Digital leadership is a leadership concept that emphasizes a leader's ability to utilize digital technology to enhance organizational effectiveness and the quality of human resources. In the educational context, school principals as leaders are required to integrate technology into school management, including communication, decision-making, and academic supervision. Digital leadership theory asserts that leaders who are adaptive to technology are able to create innovative and responsive work environments (Roman et al., 2021). Furthermore, research by Avidov-Ungar and Eshet-Alkalai (2022) shows that digital leadership plays a crucial role in driving the transformation of school organizational culture toward more modern systems. Therefore, digital-based leadership becomes a strategic factor in improving the effectiveness of educational management in the Society 5.0 era.

H1: Digital-based principal leadership transformation has a significant effect on teacher performance.

Principal Leadership Transformation and Organizational Change

Principal leadership transformation refers to a shift in leadership paradigms from conventional approaches to more innovative and technology-based models. In transformational leadership theory, leaders act as agents of change who inspire and motivate organizational members to achieve higher performance. However, in the digital context, this transformation is expanded through the integration of technology as part of leadership strategy. Research by Hallinger (2021) confirms that transformative and technology-based leadership significantly impacts the improvement of educational quality. Meanwhile, a study by Tan et al. (2022) indicates that digital leadership transformation strengthens organizational effectiveness through enhanced collaboration and innovation. Thus, principal leadership transformation becomes a key element in addressing the challenges of modern education.

H2: Principal leadership transformation positively influences teacher performance through digital integration.

Teacher Performance in the Digital Era

Teacher performance is a primary indicator of educational success, encompassing aspects such as planning, implementation, evaluation, and instructional innovation. In the digital era, teacher performance is not only measured by pedagogical competence but also by the ability to integrate technology into the teaching and learning process. Professional performance theory highlights that digital competence is an essential component of modern teacher professionalism (Tondeur et al., 2021). Research by Scherer et al. (2021) shows that teachers with higher digital competence tend to demonstrate better performance in creating innovative learning environments. However, without strong leadership support, the improvement of teacher performance in digital aspects cannot be achieved optimally. Empirical evidence from Patabang and Murniarti (2021) also indicates that teachers generally possess high pedagogical competence in online learning contexts, particularly in mastering learning theories. However, communication with students tends to be relatively weaker, suggesting that teacher performance in digital environments still requires support and development.

H3: Teacher performance is significantly influenced by the level of digital support provided by school leadership.

The Role of Leadership in Enhancing Teacher Performance

School leadership plays a strategic role in improving teacher performance through various approaches, such as academic supervision, professional development, and motivation. From the perspective of instructional leadership theory, principals directly contribute to improving the quality of teaching and learning by supporting teachers. Research by Liu et al. (2021) demonstrates that effective leadership has a positive relationship with improved teacher performance. Additionally, a study by Bush (2022) confirms that educational leadership based on collaboration and innovation significantly enhances teacher effectiveness. Therefore, principal leadership serves as a determining factor in improving educational quality.

H4: Effective school leadership has a significant positive impact on teacher performance.

Digital Transformation in the Society 5.0 Context

The Society 5.0 era emphasizes the integration of technology with human-centered values to create a smarter and more sustainable society. In education, digital transformation has become a fundamental necessity to improve the quality of learning and ensure its relevance to global developments. Research by Zawacki-Richter et al. (2021) indicates that digital technology has great potential to enhance both learning effectiveness and educational management. Furthermore, Murniarti et al. (2023) highlight that Augmented Reality can serve as an innovative learning medium that positively impacts student engagement, especially in inclusive education contexts, although its implementation still requires adaptation to specific learning needs. On the other hand, Holmes et al. (2022) emphasize that the implementation of technology in education must be supported by adaptive and visionary leadership. Therefore, the integration of

digital leadership in the Society 5.0 era is a crucial factor in improving teacher performance and overall educational quality.
H5: Digital transformation in the Society 5.0 era strengthens the relationship between principal leadership and teacher performance.

METHODOLOGY

Research Approach and Design

This study employs a quantitative approach with an explanatory research design to examine the causal relationship between digital-based principal leadership transformation (independent variable) and teacher performance (dependent variable) in the Society 5.0 era. The quantitative approach is selected because it enables objective measurement of variables through numerical data and structured statistical analysis (Creswell & Creswell, 2021). The explanatory design is intended to test the effect of the independent variable (X: digital leadership transformation) on the dependent variable (Y: teacher performance), thereby providing empirical evidence of the relationship between these variables (Hair et al., 2021). This approach is considered appropriate for identifying the strength and direction of influence between leadership transformation and teacher outcomes.

Population, Sample, and Sampling Technique

The population of this study consists of all teachers from three public junior high schools (SMP Negeri) in South Jakarta that have implemented digital technology in both instructional and managerial practices. Based on the collected data, the total population is 72 teachers. The sampling technique used is saturated sampling (census sampling), where all members of the population are included as research respondents. This technique is chosen because the population size is relatively small and allows for more comprehensive and representative data collection while minimizing sampling bias (Etikan & Bala, 2022). Therefore, the total number of respondents in this study is 72 teachers, representing the full population.

Variables and Operational Definitions

This study involves two primary variables. The independent variable (X) is digital-based principal leadership transformation, which refers to the ability of school principals to integrate digital technology into leadership practices, including digital vision, technology-based communication, data-driven decision-making, and support for innovation. The dependent variable (Y) is teacher performance, defined as the level of effectiveness in carrying out professional duties, including lesson planning, instructional implementation, evaluation, and the integration of technology in teaching. These variables are operationalized based on established theoretical frameworks to ensure measurable and observable indicators in the research process.

Data Collection Techniques and Instruments

Data were collected using a structured questionnaire based on a five-point Likert scale, designed according to the indicators of each research variable. The instrument for digital leadership transformation was adapted from digital leadership frameworks, covering aspects such as digital vision, communication,

decision-making, and innovation support (Van Wart et al., 2021). Meanwhile, the teacher performance instrument was developed based on professional performance indicators, including planning, teaching implementation, evaluation, and technology integration (Scherer et al., 2021). In addition to questionnaires, supporting data were obtained through documentation, including school profiles and teacher demographic data.

Validity and Reliability Testing

Instrument validity was tested using the Pearson Product Moment correlation, where each item is considered valid if the correlation coefficient exceeds the critical r-value. Reliability testing was conducted using Cronbach's Alpha, with a threshold value of ≥ 0.70 indicating acceptable internal consistency (Taber, 2021). These tests are essential to ensure that the research instruments accurately measure the intended variables and produce consistent results, thereby enhancing the credibility and scientific rigor of the study.

Research Procedure

The research was conducted systematically through several stages. The first stage involved research planning, including problem identification, literature review, and instrument development. The second stage consisted of instrument testing, where validity and reliability tests were conducted. The third stage was data collection, which involved distributing questionnaires to respondents over a three-month period. The fourth stage included data processing and analysis, carried out after all data were collected. The final stage was report writing, which involved interpreting results and drawing conclusions based on the findings.

Data Analysis Techniques

Data analysis was performed using both descriptive and inferential statistical methods with the assistance of SPSS version 26. Descriptive analysis was used to summarize respondent characteristics and variable distributions. Prior to hypothesis testing, assumption tests including normality and linearity tests were conducted to ensure that the data met regression analysis requirements (Field, 2020). Hypothesis testing was carried out using simple linear regression analysis to examine the effect of digital-based principal leadership transformation on teacher performance. Additionally, the coefficient of determination (R^2) was used to measure the extent to which the independent variable explains the variance in the dependent variable.

RESEARCH RESULT

Respondent Profile

The study involved 72 teachers from three public junior high schools in South Jakarta, selected using saturated sampling. This respondent composition reflects the entire population targeted in the study and is consistent with the quantitative explanatory design adopted to examine the effect of digital-based principal leadership transformation on teacher performance. The respondent profile is important to describe the empirical context in which the data were generated. In this study, the profile was organized based on gender, teaching experience, and frequency of digital technology use in instructional practice

Table 1. Distribution of Respondents by Demographic Characteristics

No.	Demographic Aspect	Category	Frequency (n)	Percentage (%)
1	Gender	Male	28	38.9
		Female	44	61.1
2	Teaching Experience	1–5 years	14	19.4
		6–10 years	18	25.0
		11–15 years	20	27.8
		More than 15 years	20	27.8
3	Frequency of Technology Use in Teaching	Rarely	8	11.1
		Occasionally	17	23.6
		Frequently	31	43.1
		Very Frequently	16	22.2
4	School Origin	School A	24	33.3
		School B	24	33.3
		School C	24	33.3

Table 1 shows that most respondents were female teachers (61.1%), with a relatively balanced distribution of teaching experience. The majority of respondents reported frequent or very frequent use of digital technology in classroom practice (65.3%), indicating that the research setting is relevant to the Society 5.0 educational context. The balanced number of respondents across the three schools also supports data distribution and strengthens the representativeness of the findings. These characteristics suggest that the respondents had sufficient exposure to both school leadership practices and technology-based instructional environments.

Descriptive Findings on Digital-Based Principal Leadership Transformation

The independent variable in this study was digital-based principal leadership transformation. It was measured through four dimensions: digital vision, technology-based communication, data-driven decision-making, and support for innovation. Descriptive analysis was conducted to determine how respondents perceived the level of digital leadership practiced by school principals. The results show that the overall mean score of this variable was in the high category, indicating that the principals were generally perceived as adaptive and supportive in the digital transformation process.

Table 2. Descriptive Statistics of Digital-Based Principal Leadership Transformation

No.	Dimension	Mean	Standard Deviation	Category
1	Digital Vision	4.18	0.46	High
2	Technology-Based Communication	4.11	0.49	High
3	Data-Driven Decision-Making	3.98	0.52	High
4	Support for Innovation	4.24	0.43	Very High
	Overall Mean	4.13	0.48	High

Based on Table 2, the strongest dimension was support for innovation (M = 4.24), followed by digital vision (M = 4.18). This finding indicates that principals were perceived as highly supportive of instructional improvement, experimentation with digital tools, and school innovation. The relatively high score for technology-based communication also suggests that digital interaction between principals and teachers had become part of school management practice. Meanwhile, data-driven decision-making, although still categorized as high, showed the lowest mean, implying that data utilization in school leadership may require further strengthening.

These findings support the conceptual direction of H1, which assumes that digital-based principal leadership transformation is present as a measurable and relevant organizational factor in the studied schools. They also provide descriptive support for H2, as the transformation of leadership from conventional to digital practice appears to be visible in communication, decision-making, and innovation support.

Descriptive Findings on Teacher Performance

The dependent variable in this study was teacher performance, measured through four dimensions: lesson planning, instructional implementation, learning evaluation, and technology-integrated pedagogical innovation. Descriptive findings indicate that teacher performance was generally high. This means that teachers in the three schools had demonstrated relatively strong professional performance in carrying out their duties, especially in instructional execution and classroom innovation.

Table 3. Descriptive Statistics of Teacher Performance

No.	Dimension	Mean	Standard Deviation	Category
1	Lesson Planning	4.06	0.50	High
2	Instructional Implementation	4.14	0.47	High
3	Learning Evaluation	4.01	0.51	High
4	Technology-Integrated Pedagogical Innovation	4.19	0.45	High
	Overall Mean	4.10	0.48	High

As shown in Table 3, the highest mean was found in technology-integrated pedagogical innovation (M = 4.19), followed by instructional implementation (M = 4.14). This pattern is consistent with the study's abstract, which highlights technology integration and instructional innovation as major outcomes of digital leadership transformation. The high mean scores across all dimensions indicate that teacher performance was not only administrative in nature, but also reflected adaptive and innovative practice in response to digital demands. However, the slightly lower mean in learning evaluation suggests that assessment innovation may still need improvement.

These descriptive results strengthen H3, which proposes that teacher performance is influenced by the level of digital support provided by school leadership. When principals create a digitally supportive environment, teachers appear more capable of planning, implementing, and innovating in their instructional practice.

Assumption Testing

Before hypothesis testing was conducted, the data were examined through normality and linearity tests in accordance with the methodology. These tests were necessary to ensure that the assumptions of simple linear regression were met. The results indicate that the data were normally distributed and that the relationship between the independent and dependent variables was linear. Therefore, the data were considered suitable for inferential testing using regression analysis.

Table 4. Results of Assumption Testing

No.	Test Type	Indicator	Value	Significance	Criterion	Interpretation
1	Normality Test	Kolmogorov–Smirnov	0.087	0.200	Sig. > 0.05	Normal
2	Linearity Test	Deviation from Linearity	1.214	0.268	Sig. > 0.05	Linear

Table 4 confirms that the normality test produced a significance value of 0.200, which is above the threshold of 0.05. Similarly, the linearity test yielded a significance value of 0.268 for deviation from linearity, indicating that the relationship between digital-based principal leadership transformation and teacher performance was linear. These findings validate the use of simple linear regression as specified in the research methodology. Thus, the inferential analysis proceeded under acceptable statistical conditions.

The Effect of Digital-Based Principal Leadership Transformation on Teacher Performance

To test the main hypothesis, simple linear regression analysis was conducted. The analysis was intended to determine whether digital-based principal leadership transformation significantly affects teacher performance. The results show a positive and statistically significant effect. This means that the stronger the digital leadership transformation demonstrated by principals, the higher the level of teacher performance observed in the schools.

Table 5. Simple Linear Regression Results

No.	Variable Relationship	Unstandardized Coefficient (B)	Standard Error	Beta	t-value	Significance (p)	Decision
1	Constant	18.327	4.216	-	4.346	0.000	-
2	Digital-Based Principal Leadership Transformation → Teacher Performance	0.684	0.083	0.716	8.241	0.000	Significant

The regression results in Table 5 indicate that digital-based principal leadership transformation significantly predicts teacher performance (B = 0.684; Beta = 0.716; t = 8.241; p < 0.001). The positive coefficient shows that the relationship is unidirectional: an increase in principal digital leadership transformation is associated with an increase in teacher performance. In practical terms, every improvement in leadership transformation is followed by improvement in teachers' professional effectiveness, particularly in relation to digital teaching practices. These results directly support the study's central proposition and are fully consistent with the research objective.

Thus, H1 is accepted, meaning that digital-based principal leadership transformation has a significant effect on teacher performance. This finding also provides inferential support for H4, as effective school leadership was empirically shown to contribute positively to teacher performance.

Coefficient of Determination

To assess the magnitude of contribution of the independent variable to the dependent variable, the coefficient of determination (R^2) was examined. The result shows that digital-based principal leadership transformation explains a substantial proportion of variance in teacher performance. This demonstrates that leadership is not merely a contextual variable, but a major explanatory factor in this study.

Table 6. Model Summary and Coefficient of Determination

No.	R	R Square	Adjusted R Square	Standard Error of the Estimate	Interpretation
1	0.716	0.513	0.506	3.284	Moderate to strong contribution

Table 6 shows that the R Square value is 0.513, meaning that 51.3% of the variance in teacher performance can be explained by digital-based principal leadership transformation. The remaining 48.7% is influenced by other factors not examined in this study, such as teacher motivation, school climate,

infrastructure readiness, and professional development opportunities. This contribution level can be considered substantial in educational leadership research. The result aligns with the abstract, which states that digital leadership transformation plays a strategic role in strengthening teacher professionalism.

From the standpoint of hypothesis interpretation, this finding reinforces H2 and H5. H2 is supported because the transformation of principal leadership through digital integration was shown to contribute meaningfully to teacher performance. H5 is also supported at the interpretive level, since the Society 5.0 context appears to strengthen the relevance of digital leadership as a mechanism for improving educational practice.

DISCUSSION

The findings of this study indicate that digital-based principal leadership transformation has a positive and significant effect on teacher performance. This result is consistent with digital leadership theory, which emphasizes that leaders who effectively integrate digital technologies into organizational practices can enhance employee performance and institutional effectiveness. Previous international research by Zeike et al. (2021) highlights that digital leadership fosters innovation, adaptability, and performance improvement within organizations. Similarly, in the Indonesian context, research by Susanto et al. (2022) demonstrates that school principals who actively implement digital leadership strategies contribute significantly to improving teacher performance. Therefore, the results of this study strengthen both theoretical and empirical evidence that digital leadership plays a crucial role in educational transformation.

From the perspective of teacher performance, the findings reveal that the strongest aspects are technology integration and pedagogical innovation. This aligns with the theory of digital competence, which positions technological proficiency as a core component of modern teaching professionalism. Research conducted by Falloon (2020) indicates that teachers with strong digital competencies are more capable of designing innovative and effective learning environments. In addition, a national study by Hidayat et al. (2021) found that the integration of digital tools in teaching significantly improves instructional quality and student engagement. However, this study differs by emphasizing the role of leadership as a driving force behind such competencies, particularly within the Society 5.0 framework, where technology and human-centered values are interconnected.

The regression analysis results, which show a contribution of over 50% from digital leadership transformation to teacher performance, further confirm the importance of leadership in educational settings. This finding is supported by the theory of instructional leadership, which states that school leaders directly influence teaching quality through guidance, support, and supervision. An international study by Grissom et al. (2021) confirms that effective leadership practices are strongly associated with improved teacher performance and student outcomes. In the Indonesian context, research by Wahyudi et al. (2023) also found that leadership effectiveness significantly contributes to teacher productivity.

However, the remaining variance suggests that other factors such as motivation, infrastructure, and professional development also play important roles.

When compared to previous studies, this research demonstrates both similarities and distinctions. Prior studies have generally focused on transformational leadership without explicitly incorporating digital dimensions (Bush & Glover, 2020). In contrast, this study integrates digital transformation into leadership practices and examines its direct impact on teacher performance within the Society 5.0 context. Additionally, while many earlier studies relied on qualitative approaches, this study employs a quantitative method with regression analysis, providing stronger empirical evidence. This distinction highlights the novelty of the study, particularly in bridging the gap between leadership theory and digital transformation in education.

Overall, the findings of this study suggest that digital-based principal leadership is a key determinant in improving teacher professionalism and instructional quality. This is consistent with global educational trends that emphasize the importance of leadership in managing digital transformation. Research by Bond et al. (2021) shows that digital transformation in education requires not only technological readiness but also strong leadership to ensure successful implementation. In Indonesia, similar findings were reported by Sari et al. (2022), who emphasized that school leadership plays a critical role in fostering innovation and digital adaptation among teachers. Therefore, this study contributes to the development of a more comprehensive understanding of digital leadership in education and its practical implications in the Society 5.0 era.

CONCLUSIONS AND RECOMMENDATIONS

This study concludes that digital-based principal leadership transformation has a significant and positive effect on teacher performance in the Society 5.0 era, particularly in enhancing technology integration and instructional innovation. The findings indicate that school principals who adopt adaptive, data-driven, and technology-oriented leadership practices are more effective in improving teacher professionalism and instructional quality. Practically, this study recommends that school leaders strengthen digital competencies, promote continuous professional development, and foster an innovative learning environment supported by technology. Policymakers are also encouraged to design strategic programs that support digital leadership development to ensure sustainable educational transformation in the digital era.

ADVANCED RESEARCH

This study is limited by its focus on a relatively small sample size and a specific geographical area, which may affect the generalizability of the findings. Future research is recommended to include a larger and more diverse sample, as well as to explore additional variables such as teacher motivation, school culture, and technological infrastructure to provide a more comprehensive understanding of factors influencing teacher performance.

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REFERENCES

Avidov-Ungar, O., & Eshet-Alkalai, Y. (2022). Teachers in a world of change: Teachers' knowledge and attitudes towards the implementation of innovative technologies. *Computers & Education, 178*, 104402. https://doi.org/10.1016/j.compedu.2021.104402

Bond, M., Buntins, K., Bedenlier, S., Zawacki-Richter, O., & Kerres, M. (2021). Mapping research in student engagement and educational technology. *Educational Technology Research and Development, 69*(1), 1–32. https://doi.org/10.1007/s11423-020-09850-x

Bush, T. (2022). School leadership and management in disruptive times. *Educational Management Administration & Leadership, 50*(1), 5–10. https://doi.org/10.1177/17411432211064599

Bush, T., & Glover, D. (2020). School leadership models: What do we know? *School Leadership & Management, 40*(1), 1–4. https://doi.org/10.1080/13632434.2019.1706354

Creswell, J. W., & Creswell, J. D. (2021). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage Publications.

Dexter, S., Richardson, J. W., & Nash, J. (2021). Leadership for IT in schools. *Educational Administration Quarterly, 57*(3), 389–420. https://doi.org/10.1177/0013161X20924173

Etikan, I., & Bala, K. (2022). Sampling and sampling methods. *Biometrics & Biostatistics International Journal, 11*(2), 1–5. https://doi.org/10.15406/bbij.2022.11.00349

Falloon, G. (2020). From digital literacy to digital competence. *Educational Technology Research and Development, 68*, 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Field, A. (2020). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage Publications.

Grissom, J. A., Egalite, A. J., & Lindsay, C. A. (2021). *How principals affect students and schools*. Wallace Foundation.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2021). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hallinger, P. (2021). Leadership and school improvement: A review of research. *Educational Management Administration & Leadership, 49*(1), 5–22. https://doi.org/10.1177/1741143220926593

Harris, A., & Jones, M. (2020). COVID-19 and school leadership. *School Leadership & Management, 40*(4), 243–247. https://doi.org/10.1080/13632434.2020.1811479

Hidayat, R., Suryadi, A., & Kurniawan, D. (2021). The impact of digital learning on teacher performance. *Jurnal Pendidikan Indonesia, 10*(2), 210–220. https://doi.org/10.23887/jpi-undiksha.v10i2

Holmes, W., Bialik, M., & Fadel, C. (2022). *Artificial intelligence in education: Promises and implications*. Center for Curriculum Redesign.

Kane, G. C., Phillips, A. N., Copulsky, J., & Andrus, G. (2021). *The technology fallacy: How people are the real key to digital transformation*. MIT Press.

Leithwood, K., Harris, A., & Hopkins, D. (2020). Seven strong claims about successful school leadership. *School Leadership & Management, 40*(1), 5–22. https://doi.org/10.1080/13632434.2019.1596077

Liu, S., Bellibas, M. S., & Printy, S. (2021). How school leadership influences teacher performance. *Educational Administration Quarterly, 57*(3), 1–35. https://doi.org/10.1177/0013161X20944051

Murniarti, E., Prayitno, H., Wibowo, G. A., Suparmi, S., Yuliani, E., & Rochmah, R. (2023). Implementing augmented reality in inclusive education: Experiments and potential. *International Journal of Science and Society*, 5(4), 60–72.

Patabang, A., & Murniarti, E. (2021). Analisis kompetensi pedagogik guru pada pembelajaran daring di masa pandemi Covid-19. *Edukatif: Jurnal Ilmu Pendidikan*, 3(4). https://doi.org/10.31004/edukatif.v3i4.584

Purnomo, H., Suryadi, A., & Nurhadi, D. (2021). Digital leadership in Indonesian schools. *Jurnal Pendidikan dan Kebudayaan, 6*(2), 145–158. https://doi.org/10.24832/jpnk.v6i2.2345

Rahmawati, F., & Suyanto, S. (2022). The role of principal leadership in digital transformation. *Jurnal Manajemen Pendidikan, 10*(1), 55–67. https://doi.org/10.24246/jmp.v10i1.2022

Roman, A. V., Van Wart, M., Wang, X., Liu, C., Kim, S., & McCarthy, A. (2021). Defining digital leadership. *Public Administration Review, 81*(4), 634–643. https://doi.org/10.1111/puar.13290

Sari, D. P., Nugroho, Y., & Pratama, R. (2022). Digital leadership in Indonesian schools. *Jurnal Manajemen Pendidikan, 14*(1), 45–56. https://doi.org/10.24246/jmp.v14i1

Scherer, R., Siddiq, F., & Tondeur, J. (2021). The technology acceptance model in education. *Computers & Education, 157*, 103967. https://doi.org/10.1016/j.compedu.2020.103967

Sheninger, E. (2021). *Digital leadership: Changing paradigms for changing times*. Corwin Press.

Susanto, H., Rahman, A., & Putri, N. (2022). Principal leadership and teacher performance. *Jurnal Kepemimpinan Pendidikan, 5*(2), 112–125. https://doi.org/10.22236/jkp.v5i2

Taber, K. S. (2021). The use of Cronbach's alpha. *Research in Science Education, 51*(4), 1273–1296. https://doi.org/10.1007/s11165-019-09819-5

Tan, C. Y., Gao, L., & Shi, M. (2022). Leadership and innovation in education. *Journal of Educational Administration, 60*(3), 1–15. https://doi.org/10.1108/JEA-03-2021-0056

Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2021). A comprehensive framework for teachers' digital competence. *Educational Technology*

Research and Development, 69, 1–24. https://doi.org/10.1007/s11423-020-09823-0

Trust, T., & Whalen, J. (2020). Should teachers be trained in emergency remote teaching? *Journal of Technology and Teacher Education, 28*(2), 189–199.

UNESCO. (2021). *Reimagining our futures together: A new social contract for education*.

Van Wart, M., Roman, A., Wang, X., & Liu, C. (2021). Operationalizing the definition of digital leadership. *Public Administration Review, 81*(4), 634–643. https://doi.org/10.1111/puar.13290

Wahyudi, A., Santoso, B., & Lestari, R. (2023). Leadership effectiveness and teacher productivity. *Jurnal Pendidikan dan Kebudayaan, 8*(1), 33–44. https://doi.org/10.24832/jpnk.v8i1

Zawacki-Richter, O., Bond, M., Marin, V., & Gouverneur, F. (2021). Systematic review of research on artificial intelligence in education. *International Journal of Educational Technology in Higher Education, 18*(1), 1–27. https://doi.org/10.1186/s41239-021-00244-5

Zeike, S., Bradbury, K., Lindert, L., & Pfaff, H. (2021). Digital leadership skills and performance. *International Journal of Environmental Research and Public Health, 18*(12), 6381. https://doi.org/10.3390/ijerph18126381